

Impacts of WTO Policy Reforms on U.S. Rice

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Abstract

Consequences of the WTO ruling on the Brazilian cotton case for commodities in the U.S. in addition to cotton are of concern. This paper uses the global GTAP model to provide a preliminary assessment of the consequences for U.S. rice if the ruling had applied in 2001. Two scenarios are estimated with a 36% and 100% elimination in the PSE on U.S. rice in 2001. The results show that if loan deficiency payments, production flexibility contract payments and market loss assistance payments along with export credits were reduced or eliminated the U.S. rice industry would be significantly and negatively affected. The results should be received with caution since the PSE peaked at 52 percent in 2001 and has averaged 32 percent over the past 10 years.

Impacts of WTO Policy Reforms on U.S. Rice

A number of WTO issues are likely to influence U.S. rice policy in the future. The July, 2004 Framework, while still vague, provides enough information to suggest that additional reform in domestic support, export subsidies and market access will impact on the U.S. rice policy and market opportunities. In addition, several U.S. domestic programs that apply to rice are under scrutiny after the findings by the WTO Dispute Panel in the cotton case brought by Brazil against the U.S. (WT/DS267). The report of the panel, released on September 2004, found that several U.S. programs such as counter-cyclical payments and export credit guarantees under the GSM 102, GSM 103 and SCGP export credit guarantee programs are in violation of several articles of the Agreement on Agriculture. The panel recommends that the U.S. withdraw the prohibited subsidies without delay.

On October 14th, 2004, the U.S. presented an appeal to review the findings of the panel, arguing the programs under question are in compliance with the statements in the Agreement of Agriculture. However the appellate body's report issued on March 3, 2005 upheld essentially all of the findings in favor of Brazil's claims. With respect to rice the findings of relevance include: 1) the export credit guarantee programs were prohibited subsidies, 2) the counter-cyclical and direct payment programs, by prohibiting production of fruits and vegetables on base land eligible for payments can not be notified as green box. Regardless of the final results of this case, the objective of this paper is to estimate the potential effects of bringing the U.S. domestic programs in compliance with the Dispute Panel findings.

Partial equilibrium analysis of the impacts on the U.S. and global rice economy has been analyzed using the Arkansas Global Rice Model. This model specifies the U.S. price and income support mechanisms directly in the supply response models for the U.S. Simulations of the model under current and alternative program expenditures in previous studies have provided information on the impact of “prejudice” on the global rice economy from U.S. subsidies.

The general equilibrium analysis is done using the Global Trade Analysis Project (GTAP) model developed by the Center for Global Trade Analysis at Purdue University, and the GTAP 6.0 beta version database provided by the same source. This database represents the situation of the global economy as of 2001. Domestic support to agriculture is represented in this database by the rates of total domestic support and the percentage shares of output subsidies, intermediate input subsidies, land-based payments, and capital-based payments to total domestic support.

The potential impact of a reduction in the budget devoted to specific programs such as direct payments as determined by the Dispute Panel in the case WT/DS267 are simulated by shocking the different variables of support cited above. Reduction of expenditures on counter-cyclical payment and direct payment programs are simulated by shocking the level of output subsidies. Reduction in export subsidy expenditures are simulated by shocking the export subsidy variable defined in GTAP. Results are presented for the rice sector and related factor markets.

According to the Dispute Panel, loan rate gains, loan deficiency payments, marketing loan payments, certificate exchange gains, CCC commodity loan interest gains, and counter-cyclical payments are not decoupled based on the provisions in Annex

2 of the Agreement on Agriculture (AA), since their expenditures are related to prices applying to production undertaken after the base period. The Panel also found that the Direct Payment program is not decoupled given that the amount of such payments is related to the type of production undertaken in any year after the base period. Therefore, by not being decoupled, these programs are in violation of article 13(a)¹ and, when included in the estimation of AMS, in violation of article 13(b.ii)². These findings raised concerns about the situation of other commodities receiving domestic support and export subsidies and the potential for legal disputes.

This study assesses the potential impact of reducing expenditures in those programs for other commodities besides cotton. The first scenario considers a 30 percent decrease in payments done under the programs above for rice, wheat, cereals, oilseeds, and sugar.

Previous research on trade liberalization in rice

Previous analysis of trade liberalization in rice has found that the most significant trade policy distortions are tariffs in developing countries on long grain rice and tariff rate quotas (TRQs) in developed northeast Asian countries on medium grain trade (Wailes, 2005). The analysis has examined the relative contribution to distortion in trade volume and world reference prices from export subsidies, domestic supports, and import tariffs and TRQs.

The effects of domestic price supports and trade policy were captured in the supply and demand framework of AGRM (Arkansas Global Rice Model). For this study, policy interventions in rice supply that were trade-distorting (“amber box” in WTO

¹ Namely, these programs are not exempt from reduction commitments as stated in Annex 2 of AA.

² Namely, the granted support to a specific commodity exceeds the level decided during the 1992 marketing year.

parlance) were removed. At the time of this analysis, direct payments and counter-cyclical payments were not included in the trade-distorting set of policy interventions. To place the impacts of the removal of domestic policies on rice trade in perspective, the model was also simulated for the removal of import tariffs and export subsidies as well. Finally the AGRM was used to examine the net effect of the combination of policy reforms including domestic support, import protection and export subsidies.

The AGRM baseline global trade projections were 27.9 mmt in 2005 increasing to 33.6 mmt by 2012. The world reference export price of long grain is the Thai 100 percent B and the reference export price for medium grain is the US California No. 2 Medium grain price. Long grain prices in the baseline begin at USD 232/mt in 2005 and increase to USD 277/mt by 2012. Medium grain prices increase from USD 332/mt in 2005 and increase to USD 406 by 2012.

The impact on global rice trade from the removal of tariffs dominates all policy reform scenarios. Trade increases by 3.5 mmt in 2005 and continues to expand over time to 5.3 mmt above the baseline. The removal of export subsidies reduces global rice trade in the short-term by 720 thousand mt but the effect in the long term is negligible. Taken together, removal of import tariffs and export subsidies, the effect on global rice trade is swamped by the tariff effects. Trade is higher in 2005 by 2.7 mmt and by 2012 higher by 5.2 mmt. Elimination of domestic supports in the United States, the European Union and Japan reduces trade very slightly and not at all over the longer term. The combined effect of the removal of tariff barriers, export subsidies, and domestic supports increases trade by 2.4 mmt in 2005 and by 4.9 mmt by 2012.

The impact on global export prices follows the impact on trade with the dominant impact on prices resulting from removal of import tariffs. The long grain price is higher in the short term by USD 23/mt and in the longer term by USD 43/mt. In the more highly protected medium grain market, tariff removal causes prices to be higher by USD 291/mt in 2005 and by USD 340/mt by 2012. The impact of removal of export subsidies is important only in the short term with long grain export prices higher by 6 percent and medium grain prices higher by 5 percent. The removal of domestic supports is negligible throughout the projection period. The aggregate effects of policy reforms, including tariffs, export subsidies and domestic supports is significant for both long grain and medium grain prices. Long grain export prices are higher by 18 to 22 percent. Medium grain prices are higher than baseline projections by 70 to 80 percent.

Methodology

For the current study, the general equilibrium analysis is conducted using the GTAP modeling framework. This is a multi-region, multi-sector computable general equilibrium model, with perfect competition and constant returns to scale. The model is fully described in Hertel (1997). The GTAP 6.0 beta version database is used for this analysis (Dimaranan and McDougall, 2005). It contains detailed bilateral trade, transportation and protection data among regions, linked together with country specific input-output tables. This version of the GTAP database corresponds to the global economy in 2001, and divides the world into 87 regions, 57 sectors, and five primary factors of production (land, unskilled labor, skilled labor, capital, and natural resources). For this application, land and natural resources are considered sluggish whereas labor and capital are considered mobile factors of production. For this application, the database is

aggregated into five regions and ten sectors. The five regions are: U.S., European Union (EU), Japan, the aggregation of all net rice exporters, and the aggregation of all net rice importers besides the EU and Japan. The ten sectors are: paddy rice, milled rice, wheat, cereals³, oilseeds⁴, sugar, food, manufactures, services, and capital goods. Demand elasticity parameters are adjusted based on desired elasticity values. The mobility of sluggish production factors, mainly land, across sectors is expected to affect the results. Returns to factors of production are expected to decrease in those sectors affected by output subsidy reduction; the more mobile the factors, the lower the reduction in returns. The elasticity of transformation for land is set at -0.5 . Systematic sensitivity analysis⁵ is performed on this parameter to analyze the reliability of the results, assuming that the magnitude of the elasticity of transformation for land varies normally by 0.4 from the mean.

Unilateral reduction of domestic support and export subsidies by the US is possible but highly unlikely. It seems appropriate to also assess the potential EU reduction in domestic support and export subsidies for paddy rice, wheat, cereals, oilseeds, and sugar. The assumption here is that the EU will follow the US and reduce its output subsidy and export subsidy expenditures by the same level. It is also desirable to evaluate the effects of tariff and TRQ reform but that analysis is beyond the scope of this paper.

This study assesses the potential impact of reducing expenditures in the programs subject to expenditure reduction in the cotton case for other commodities as well. The

³ This aggregation includes: corn, barley, rye, oats, and other minor cereals.

⁴ This aggregation includes all oil seeds and oleaginous fruits.

⁵ GTAP utilizes the Gaussian Quadrature technique for generating systematic sensitivity analysis. For more on systematic sensitivity analysis see Hertel et al (2004).

first scenario considers a 36 percent decrease in payments (2001 producer subsidy equivalents) for rice, wheat, cereals, oilseeds, and sugar. A second scenario considers complete removal of payments under those programs for the same commodities as the first scenario. For each of these scenarios, a complementary reduction in EU expenditures is also simulated. Systematic sensitivity analysis is performed on the elasticity of transformation in each situation to test the reliability of the results with respect to this parameter.

Results

Results are presented by scenario and mainly for the US rice sector. Table 1 below presents a summary of the impact of the different scenarios on some key sectoral variables.

36 Percent Reduction in Output and Export Subsidy Expenditures by the US

The unilateral US reduction in output subsidy expenditures by 36 percent is expected to generate an estimated 24 percent decrease in the value of rice production, most of which is likely to be explain by volume (20 percent decrease) rather than supply price (5 percent) reductions. The domestic market and export prices for US paddy rice are expected to increase by around 9.9 percent as a result of the decrease in output subsidies. The value of domestic demand for paddy rice, which at the baseline accounted for 67.3 percent of the total value of paddy production, is estimated to slightly increase by 5.4 percent as a result of an increase in the market price for paddy rice that more than offsets the decrease in the demanded volume. The US food sector, which according to the specification of the GTAP database accounts for 78.6 percent of the value of domestic paddy consumption, is expected to increase its demand for paddy rice by 6.2 percent in

value. The US rice milling sector is expected to also increase its demand for paddy rice by 6.9 percent in value; this increase results despite the 2.7 percent reduction in the volume demanded.

The US is estimated to lose a significant part of its share in the international rice market. While global trade of paddy rice is estimated to remain basically unchanged, the US volume and price of paddy exports are estimated to change by –53.7 percent and 9.9 percent, respectively. The value of US milled exports is expected to change only marginally since the percentage increase in export prices practically offsets the decrease in export volume.

By virtue of the zero profit assumption in GTAP, most of the impact of a supply price reduction is expected to be transmitted into the price of the sluggish factor, in this case land, thus adjusting the cost of production to the revenues generated by the rice sector. Rent for rice land in the US is expected to decrease by approximately 45.1 percent, while price for other factors of production such as skilled and unskilled labor and capital is estimated to remain practically unchanged. It is also estimated that the amount of land devoted to rice is likely to decrease by 15.0 percent.

Overall, the policy changes suggested in this scenario are estimated to increase US welfare, as measured by equivalent variation, by USD 705 million, most of which results from allocative efficiency and term of trade gains.

The results from the systematic sensitivity analysis on the elasticity of transformation indicate that the simulation findings are robust, with values for all key variables being significant at the 99 percent level.

36 Percent Reduction in Output and Export Subsidy Expenditures by the US and the EU

Results for the US rice industry from this scenario are very similar to those obtained in the first scenario. The reductions in subsidy expenditures suggested for the EU are not expected to generate significant changes either in EU's value of rice output and value of rice imports obtained in the previous scenario or in the EU derived and direct demands for rice. According to the GTAP database, rice output in the EU was taxed, not subsidized, during the baseline period and it was mainly for domestic use. Thus, a reduction in export subsidies is expected to affect this sector only slightly, whereas a reduction in output subsidies granted to other sectors such as oilseeds and cereals is expected to free resources from the subsidized sectors, increasing the supply and reducing factor prices, mainly land rent, in the EU rice sector. The value of US rice production is estimated to decrease by approximately 24.2 percent, a slightly lower decrease than for the previous scenario. Both derived and direct domestic demands for paddy and milled rice in the US are estimated to remain roughly unchanged compared with the results from the previous scenario.

The US welfare is expected to be also marginally increased by 2.6 percent from the previous scenario, with allocative efficiency and term of trade gains being the most significant.

Table 1. Impact of each scenario on key domestic and global variables describing the US and international rice sector.

<i>Volume</i>	36 percent reduction on US output subsidies						100 percent reduction on US output subsidies					
	US unilateral reduction			36 % EU reduction			US unilateral reduction			100 % EU reduction		
	SSA results			SSA results			SSA results			SSA results		
	Base	Mean	SD	Base	Mean	SD	Base	Mean	SD	Base	Mean	SD
US Paddy rice production	-20.3%	-20.1%	1.2	-20.3%	-20.1%	1.2	-54.8%	-54.7%	1.2	-54.8%	-54.6%	1.2
US paddy exports	-53.7%	-53.2%	3.0	-53.8%	-53.3%	3.0	-98.8%	-98.7%	0.2	-98.8%	-98.7%	0.2
US paddy imports	52.7%	52.0%	5.2	52.8%	52.1%	5.2	668.6%	663.8%	42.8	667.5%	662.7%	43.0
US rice milling output	-0.3%	-0.3%	0.0	-0.3%	-0.3%	0.0	-2.0%	-2.0%	0.1	-2.0%	-2.0%	0.1
US milled rice exports	-1.0%	-0.9%	0.1	-0.9%	-0.9%	0.1	-6.5%	-6.4%	0.3	-6.3%	-6.3%	0.3
US milled rice imports	0.6%	0.6%	0.1	0.6%	0.6%	0.1	3.7%	3.7%	0.2	3.7%	3.6%	0.2
Global paddy rice trade	-1.7%	-1.7%	0.0	-1.6%	-1.6%	0.0	6.2%	6.1%	0.7	6.6%	6.5%	0.8
Global milled rice trade	0.1%	0.1%	0.0	0.1%	0.1%	0.0	0.1%	0.1%	0.0	0.2%	0.2%	0.0
<i>Commodity Prices</i>												
US paddy supply price	-5.0%	-5.1%	0.7	-5.0%	-5.1%	0.7	-12.0%	-12.1%	1.4	-11.9%	-12.0%	1.4
US paddy market and f.o.b. price	9.9%	9.7%	0.8	9.9%	9.8%	0.8	63.5%	63.2%	2.6	63.7%	63.4%	2.6
US milled rice price	0.4%	0.4%	0.0	0.4%	0.4%	0.0	2.0%	2.0%	0.1	2.1%	2.1%	0.1
Paddy rice world price index	1.1%	1.0%	0.0	1.1%	1.1%	0.0	2.3%	2.4%	0.1	2.4%	2.4%	0.1
Milled rice world price index	0.1%	0.1%	0.0	0.2%	0.2%	0.0	0.5%	0.5%	0.0	0.5%	0.5%	0.0
<i>Endowment Use in the US rice sector</i>												
Land	-15.0%	-14.6%	2.5	-15.0%	-14.6%	2.2	-42.9%	-42.0%	4.4	-43.0%	-42.1%	4.3
Labor and capital	-22.0%	-21.8%	1.0	-22.0%	-21.9%	1.0	-57.4%	-57.3%	0.8	-57.3%	-57.2%	0.8
<i>Price of Endowments in the US</i>												
Rice land rent	-30.4%	-31.0%	4.0	-30.2%	-30.8%	4.0	-70.5%	-71.2%	6.6	-70.2%	-70.9%	6.7
Wages and rate of return	0.0%	0.0%	1.0	0.0%	0.0%	0.0	-0.1%	-0.1%	0.0	0.0%	0.0%	0.0

100 Percent Reduction in Output and Export Subsidy Expenditures by the US

As expected, the impact of total removal of US output and export subsidies on the US rice industry is estimated to be significant. The unilateral US reduction in output subsidy expenditures by 100 percent is expected to generate an estimated 60.2 percent decrease in the market returns from rice production, with volume rather than price explaining most of the reduction. However, when balanced with the changes in output subsidy expenditures, the market value of the US rice production is estimated to decrease but only by 26 percent. The domestic market and export prices for US paddy rice are expected to increase by around 63.5 percent as a result of the decrease in output and export subsidies. The value of domestic demand for paddy rice is estimated to increase by approximately 8.7 percent as a result of the significant increase in the market price for paddy rice that more than offsets the decrease in the demanded volume. It is again the US food sector, given its large share, the one driving the increase in derived demand for paddy rice; this sector is expected to increase its demand by an estimated 9.7 percent in value. The US rice milling sector is expected to also increase its demand for paddy rice by 19.7 percent in value.

The US is estimated to lose its share in the international paddy rice market almost completely. This would likely generate an estimated 2.2 percent increase in the world price of paddy, which in turn would materialize into an increase of approximately 6.2 percent in the volume of paddy rice traded internationally. The value of US milled exports is expected to change only marginally by an estimated 4.6 percent. The international market for milled rice is expected to be affected only marginally as well.

Rent for rice land in the US is expected to decrease by approximately 70.5 percent, while price for other factors of production such as skilled and unskilled labor and capital is estimated to remain practically unchanged. It is also estimated that the amount of land devoted to rice is likely to decrease by 42.9 percent. Such large reductions reflect the relevance of output subsidies to the rice sector (according to the GTAP database, 46 percent of the value of production), and the distortion these subsidies generate in the sluggish factor market.

The US welfare is expected to increase significantly by USD 1,535 million from the baseline as a result of the removal of output and export subsidies. Allocative efficiency gains account for roughly 66 percent of the welfare gains.

As for the scenarios above, the results from the systematic sensitivity analysis on the elasticity of transformation indicate that the simulation findings are robust, with values for all key variables being significant at the 99 percent level.

100 Percent Reduction in Output and Export Subsidy Expenditures by the US and the EU

Results for the US rice industry from this scenario are very similar to those obtained in the first scenario. The simultaneous reduction in subsidy expenditures suggested for the EU is expected to have only marginal impact in the key US rice variables analyzed here. In general, the EU elimination of output and export subsidies will slightly alleviate the dramatic impact of US subsidy removal. The value of domestic demand for paddy rice in the US is expected to increase by around 9 percent from the baseline, again driven by the food and rice milling sectors. The output value of the EU rice sector is expected to actually rise by 6.45 percent as a result of the policy changes

assumed in this scenario, again due to the elimination of distortions in the market for sluggish factors of production (1 percent decrease in rice land rents) that stimulates the expansion in production.

As estimated for the previous scenario involving EU subsidy reduction, US welfare is expected to increase as a result of EU subsidy removal by an estimated 6.5 percent, with the same components dominating the increase, namely allocative efficiency and term of trade gains.

Limitations

The model results are based on comparative static analysis and therefore dynamic response in world prices and trade as a result of unilateral U.S. policy reforms is not estimated. As such, the findings of this study are very limited and may be considered a worst case scenario of responding to the ruling of the Brazilian cotton case ruling.

This study has the objective of providing some insight regarding the impact of output and export subsidies removal on the US rice industry. Results are shown mainly for the US rice industry; however, nothing is said about the welfare of the rice sector. Partial equilibrium analysis usually utilizes producer and consumer surplus as measures of sectoral welfare. Welfare in GTAP is analyzed using the equivalent variation approach at the country level. Modifications of the GTAP model can be done to get a sectoral equivalent variation measure that will greatly enrich the findings of this study.

Conclusions

The findings reported in this study are very preliminary and extreme. Compared to previous research on trade liberalization, analysis of domestic support reform showed relatively small impacts. The previous analysis however did not include counter-cyclical and direct payments in the domestic support reform framework. In this study, the effects of domestic support and export credit reform in the U.S. are based on levels that existed in 2001. World prices were extremely low in 2001 and consequently, the PSE estimate for the U.S. was at an all time high of 52 percent, compared to an average of 32 percent over the 1996-2003. The general equilibrium analysis suggests that the US rice sector would likely experience significant losses as a result of a reduction or total elimination of export, price and income subsidies. U.S. rice production will significantly decrease, and the U.S. will likely give up a very large part of its international market share to the point of becoming a net importer of rice. Domestic rice demand is expected to increase driven by an increase in the derived demand by the food sector. Simultaneous subsidy reduction in the EU is likely to have only a marginal effect on the US rice sector.

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