The Economic Impacts of WTO Accession by Uzbekistan – Preliminary Assessment and Recommendations for Future Work

Report by

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April 20, 2004

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Paper prepared for BearingPoint-Abt Associates under Contract No. PCE-I-807-99-00005 for the U.S. Agency for International Development, the Tax/Fiscal Reform Project for the Government of Uzbekistan. Vernon Roningen is economic consultant and developer of VORSIM, software for economic modeling in Microsoft Excel, headquartered in Arlington, Virginia USA. Dean DeRosa is principal economist of ADR International Ltd., an economic research and policy-consulting firm located in Falls Church, Virginia USA. Roningen and DeRosa are both members of Potomac Associates, a consortium of independent consulting firms specializing in trade policy analysis and capacity building projects for developing countries.

We are very grateful to many people in Uzbekistan who provided guidance, data, translation services, and insights into the economy. David Martin, the head of the BearingPoint mission in Tashkent provided excellent support for the project. Dr. Sergey Chepel and M Katinova of the Center for Effective Economic Policy (CEEP) and Farhod Jurahanov of the Ministry of the Economy provided data along with insightful questions and comments which guided our work. Boris Korotkov skillfully solved our computer problems. Eshref Trushin and Bakhodir Mardonov provided economic advice, coordinated our work with CEEP, and provided Russian translation for meetings and seminars. Other BearingPoint staff also helped with Russian translation and logistics, making the visit of Vernon Roningen to Tashkent very productive and enjoyable.

Views expressed in this paper are solely those of the authors, and they do not necessarily represent official views of the Uzbekistan Government, the U.S. Agency for International Development, or Abt Associates Inc.

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Executive Summary

The Economic Impacts of WTO Accession by Uzbekistan – A Preliminary Assessment and Recommendations for Future Work

Vernon O. Roningen
Dean A. DeRosa

Accession to the World Trade Organization (WTO) by Uzbekistan imposes requirements on the country's trade policies, especially in regard to making trade policies transparent and principally dependent upon tariffs enforced on a nondiscriminatory, most-favored-nation (MFN) basis. Indeed, WTO encourages members to replace non-tariff restrictions with tariffs, to be bound by the provisions of the General Agreement on Tariffs and Trade (GATT) on the widest possible basis. In observance of the WTO rules and based on economic research, international organizations such as the International Monetary Fund and the World Bank also encourage tariffication of trade restrictions and adoption of relatively uniform tariff rates. Such reforms to trade policies give clear signals about world price movements to domestic firms, make trade policy administration simpler and less prone to corruption, and discourage smuggling and import tax evasion. Strong evidence in many countries over decades shows that more open trade fostered by liberal trade policies encourages economic growth and efficiency, and speeds development.

The government of Uzbekistan should use the reform required for WTO accession as an opportunity for the continuation of a comprehensive reform of its trade and associated economic policies in order to encourage rapid economic growth. As part of WTO accession, the government should develop and improve its capacity for assessing the impact of trade policy changes on the economy, including production, employment, economic benefits for producers and consumers, and government revenue. This paper provides an initial assessment of the economic impacts of WTO accession by Uzbekistan based on application of two economic models: a simple 97 sector trade model and a more complex but aggregate 12 sector trade model. These two models point the way towards improved analysis using a more appropriately disaggregated model of Uzbekistan's trade regime in the future.

Three problems have to be dealt with in assessing the impacts of changes in trade policies in Uzbekistan. First, consistent detailed data on tariff rates, taxes, non-tariff measures, and trade flows are not currently available. Thus, the large economic model had to rely on a 1998 tariff schedule with some modification and had to represent Uzbekistan's trade by reliance on the reported trade of partner countries. The small 12-sector model, on the other hand, relied on trade and protection data compiled by the Center for Effective Economic Policy (CEEP) from a previous study. The tariff measurement problem is highlighted by differences in the average overall tariff found for the two models. Whereas the large model finds an overall import-weighted tariff average of 28% (based on 1998 tariff data), the small model finds an overall import-weighted tariff average of only 16% (based on the CEEP-provided data).

The second problem concerns the measurement of non-tariff barriers (NTBs), i.e., policies other than tariffs that restrict trade. There were no NTB measures for the large model, but CEEP did provide estimates of the frequency of NTBs at the aggregate level. The CEEP estimates suggest that on average, over half of Uzbekistan trade is affected by non-tariff barriers.

The third problem is the formulation of the WTO accession scenario itself, not only to the type and magnitude of trade policy reforms but also possible policy responses that might be needed in response to trade policy reforms. For example, if the lowering of tariffs and removal of non-tariff barriers results in increased imports, unless exports increase an equal amount, a balance of payments deficit will occur. Foreign exchange reserves could be depleted unless the deficit is offset by increased foreign investment, other financial inflows, or some other policy response. One simple policy response would be for the government to allow the real exchange rate to depreciate; decreasing imports by making them more expensive and increasing exports by making them more profitable in local currency, and restoring the balance of payments.

A Preliminary Assessment

A preliminary impact assessment was done with two models by completely removing tariffs and presenting the aggregate results relative to the change in the overall average tariff. The more detailed analysis using the larger economic model indicates that the transport equipment (vehicles), machinery, electronic equipment, and technical apparatus sectors would be the most affected by an across-the-board reduction in tariffs. On average, a 1% across the board reduction in tariffs would lead to a 2.7% increase in imports, a 1.2% decrease in import revenues, and 15 million U.S. dollars in improved economic welfare for consumers; but leaving Uzbekistan with a 46 million U.S.$ balance of payments deficit. However if an exchange rate depreciation of 17% corrected the balance of payments deficit, the import displacement would be cut a third and export sectors such as cotton, minerals, fruit and vegetables and others would increase their output. In this situation, a 1% reduction in all tariffs would only lead to a 0.7% increase in imports and exports but a (larger) 1.9% decrease in revenue. It would also result in a total economic welfare gain of 18 million U.S. dollars with 80% of the gain going to producers and 20% going to consumers on average.

The aggregate analysis using the small economic model (which has 12 sectors - 10 producing traded goods, a lower average tariff, and an equation system that accounts for input costs) indicates that the largest import displacement would occur in the machine building, food products, and consumer goods sectors. However because of the change in export prospects due to lower input costs, the consumer goods, “other” goods, and agricultural sectors would benefit the most. On average, a 1% across-the-board decrease in tariffs leads to a 0.7% increase in imports and a 0.8% increase in exports because of lower production costs owing to the discipline of import competition. Tariff and other Government revenues from imports decrease by 1.4%. Economic welfare increases by 549 million soum with 90% going to producers and 10% to consumers and a balance of payments deficit of 53 million soum ensues. If the removal of tariffs is accompanied by

an exchange rate change to restore the balance of payments, imports and exports are unchanged, government revenues decrease by 2.5%, and economic welfare increases to 585 million soum with the distribution between producers and consumers remaining the same. If, in addition to tariff reductions, non-tariff barriers are also removed, the trade and other economic impacts are more than doubled. A 1% tariff reduction on average yields a 1.9% increase in imports, a 1.1% increase in exports, and a 1.6% decrease in revenues. When an exchange rate change responds to the balance of payments deficit, imports increase only 1.3%; exports increase 2%, and revenues decrease by 2.1%. In this scenario, a 1% decrease in the average tariff results an increase in national economic welfare of 1414 million soum with a similar distribution as before. The economic welfare gain of tariff removal coupled with the removal of non-tariff barriers is 2.4 times that of the scenario where only tariffs are removed.

Two main lessons emerge from this more aggregate analysis. The most important lesson is that non-tariff barriers to trade matter very much for Uzbekistan and that their removal would more than double the economic impacts of tariff reductions on average. The second lesson is that accounting more carefully for input costs results in smaller adverse economic impacts for sectors. If tariff reductions reduce output prices, they may also reduce some input prices, thus mitigating the impact on sector production. Both the detailed and more aggregate models show that the initial tariff levels are crucial in determining the impacts, by sector and in the aggregate, if the exchange rate is allowed to adjust in response to trade policy changes.

In addition, two specific scenarios were requested by CEEP; a liberal scenario in which tariffs were lowered an average of 4.3% and a conservative scenario in which they were raised an average of 1.4%. These two scenarios were simulated with the small 12 sector model; non-tariff barriers were not changed and exchange rates were not used to deal with any resulting balance of payments deficit. On average under the liberal scenario, a 1 % decrease in tariffs resulted in a 0.9% increase in imports, a 0.5% increase in exports, and a 2% decrease in government revenues. On average under the conservative scenario, a 1% increase in tariffs resulted in a 0.3% decrease in imports, a 1.2% decrease in exports, and a 2.7% increase in government revenues. The relative magnitudes of changes in imports, exports, and government revenues in these two scenarios are roughly similar to those of uniform tariff changes; however, they do differ by sector because the changes in tariffs were different for different sectors. This highlights the importance of the distribution of tariff changes between sectors in determining the final impact of changes in trade policy.

Recommendations for Future Work:

1. The most pressing need is for the Uzbekistan government to assemble an up-to-date, consistent set of detailed tariff, vat, excise tax, import and export data, and non-tariff barrier information at the tariff line level covering all traded products. It would also be very helpful if the data set included tariff, vat, and excise tax revenues. Such a comprehensive data set would be very helpful in practical matters regarding the negotiations of WTO accession. Weighted tariff averages could easily be calculated,

specific tariffs could be converted to ad-valorem equivalents, etc. The most difficult challenge is the assessment of the importance of non-tariff trade barriers, possibly with the assistance of industry experts or experts from the WTO or the UNCTAD Trade Information and Analysis System (www.unctad-trains.org). While this assessment is difficult, it is an extremely useful preparatory exercise for WTO negotiations because the WTO encourages the transparency of non-tariff barriers and their ultimate conversion to bound tariffs. If there are available data on domestic and import prices or unit values for products covered by non-tariff barriers, it might be possible to assign a tariff equivalent, i.e., a tariff that could replace them. Finally, if the data set also contained a concordance to domestic sector production and employment data, then trade, tariff, and non-tariff data could be aggregated to the level of the most detailed domestic data available. This would allow much better impact assessment using the model building techniques illustrated in this report.

2. Once an adequate domestic and international data set is prepared, one or more improved models should be constructed, maintained, and upgraded (as data improves) for ongoing impact analyses. For some products, models might rely on even more detailed data than provided in 97 sector model. For other products, sectors might be aggregated. Typically, governments want detail on sectors and products that they feel are more sensitive to trade policy changes. Future models surely should have more detail than the small, 12 sector model employed here, if they are to say anything about specific products or sectors of special interest to the government. Besides questions related to the WTO accession negotiations, CEEP has the economic skills and modeling tools necessary to prepare these improved analytical models for assessing a number of trade policy questions likely to be encountered in the future.

3. In order to provide more comprehensive information about tariff and other government revenues affected by trade policy changes, it would also be useful to construct a model which directly includes domestic production and consumption along with value-added and excise taxes. Trade models can only calculate revenue impacts from changes in trade and tariffs or other taxes on trade, and as the economy more open to world markets, government tax revenues can become an increasing concern and require economy-wide models for analysis.[1]

4. Useful research could be undertaken to estimate or otherwise investigate the parameters for improved trade and economic models. The models used in this report relied on World Bank estimates of trade price elasticities. There may well be parameter values available from other studies and model building efforts for neighboring countries or countries similar to Uzbekistan. As economic transition proceeds in Uzbekistan, and more market-based data becomes available for the country, econometric techniques might be applied to estimate model parameters. For now, however, CEEP will have to rely on available parameter estimates. However sensitivity analysis with respect to key model

[1] An example of a definition of such a model is found in Appendices O, P, and Q. This UZPM model includes equations for domestic production and consumption as well as trade. Trade-offs are modeled for consumer choice between imports and domestic products, the use of imports versus domestic products in domestic production, and domestic production for the domestic and export market.

parameters should be undertaken to determine a reasonable range of impacts for important trade policy scenarios.

5. It is important that government policy makers be aware of, and be involved in, the use of analytical models for policy analysis. One of the main benefits of economic modeling is that it encourages participants to think about the economics of policy changes and to develop a much better sense of their possible impacts. A modeling approach is most successful when the knowledge gained in model building and simulation improves not only the thinking process and judgment of the model builder, but also of the policy maker.

6. As part of a more outward-oriented policy viewpoint, the government should also assemble a matrix of detailed, bilateral trade data for Uzbekistan. Such a data set would be useful for the analysis of special trade arrangements with regard to the CIS countries, which historically are important trading partners of Uzbekistan. Such a bilateral trade matrix would also be useful for analysis as Uzbekistan seeks new and expanded markets for its exports. A project such as this might be carried out cooperatively with institutes in other CIS members and neighboring trading partners.

7. If CEEP is to continue to use the VORSIM software for the construction of improved analytical models, it would be useful to prepare a Russian language version of the software. This could be done by a small joint project between VORSIM and CEEP where CEEP would provide translation services and a Russian version of the Excel spreadsheet and VORSIM would modify the software to operate in a Russian language version of Excel. If successful, CEEP might serve as a consulting source for VORSIM in Russian speaking countries.[2]

[2] Economic modeling is an essential tool for effective policy-making in market economies and can be useful in tracking the transition to a market economy as well. Informative models can be assembled and used even if the data and model parameters are less than perfect. On the one hand, a perfect theoretical economic model without data is of limited use as is a perfect data set without an economic model to help with its interpretation. Model and data improvement go hand in hand, both are required, and both contribute to the economist-policy-maker's understanding of the policy options they face. Modern technology such as spreadsheets and model-building programs like VORSIM have lowered the cost of model-based analysis to the point where problems can be modeled by experienced analysts in days or weeks rather than months or years.

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Background

Accession to the World Trade Organization (WTO) by Uzbekistan imposes requirements on the country's trade policies, especially in regard to making trade policies transparent and principally dependent upon tariffs enforced on a nondiscriminatory, most-favored-nation (MFN) basis. WTO encourages members to replace non-tariff restrictions with tariffs, to be bound by the provisions of the General Agreement on Tariffs and Trade (GATT) on the widest possible basis. In observance of the WTO rules and based on economic research, international organizations such as the International Monetary Fund and the World Bank also encourage tariffication of trade restrictions and adoption of relatively uniform tariff rates. Such reforms to trade policies give clear signals about world price movements to domestic firms, make trade policy administration simpler and less prone to corruption, and discourage smuggling and import tax evasion. Strong evidence in many countries over decades shows that more open trade fostered by liberal trade policies encourages economic growth and efficiency, and speeds development.

The government of Uzbekistan can use the reform required for WTO accession as an opportunity for the continuation of a comprehensive reform of its trade and associated economic policies. As part of WTO accession, the government needs to develop and improve its capacity for assessing the impact of trade policy changes on the economy, including production, employment, economic benefits for producers and consumers, and government revenue.

BearingPoint manages an ongoing USAID Uzbekistan Economic Reform Project in Tashkent, Uzbekistan. As part of that effort, the authors were asked to assist the Center for Effective Economic Policy (CEEP) in evaluating the likely economic impact of Uzbekistan joining the World Trade Organization (WTO). Working with CEEP researchers, partial equilibrium trade models were created and installed at CEEP and preliminary economic impacts of WTO accession were calculated for Uzbekistan. This paper provides an initial assessment of the economic impacts of WTO accession by Uzbekistan based on application of two economic models: a simple 97 sector trade model and a more complex aggregate 12 sector trade model. These two models point the way towards improved analysis using a more appropriately disaggregated model of Uzbekistan's trade regime in the future. While this report presents summary results of model simulations, detailed calculation results are presented in appendices[1].

Three problems had to be dealt with in assessing the impacts of changes in trade policies in Uzbekistan. First, consistent current detailed data on tariff rates, taxes, and non-tariff

[1] Appendices also provide brief documentation of the models themselves. Additional documentation resides on the model files themselves at CEEP in Tashkent and at VORSIM in Arlington, Virginia.

measures were not readily available, certainly at an adequate level of detail. Thus, the large economic model had to rely on a 1998 tariff schedule with some modification and had to represent Uzbekistan's trade by reliance on the reported trade of partner countries.[2] The small 12-sector model, on the other hand, relied on trade and protection data compiled by the Center for Effective Economic Policy (CEEP) for a previous study.[3] CEEP researchers then added calculations of average tariffs for the 12 sectors. However the tariff measurement problem is highlighted by differences in the average overall tariff used for the two models. Whereas the large model finds an overall import-weighted tariff average of 28% (based on 1998 tariff data with some updates), the small model finds an overall import-weighted tariff average of only 16% (based on the CEEP-provided data). In the former case, problems may lie with the old tariff rates used, errors in their application to trade data in detailed sectors, or with the trade data itself which may not adequately reflect Uzbekistan trade (because of reporting problems with Uzbekistan's trade partners' data in the U.N. trade data set). Similarly, there may be weighting or averaging problems with the CEEP tariff averages for 12 sectors. However even with uncertain tariff data, models can be built which give insight into potential economic impacts of changes in tariff protection. The tariff discrepancy in average tariffs clearly points out the need to develop a better comprehensive tariff and trade data set.

The second problem concerns the documentation and measurement of non-tariff barriers (NTBs), i.e., policies other than tariffs that restrict trade. Discussions with Uzbekistan economists and World Bank reports suggested that Uzbekistan has many trade control measures in place. Many of them are holdovers from the Soviet era when Uzbekistan was a planned economy. Since WTO requires that NTB's be made transparent and encourages their conversion to bound tariffs, it is important the NTB documentation and hopefully measures also be included in a comprehensive data set. From an analytical viewpoint, one way of quantifying NTB's is to create a "frequency" index for each sector which varies between 0 and 1. A "0" means there are no NTB's and world prices and tariff changes transmit fully to domestic prices in Uzbekistan. A "1" means that trade is fully controlled and changes in world prices or tariffs result in no change in domestic Uzbekistan prices. Most NTB's indices have values between 0 and 1, meaning that world price and tariff effects are only partially transmitted to internal Uzbekistan prices. A frequency index can be then easily be incorporated into simple trade models. One of the data tasks was to "estimate" the value of NTB indices for imports and exports. Although there was not time or information to create detailed NTB index measures or even descriptions of NTB's for the large model, CEEP staff did provide estimates of the

[2] Uzbekistan imports were derived as the exports of other countries to Uzbekistan and Uzbekistan exports were derived as the imports of other countries from Uzbekistan. The calculations were made at the 2 digit HS level. Possible problems exist with this procedure if partner countries reporting data is inaccurate or if the U.N. data set used does not include all of Uzbekistan's trading partners. The data set does contain data from major world traders but some smaller countries, including Uzbekistan, have not reported their complete trade data to the United Nations at a detailed HS level. The only sure way of preparing a complete trade data set for Uzbekistan is to put a comprehensive set of Uzbekistan data into a spreadsheet for researchers. The derived data set for Uzbekistan in Appendix B could serve as a check on Uzbekistan efforts to prepare such a trade data set.

[3] S. Chepel, D. Muinov, and M. Katanova, "A Sensitivity Analysis of Uzbekistan's Accession to the WTO", study by the Center for Effective Economic Policy (CEEP) in Tashkent, Uzbekistan.

frequency of NTBs at the aggregate level for the 12 sector model for imports and exports. This was done using staff knowledge about sector controls and judgment about the impact of those controls on price transmission. Such judgments are always difficult but CEEP staff is commended for a heroic effort in this regard. The CEEP estimates of NTB index values suggest that on average, over 50% of Uzbekistan import trade is constricted by non-tariff barriers and 17% of exports are restricted. Such an estimate is consistent with World Bank reports on Uzbekistan trade policies. The smaller model with the NTB estimates allowed a comparison of tariff reductions with and without accompanying changes in non-tariff trade restrictions.

The third problem is the formulation of the WTO accession scenario itself; with respect not only to the type and magnitude of trade policy reforms, but also possible policy responses that might be needed in response to trade policy reforms. For example, if the lowering of tariffs and removal of non-tariff barriers results in increased imports, unless exports increase sufficiently, a balance of payments deficit will occur. Foreign exchange reserves could be depleted unless the deficit is offset by increased foreign investment, other financial inflows, or some other policy response. One simple policy response would be for the government to allow the real exchange rate to depreciate; decreasing imports by making them more expensive and increasing exports by making them more profitable in local currency, and restoring the balance of payments.

To highlight the potential role of the exchange rate in trade liberalization efforts, most model scenarios were presented with and without an exchange rate change. Without a real exchange rate change, the lowering of tariffs typically leads to a balance of payments deficit which has to be managed by the government some way. With an exchange rate change, payments are balanced and the devaluation that accompanies trade liberalization improves export profits and redistributes some of the economic benefits to the export sector. Also, economic losses are moderated for sectors whose tariffs have been cut dramatically.

With any of the models used for this report, calculated impacts depend upon the particular tariff and other changes entered into the model. In order to allow some comparability, tariffs were completely removed (reduced by 100%) and those results are presented in full in appendices. In order to make a reasonable comparison between the large and small model (with different overall tariff averages), the percentage changes were calculated divided by the overall average tariff. This allows a comparative interpretation of the impact of a 1% across-the-board cut in the average tariff.

CEEP and the Uzbekistan government were also interested in a particular combination of tariff changes which might be similar to proposals in the WTO negotiations. Two specific options were chosen: a “liberal” option where most, but not all, tariff averages in the 12 sector model were reduced 4.3% on average. A conservative option raised tariffs by 1.4% increase on average. In both scenarios, different average tariff rates were set for different sectors, presumably with WTO negotiating strategies in mind. The exchange rate was not changed and NTB’s were not changed in these two scenarios. These scenarios are examples of the practical types of questions policy makers would like to

answer with an appropriate economic model. Different patterns of tariff change will yield different results and so each proposal for change must have its economic impacts estimated. Once an acceptable model is operational, CEEP and the Uzbekistan government will be able to get answers to new questions quickly as a matter of course during WTO negotiations and in response to subsequent trade policy question that arise.

Model Design and Software

The work started out with a trade model laid out in theory in Appendix H. It is a simple trade model with equations for imports, import prices, exports, export prices, and the balance of payments. Options in the model include coefficients for input costs and productivity increases. The simplest version of this model without input costs was used for the large 97 sector model (UZ99 for HS codes 1-99) using U.N. trade data to indirectly measure Uzbekistan's exports and imports.[4] For the smaller 12 sector model (UZ12), input costs from an Uzbekistan input-output table were included.

The UZ12 and UZ99 models were built in the Excel spreadsheet using the VORSIM model building software for Excel. The software helps organize and implement models in Excel yet leaves the flexibility of the spreadsheet available for customization.[5]

Costs and Benefits of WTO Accession and Other Trade Policy Changes

WTO accession possibly will involve many changes in tariffs and other trade controls. The assumption is that a movement to fewer controls, trade policy transparency, and lower effective tariffs will occur gradually over time. A major reason for modeling trade policy changes is the anticipation of possible these costs and benefits.

Costs of trade liberalization typically involve increased imports which benefit consumers but which replace domestic production by decreasing domestic profitability for highly protected sectors. The government is also concerned about revenue loss if tariffs are reduced. Revenue from trade can decline directly because of tariff cuts. It can also change because of changes in value added and excise tax collections on imports. On the one hand, reduced tariffs might increase imports and increase these other tax collections. On the other hand, vat and excise taxes are usually charged on tariff inclusive prices which may decline if tariffs are reduced, reducing revenue from these sources. The net result on revenue can only be calculated after all economic impacts, including exchange rate changes, have been estimated. A complete revenue assessment would also require the calculation of revenue changes from vat and excise taxes collected on the sales of

[4] Model definitions, basic data, and actual sample equations for the large 97 sector model are shown in Appendices A, B, and C. A more detailed explanation of the smaller 12 sector model appears in Appendix I with model definitions and actual sample equations appearing in Appendices J and K, respectively. Full sets of both models including solutions and output workbooks reside at the BearingPoint office and CEEP in Tashkent, Uzbekistan.

[5] Details about VORSIM, including the full User's Guide, can be found on the website www.vorsim.com. Most output calculations concentrate on differences between a particular scenario and the base status quo. Major output reports are included in Appendices D, E, and F for the large UZ99 model. Full output reports from the smaller UZ12 model appear in Appendices L, M, and N.

domestic produced products, since domestic production and sales may well be changed by trade policy changes.

In terms of benefits, consumers benefit from being able to buy more imports at lower prices. This in effect, increases their real income. Also if protection is decreased, input costs may decline for some production sectors giving them a financial boost. This includes sectors that produce products for exports. Experience has shown that competitive pressures from reduced protection tends to increase domestic productivity and economic growth. Measures of producer and consumer benefits, total economic welfare, and changes in revenue collection are used to capture these costs and benefits.[6]

UZ99 and UZ12 are static models; they compare a new equilibrium caused by a trade policy change with the old one before the change took place. The working assumption is that model parameters such as supply and demand elasticities represent responses that would work themselves out over a 5 year or longer period. This is consistent with the common practice of carrying out policy reforms slowly in order to allow time for sectors to adjust to new economic conditions.

A Preliminary Assessment

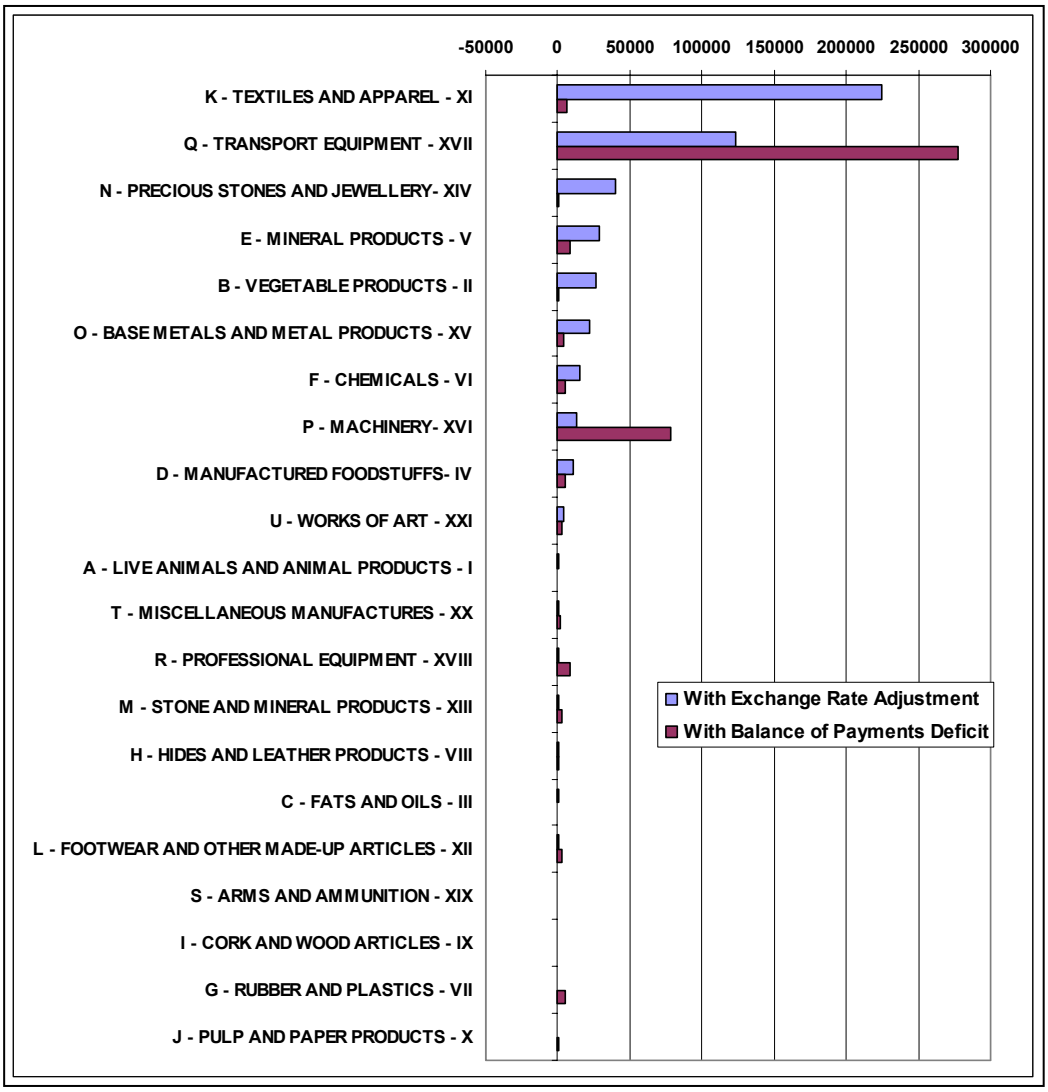
A preliminary impact assessment was done with the two models by completely removing tariffs and presenting the aggregate results relative to the change in the overall average tariff (calculating the results for measures of trade and government revenue as a percentage change resulting from a 1% average tariff reduction, and calculating the economic welfare gains resulting from a 1% reduction in the average tariff).

The more detailed analysis using the larger economic model indicates that the transport equipment (vehicles), machinery, electronic equipment, and technical apparatus sectors would be the most affected by an across-the-board reduction in tariffs. On average, a 1% across the board reduction in tariffs would lead to a 2.7% increase in imports, a 1.2% decrease in import revenues, and 15 million U.S. dollars in improved economic welfare for consumers, but with a large balance of payments deficit. If a exchange rate depreciation were corrected the resulting balance of payments deficit, import displacement would be cut more than in half and export sectors such as cotton, minerals, fruit and vegetables and others would increase their output. In this situation, a 1% reduction in all tariffs would only lead to a 0.7% increase in imports and a 0.7 % increase in exports and a (larger) 1.9% decrease in revenue. It would also result in a total economic welfare gain of 18 million U.S. dollars with 80% of the gain going to producers and 20% going to consumers. A graph of the ranked welfare impacts for 21 aggregate sectors for the UZ99 model is shown in the Figure 1 (below).[7] Economic welfare is the sum of producer and consumer benefits. Results are shown with and without exchange

[6] An brief explanation of producer and consumer benefits is given in Appendix G. Formulas for the calculation of revenue changes are shown in the model definition sheets in Appendices A and J. Self-explanatory tables in the appendices contain the detailed impacts for sectors.

[7] Details for all 97 sectors, including producer, consumer, and total economic benefits for this scenario are shown in Appendix D.

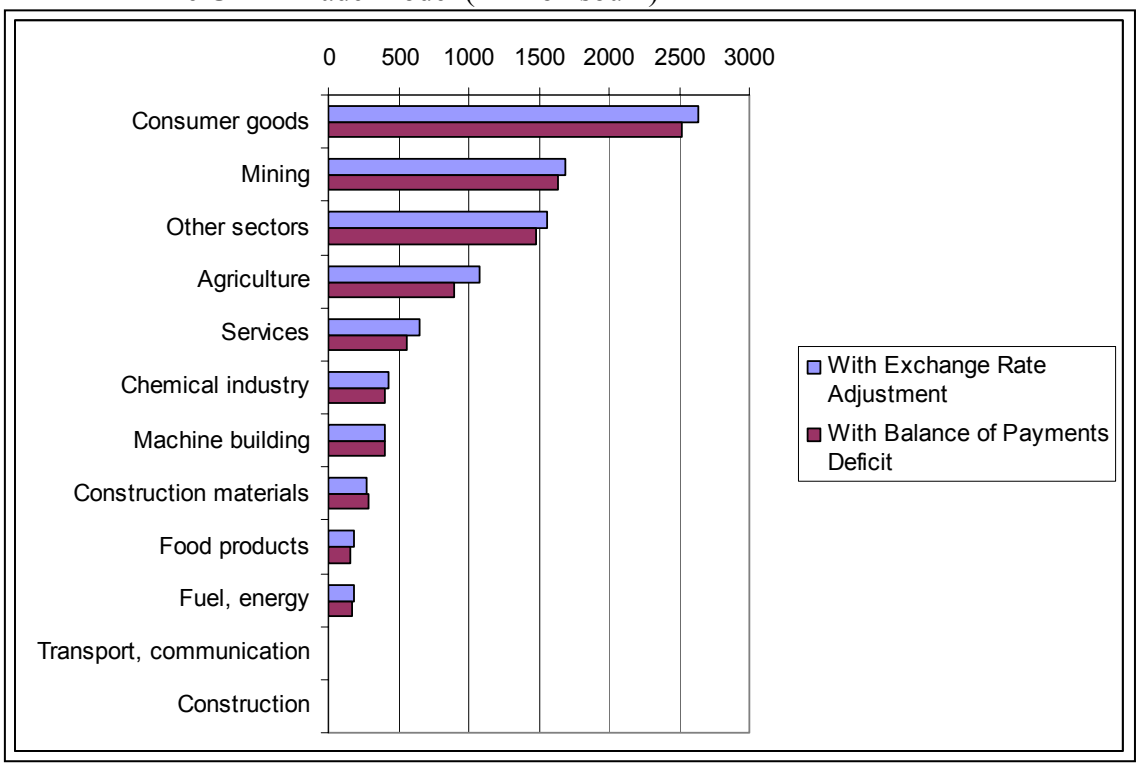
Figure 1 – Ranked Welfare Impacts of Tariff Removal for 21 Aggregate Sectors in the UZ99 Trade Model (000 US$)



rate adjustments that restore the balance of payments to equilibrium. When tariffs are removed and no exchange rate change occurs, imports increase greatly in the transport equipment and machinery sectors with all of benefits in UZ99 going to consumers and none to producers. However with a 17% devaluation, imports in these sectors decline and exports increase. In these two sectors, benefits are transferred from consumers to sector producers. In addition, the devaluation benefits other export sectors like textiles which otherwise would receive few benefits. The lesson here is that if a trade policy change results in a significant change in the balance of payments, the type of response to the balance of payments deficit can affect the final results very much in terms of the distribution of economic benefits between consumers and producers in a sector and across sectors of the economy.

The more aggregate analysis using the small economic model[8] indicates that the largest import displacement would occur in the aggregate machine building, food products, and consumer goods sectors. However because of the change in export prospects due to lower input costs, the consumer goods, mining, "other" goods, and agricultural sectors would benefit the most (Figure 2). Unfortunately these sectors in this model are very aggregate and no information is available for the impact on particular products within the sectors.

Figure 2 – Ranked Welfare Impacts of Tariff Removal for 12 Aggregate Sectors in The UZ12 Trade Model (Million soum)

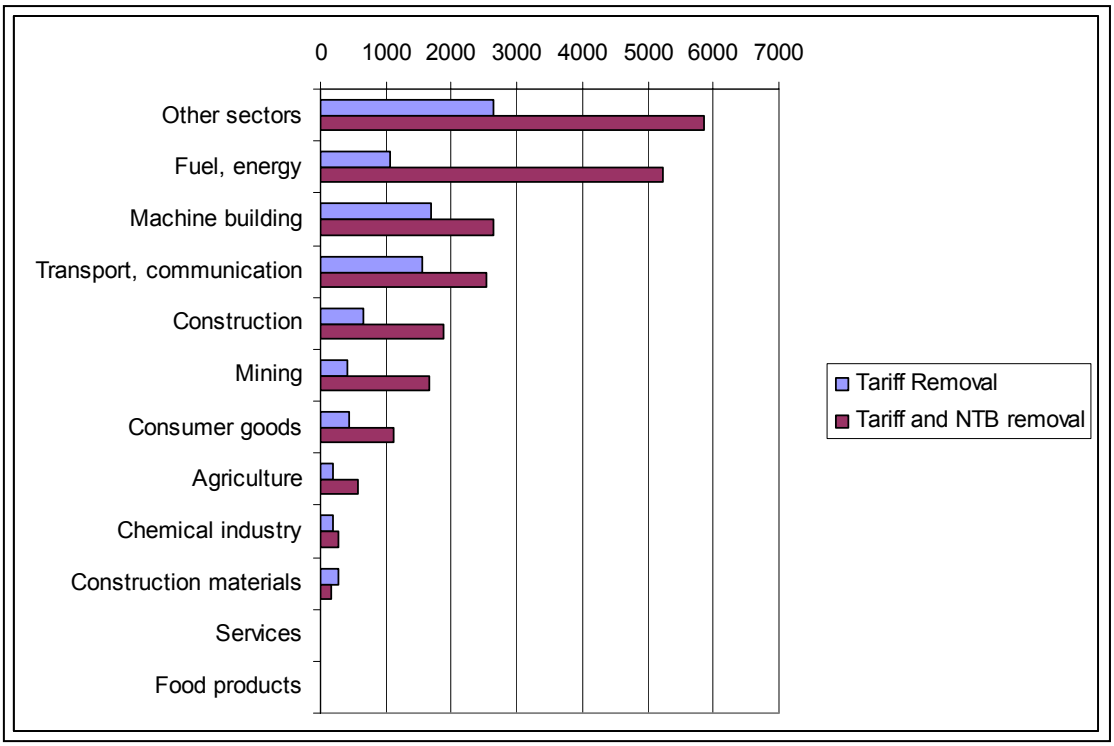


In this scenario (Figure 2) with the UZ12 model, tariff removal only results in a small balance of payments deficit. Hence ranked welfare benefits are basically the same with and without an exchange rate change.

The UZ12 model includes measures of the incidence of non-tariff barriers to trade for imports and exports. These NTB indices restrict the impact of tariff changes on trade prices and hence trade related effects. Figure 3 (below) shows the welfare impact of tariff removal with and without the removal of NTB's. Since NTB indices are relatively large for many sectors and over 50% on average for imports, removal of NTB's makes the welfare impacts of tariff removal much larger.

[8] The smaller UZ12 model has 12 sectors, of which only 10 are associated with trade (exports and imports). The import weighted average tariff is 15.5% as opposed to 28.2% in the larger model. The UZ12 model accounts for input costs using information from the Uzbekistan input-output table. Details are shown in Appendices I, J, and K.

Figure 3 – Ranked Welfare Impact of the Removal of Tariffs in the UZ12 Model With and Without the Accompanying Removal of Non-Tariff Barriers (NTB's) (Million soum)



An important lesson here is that non-tariff barriers are important factors in Uzbekistan trade policies that must be accounted for in impact assessment analysis.

On average in the UZ12 model, a 1% across the board decrease in tariffs leads to a 0.7% increase in imports and a 0.8% increase in exports because of lower production costs owing to the discipline of import competition. Tariff and other Government revenues from imports decrease by 1.4%. Economic welfare increases by 549 million soum with 90% going to producers and 10% to consumers. If the removal of tariffs is accompanied by an exchange rate change to restore the balance of payments, imports and exports are unchanged but government revenues decrease by 2.5%. Economic welfare increases to 585 million soum with the distribution between producers and consumers remaining the same. If, in addition to tariff reductions, non-tariff barriers are also removed, the trade and other economic impacts are roughly doubled. A 1% tariff reduction on average yields a 1.9% increase in imports, a 1.1% increase in exports, and a 1.6% decrease in revenues. When an exchange rate change is added as a response to the balance of payments deficit, imports increase only 1.3%; exports increase 2%, and revenues decrease by 2.1%. In this scenario, a 1 % decrease in the average tariff results an increase in national economic welfare of 1414 million soum with a similar distribution as before. The economic welfare gain of tariff removal coupled with the removal of non-tariff barriers is 2.4 times that of the scenario where only tariffs are removed.

Two main lessons emerge from the aggregate 12 sector analysis. The most important lesson is that non-tariff barriers to trade matter very much for Uzbekistan and that their removal could more than double some of the economic impacts of tariff reductions on average. The second lesson is that accounting for input costs results in smaller adverse economic impacts for sectors. If tariff reductions reduce output prices, they may also reduce some input prices, thus mitigating the impact on a sector. The important question here is "are input costs adequately accounted for"? It may be for example, that imported imports are duty free and that the average input cost for sectors is actually overstated by an input-output coefficient and tariff inclusive import prices. Careful research is needed on this subject in each sector.

Both the detailed 97 sector and the aggregate 12 sector models show that the initial tariff levels are crucial in determining the impacts of trade liberalization by sector and in the aggregate, if the exchange rate is used to correct a balance of payments deficit.

In addition, two specific scenarios for the 12 sector model at CEEP were requested by as part of a WTO impact study.[9] The first was a "liberal" scenario in which tariffs were lowered an average of 4.3%. The second was a conservative scenario in tariffs were raised an average of 1.4%. Non-tariff barriers were not changed and exchange rates were not used to deal with any resulting balance of payments deficit. Different tariff changes were applied to different sectors in both scenarios. On average under the liberal scenario, a 1 % decrease in tariffs resulted in a 0.9% increase in imports, a 0.5% increase in exports, and a 2% decrease in government revenues. On average under the conservative scenario, a 1% increase in tariffs resulted in a 0.3% decrease in imports, a 1.2% decrease in exports, and a 2.7% increase in government revenues. The relative magnitudes of changes in imports, exports, and government revenues in these two scenarios are roughly similar to those of uniform tariff changes; however, they do differ by sector because the changes in tariffs were different for different sectors. This highlights the importance of the distribution of tariff changes between sectors in determining the final impact of changes in trade policy. These two scenarios are typical of the type asked for by policy-makers. In this case, two possible routes for the negotiation of average tariffs for WTO accession were explored.

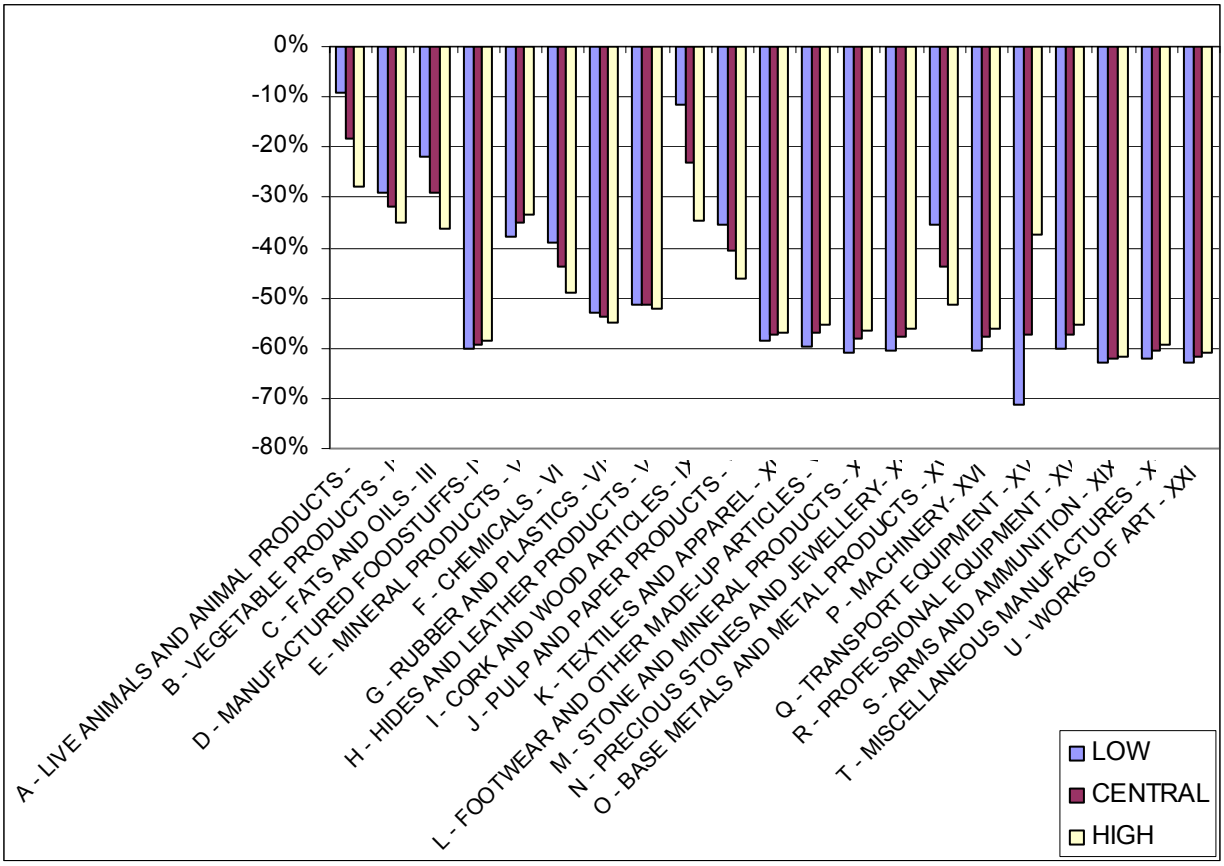
Sensitivity Analysis

Research can always improve parameters for models and extensive model use can increase confidence in the results. Some of the scenarios already presented represent sensitivity analysis to policy options such as exchange rate changes or the removal of non-tariff barriers. However when using a model, it is import to do "sensitivity" analysis of the model calculations to changes in key model parameters. It often turns out that some calculations are more sensitive to changes in model parameters than others. This is extremely useful information when interpreting the results of model simulations and selecting sets of model parameters that need improvement. Price elasticities of import demand and export supply are key parameters in the UZ99 and UZ12 models. As an illustration, a sensitivity analysis was carried out for the UZ99 model. Simulations of

[9] Details about these two scenarios including the tariff cuts and the results are given in Appendix N.

complete tariff removal were done by reformulating the model with price elasticities 50% higher and lower than the central values.[10] Figure 4 shows the results of this sensitivity analysis for revenue while Figure 5 shows the results for changes in producer benefits.

Figure 4 – Percent Change in Trade Revenue in the UZ99 Model with Low, Central, and High Elasticities of Export Supply and Import Demand

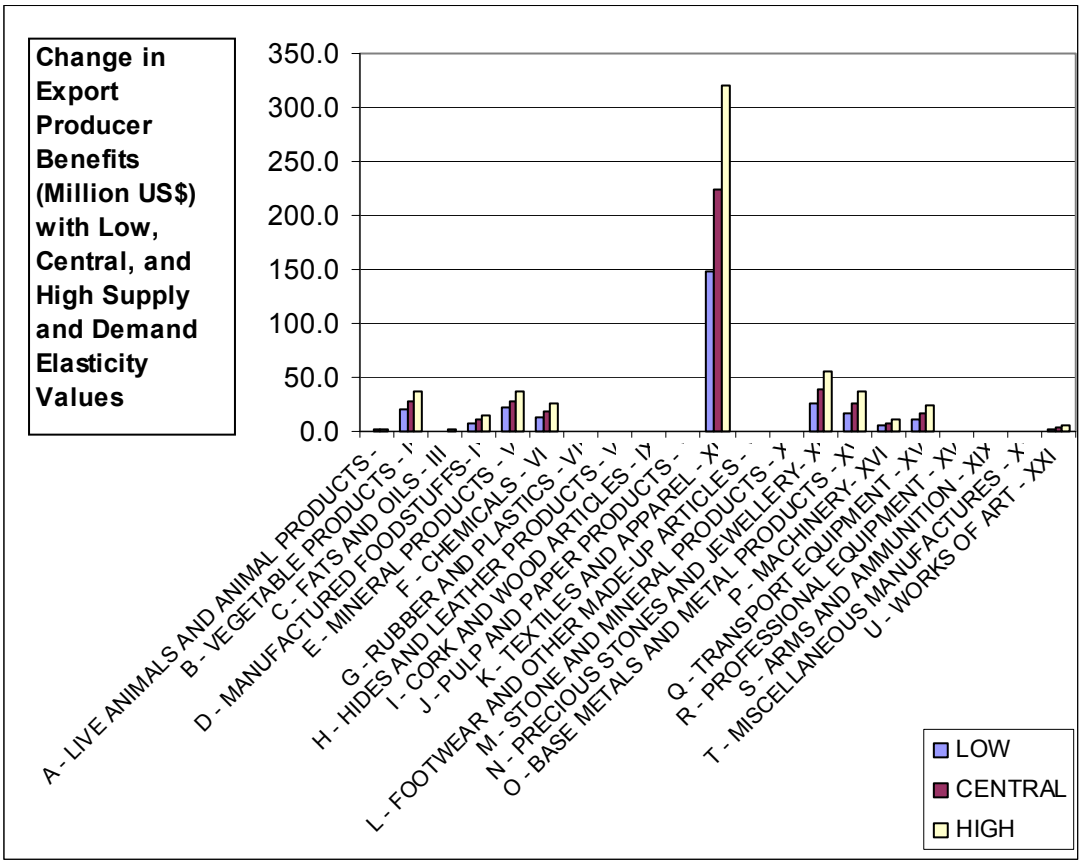


Estimates of trade revenue in Figure 4 differ significantly for some sectors such as "live animals and animal products" (9-28%) while they do not differ much at all for others such as "manufactured foodstuffs" (59-60%). This means that even if there is uncertainty about the elasticities, there can be a much greater confidence about measures for some sectors as opposed to others.

Estimates of producer benefits under these alternative elasticity assumptions are shown in Figure 5. Here the differences in benefits are striking, especially for the largest sector "textiles and apparel" (148-320 million U.S. dollars). But results for sectors with relatively smaller changes such as "live animals and animal products" don't vary that much (0.4-1.7 million U.S. dollars) in monetary terms. Producer benefits depend upon price changes (which follow tariff changes) and changes in production, which are higher with higher supply elasticities. Again it is useful to know the sectors where different model parameters matter the most.

[10] Detailed results are shown in Appendix F.

Figure 5 – Change in Producer Benefits in the UZ99 Model with Low, Central, and High Elasticities of Export Supply (Million U.S. $)



A summary of all of the impacts, including the sensitivity analysis scenarios, is found in Table 1 (below). When results are scaled to a 1% change in the overall average tariff, changes in many of the measures are roughly of the same magnitude in many of the scenarios. The differences between scenarios with and without exchange rate changes are clear. Exporters benefit in terms of increased exports and a larger share of benefits in the exchange rate scenarios and the overall welfare gains to the economy are the largest.

Accomplishments

A large 97 sector trade model (UZ99) using UN trade data and Uzbekistan tariff schedules was assembled and installed on the CEEP computer. This model did not have the expert input of CEEP staff nor actual Uzbekistan trade or input-output coefficients, so it is considered a tentative prelude to a larger and more complex sector model. However it operates and illustrates the possibilities of a model with more detail for trade impact analysis for Uzbekistan.

A small 12 sector trade model for Uzbekistan (UZ12) was constructed with data on production, trade (total exports and imports for sectors), tariffs, input costs from an input-output table, and non-tariff barrier indices. This model and documentation on its use was left on computers at CEEP and the BearingPoint office in Tashkent. CEEP staff

Table 1 – Comparison of Scenarios Assuming a 1% Decrease in the Average Tariff

		Appendix Page - Scenario # With		Impact per 1% Decrease in the Average Tariff in Model				
			Exchange Rate			Balance of Payments	% Change in Trade	Change in
Model	Scenario	Results	Change	% Change in Imports	% Change in Exports	Deficit (-)	Revenue	Welfare
						(M. US$)		(M. US$)
UZ99 1/	Remove Tariffs	D 3 -1	-17.2%	0.7%	0.7%	0.0	-1.9%	18.1
	Remove Tariffs	E 3 -2	0.0%	2.7%	0.0%	-46.3	-1.2%	14.5
	(Sensitivity Analysis)					(M. US$)		(M. US$)
1/ 2/	Remove Tariffs - Low elasticities	F	-16.2%	0.3%	0.3%	0.0	-2.0%	11.3
1/	Remove Tariffs - Central values	D 3 - 1	-17.2%	0.7%	0.7%	0.0	-1.9%	18.1
1/ 3/	Remove Tariffs - High elasticities	F	-18.3%	1.2%	1.1%	0.0	-1.7%	26.8
						(M. soum)		(M. soum)
UZ12 4/	Remove Tariffs	L 2 - 1	-0.4%	0.7%	0.8%	0.0	-1.4%	584.6
	Remove Tariffs	L 4 -2	0.0%	0.7%	0.8%	-52.7	-2.5%	548.6
4/	Remove Tariffs, NTBs	M 2 - 1	-5.7%	1.3%	2.0%	0.0	-2.1%	1413.9
4/	Remove Tariffs, NTBs	M 4 - 2	0.0%	1.9%	1.1%	-1323.9	-1.6%	1029.9
5/	Liberal	N 2 - 1	0.0%	0.9%	0.5%	-598.4	-2.0%	357.0
6/	Conservative (avg. tariff raised)	N 4 - 2	0.0%	-0.3%	-1.2%	-1132.9	2.7%	-789.3
1/ Average tariff of 28.2% - all tariffs reduced to zero - supply and demand elasticities at central values								
2/ Sensitivity analysis - supply and demand elasticites 50% lower than central values								
3/ Sensitivity analysis - supply and demand elasticities 50% higher than central values								
4/ Average tariff of 15.5% - all tariffs reduced to zero								
5/ Small decrease in average tariff - most tariffs lowered but changes differ in different sectors (see Appendix page N 1)								
6/ Small increase in average tariff - most tariffs raised but changes differ in different sectors (see Appendix page N 1)								

learned to use the 12 sector model by replicating various scenarios. CEEP staff can run alternative simulations by changing exogenous policy variables such as tariffs. A report writer designed by CEEP staff was created for quickly generating tabular and graphical results, including many of those contained in appendices to this report.

A seminar on trade model-building in general and the UZ12 and UZ99 models in particular, capped the modeling exercise for the consultant. Electronic, paper, and CD copies of the final report will be sent to Uzbekistan along with the latest versions of the models and self-installing model programs on a CD. Copies of the VORSIM software needed to operate and modify the models reside on CEEP computers and on computers in the BearingPoint office in Tashkent, Uzbekistan.

CEEP staff skills with computers, mathematics, and economic modeling insured that the UZ12 model was well understood and can be used at CEEP. More help in the future may be required if new more complex models are to be built using the VORSIM modeling system. Based on the progress to data, several recommendations can be make for future work to improve the trade policy analytical capacity of the Uzbekistan government and the CEEP.

Recommendations for Future Work:

1. The most pressing need is for the Uzbekistan government to assemble an up-to-date, consistent set of detailed tariff, vat, excise tax, import and export data (quantity and value if possible), and non-tariff barrier information at the tariff line level covering all traded products. It would also be very helpful if the data set included tariff, vat, and excise tax revenues that could be used to calculate average ad valorem tariff and tax rates. While this expanded data set would be helpful for further model development, it would also be extremely useful for the government as a way of checking on the adequate collection of tax revenues on trade. Such a comprehensive data set would certainly be needed for practical matters regarding the negotiation of WTO accession: weighted tariff averages could easily be calculated, specific tariffs could be converted to ad-valorem equivalents, etc. The most difficult challenge is the assessment of the importance of non-tariff trade barriers, possibly with the assistance of experts from Uzbekistan government agencies, the WTO, or the UNCTAD Trade Information and Analysis System (www.unctad-trains.org). While this assessment is difficult, it is an extremely useful preparatory exercise for WTO negotiations because the WTO encourages the transparency of non-tariff barriers and their ultimate conversion to bound tariffs. If there are available data on domestic and import prices or unit values for products covered by non-tariff barriers, it might be possible to assign a tariff equivalent, i.e., a tariff that could replace them. Finally, if the data set also contained a concordance to domestic sector production and employment data; trade, tariff, and non-tariff data could be aggregated to the level of the most detailed domestic data available (which should considerably more than 12 sectors). If detailed domestic production data are not available, UNIDO (the United Nations Industrial Development Organization in Vienna, Austria) and the U.N. FAO (the United Nations Food and Agriculture Organization in Rome, Italy) would be of great help if industrial and agricultural censuses were required.

2. Once a more detailed domestic and international data set is prepared, one or more improved models should be constructed, maintained, and upgraded (as data improves) for ongoing impact analyses. For some products, models might rely on even more detailed data than provided in the 97 sector model. For other products, sectors might be aggregated. Typically, governments want detail on sectors and products that they feel are more sensitive to trade policy changes. Future models surely should have more detail than the small, 12 sector model employed here, if they are to say anything about specific products or sectors of special interest to the government. Besides questions related to the WTO accession negotiations, CEEP has the economic skills and modeling tools necessary to prepare these improved analytical models for assessing a number of trade policy questions likely to be encountered in the future.

3. In order to provide more comprehensive information about government revenues affected by trade policy changes, it would be useful to construct a model which directly includes domestic production and consumption along with value-added and excise taxes. Trade models can only calculate revenue impacts from changes in trade and tariffs or other taxes on trade, and as the economy becomes less controlled and open to world

markets, government tax revenues can become an increasing concern and would require economy-wide models for analysis.[11]

4. Useful research could be undertaken to estimate or otherwise investigate the parameters for improved trade and economic models. The models used in this report relied on World Bank estimates of trade price elasticities. There may well be parameter values available from other studies and from model building efforts for neighboring countries or countries similar to Uzbekistan. As economic transition proceeds in Uzbekistan, and more market-based data becomes available, econometric techniques can be applied to estimate model parameters. For now however, CEEP will have to rely on available parameter estimates. Sensitivity analysis with respect to key model parameters should be undertaken as a matter of course to establish a reasonable range of impacts for important policy change scenarios.

5. It is important that government policy makers be made aware of, and be involved in the use of, analytical models for policy analysis. One of the main benefits of economic modeling is that it encourages participants to think about the economics of policy changes and to arrive at a much better sense of their possible impacts. A modeling approach is most successful when the knowledge gained in model building and simulation improves not only the thinking process and judgment of the model builder, but also of the policy maker.

6. As part of more outward-oriented policy making, the government could also assemble a matrix of detailed, bilateral trade data for Uzbekistan. Such a data set would be useful for the analysis of special trade arrangements such as those with the CIS countries, which historically are important trading partners of Uzbekistan. Such a bilateral trade matrix would also be useful for analysis as Uzbekistan seeks new and expanded markets for its exports. A project such as this might be carried out cooperatively with institutes in other CIS members and neighboring trading partners.

7. If CEEP is to continue to use the VORSIM software for the construction of improved analytical models, it would be useful to prepare a Russian language version of the software. This might be done by a small joint project between VORSIM and CEEP where CEEP would provide translation services and a Russian version of the Excel spreadsheet and VORSIM would modify the software to operate in that Russian language version. Experience to date suggests that programming changes to VORSIM might not be that significant. If a Russian language version of VORSIM were to become available, CEEP might serve as a consulting source for VORSIM in Russian speaking countries.

[11] See Appendix O for a possible example of a 12 sector model that includes domestic production and consumption in a simple way – the UZPM model. Expansion of the UZ12 sector trade model to include domestic sector information requires adding not only data, but also additional assumptions about economic behavior which require more parameters. The preliminary UZPM model considers three additional tradeoffs that must be modeled: a) consumer preferences for imports versus domestic products, b) the ability of domestic producers to transform production for the domestic or export markets, and c) the substitutability of imports for domestically produced products in all production processes.

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