

Report No. 65977-KZ

Kazakhstan Assessment of Costs and Benefits of the Customs

Union for Kazakhstan First Report under the Study of International Practice of Integration/Customs Union

November 24, 2012

Poverty Reduction and Economic Management Unit
Europe and Central Asia Region



Document of the World Bank

CURRENCY EQUIVALENTS

(Exchange Rate as of January 3, 2012)

Currency Kazakhstani tenge

US\$1.00 148.45

Weights and Measures: Metric System

ABBREVIATIONS AND ACRONYMS

AVE	Ad-Valorem Equivalents
CA	Central Asia
CIS	Commonwealth of Independent States
CU	Customs Union
EU	European Union
FDIs	Foreign Direct Investments
GATS	General Agreement on Trade and Services
GDP	Gross Domestic Product
HS	Harmonized System
ISIC	Industrial Classification of All Economic Activities
MFN	Most-Favored-Nation
NACE	Statistical Classification of Economic Activities in the European Community
NTBs	Nontariff Barriers
OECD	Organization for Economic Development
OTRI	Overall Trade Restrictiveness Indices
PDFS	Probability Density Functions
R&D	Research and Development
SPS	Sanitary and Phyto-sanitary
TFP	Total Factor Productivity
TRI	Trade Restrictiveness Index
VAT	Value-Added Tax
WITS	World Integrated Trade Solution
WTO	World Trade Organization

Vice President:	Philippe Le Houérou
Country Director:	Motoo Konishi
Sector Director:	Yvonne Tsikata
Sector Manager:	Ivailo V. Izvorski
Task Team Leader:	Ekaterine Vashakmadze

Table of Contents

Executive Summary	vi
1. Overview of the Model	1
2. Data of the Model and Evidence for Key Elasticities.....	7
3. Results for the Customs Union	9
4. Sensitivity Analysis	13
5. Conclusions and Extensions	15
Appendix A: Trade Data for Kazakhstan	52
Appendix B: Dixit-Stiglitz Elasticities of Substitution for Goods	53
Appendix C: Trade-facilitation and Border Costs	54
Appendix D: Nontariff Barriers in Russia and Kazakhstan	57
Appendix E: Technology Diffusion and Trade.....	61
Appendix F: Tariff Rates before and after the Customs Union	65
Appendix G: Suggestions for Extensions and Follow-up Work	78
References	80

Acknowledgments

This report is a first output of the work on the Study of International Practice of Integration/Customs Unions, financed by the Joint Economic Research work of the World Bank and the Government of Kazakhstan and led by Ekaterine Vashakmadze. The team is particularly grateful to Kazakhstan economic team Zhanar Aitzhanova and Timur Suleymenov for their invaluable strategic insights. It is a product of the ECSP1 Department of the World Bank. The lead authors are Jesper Jensen and David Tarr, with contributions from Oleksandr Shepotylo, Ilyas Sarsenov, Salamat Kussainova, and Yulia Mironova. Ivailo V. Izvorski provided useful comments. Oxana Shmidt and Zakia Nekaien-Nowrouz provided an excellent support to the team. Yvonne Tsikata, Motoo Konishi, Kazi Matin, Sebnem Akkaya, and Mehrnaz Teymourian provided a strategic managerial leadership to the team.

List of Tables

Table 1: List of Sectors, Factors, and Regions in the Model of Kazakhstan	16
Table 2: Sectoral Value-Added.....	17
Table 3: Trade Flows	19
Table 4: Benchmark and Counterfactual Distortions (%).....	21
Table 5: Trade Flows by Trading Partner (%).....	23
Table 6: Estimates of Supply Elasticity of Firms with Respect to Price	25
Table 7: Summary of Results.....	26
Table 8: Output and Employment Impacts (% change from benchmark)	27
Table 9: Impacts on Imports of Customs Union Current (% change from benchmark).....	29
Table 10: Impacts on Exports of Customs Union Current (% change from benchmark).....	31
Table 11: Impacts on Number of Firms of Customs Union Current	33
Table 12: Impacts on Imports of Customs Union Future—Pessimistic Outlook	34
Table 13: Impacts on Exports of Customs Union Future—Pessimistic Outlook	36
Table 14: Impacts on Number of Firms of Customs Union Future—Pessimistic Outlook	38
Table 15: Impacts on Imports of Customs Union Future—Optimistic Outlook	39
Table 16: Impacts on Exports of Customs Union Future—Optimistic Outlook	41
Table 17: Impacts on Number of Firms of Customs Union Future—Optimistic Outlook	43
Table 18: Piecemeal Sensitivity of Impact of Customs Union Future—Pessimistic Outlook	44
Table 19: Piecemeal Sensitivity of Impact of Customs Union Future—Optimistic Outlook	45

List of Figures

Figure 1: Sample Distribution of the Welfare Results from Customs Union Future—Pessimistic Outlook —30,000 simulations.....	46
Figure 2: Means, 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Output Changes by Sector from Customs Union Future—Pessimistic Outlook -- 30,000 simulations.	47
Figure 3: Means 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Labor Payment Changes by Sector from Customs Union Future—Pessimistic Outlook —30,000 simulations.	48
Figure 4: Sample Distribution of the Welfare Results from Customs Union Future—Optimistic Outlook —30,000 simulations.	49
Figure 5: Means 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Output Changes by Sector from Customs Union Future—Optimistic Outlook —30,000 simulations.	50
Figure 6: Means 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Labor Payment Changes by Sector from Customs Union Future—Optimistic Outlook —30,000 simulations.	51

List of Boxes

Box 1: Comparison with Previous Analysis of WTO Accession for Kazakhstan.....	x
---	---

EXECUTIVE SUMMARY

Kazakhstan in the Customs Union: Can Gains from Improved Trade Facilitation and Reduction of Nontariff Barriers Overcome the Losses from Higher Tariffs?

1. In 2010, Kazakhstan entered into a customs union with Belarus and Russia. The first, relatively easy step in the implementation of the customs union was accomplished in 2010 with the adoption of a common external tariff, with varying exceptions in each of the three member countries. It is the intention of the customs union to eliminate the exceptions, in phases, by 2015. International experience has shown, however, that successful preferential trade arrangements are frequently based on “deep integration,” that is, integration that goes beyond the tariff preferences.¹ In fact, the goals of the customs union are much more ambitious than implementation of the common external tariff. The governments of the member countries are working to achieve deep integration in key areas.

2. One area where the governments are working to deepen integration is in trade facilitation. It is the announced intention of the governments to eliminate customs posts between Russia and Kazakhstan and to reduce the costs of other aspects of trade between the countries—such as the number of required documents and the difficulty of obtaining them. Some freight forwarders in Kazakhstan, however, complain of seeing little progress in this area as of the spring of 2011.

3. Another key area where the governments are working to deepen integration is in the reduction of nontariff barriers (NTBs). Technical regulations, including sanitary and phyto-sanitary (SPS) measures, are cited by exporters in Kazakhstan as significant cost-increasing barriers on their exports to Russia. The governments are working to harmonize technical regulations and to introduce mutual recognition agreements, but little concrete progress had been reported as of the spring of 2011.

4. Clearly, successfully addressing the challenge of reducing trade-facilitation costs and NTBs is a major task that requires significant institutional development both in Kazakhstan and in the other member countries of the customs union. It is very difficult, however, to assess the probability of success that the customs union will have with the reduction of these costs. We therefore present estimates of three possible outcomes for Kazakhstan:

5. **Customs Union Current:** First, we estimate the impact of what has actually been implemented as of the spring of 2011. Kazakhstan has implemented the common external tariff with exceptions, but has made very little progress on trade facilitation or NTBs. Kazakhstan had free trade with Russia and Belarus prior to the customs union, so the only change is the implementation of the common external tariff.² In particular, since the initial common external tariff was essentially the Russian tariff, Kazakhstan does not get a terms-of-trade improvement in Russia.

¹ See, for example, Schiff and Winters (2003).

² Since Kazakhstan had free trade with Russia and Belarus prior to the customs union, the tariffs on trade among the member countries did not change. In our analysis, we assume that Kazakhstan had a regime of free trade with the countries of the Commonwealth of Independent States (CIS) plus Georgia and that this will continue after the formation of the customs union. Kazakhstan had a bilateral free trade agreement with Russia, signed on October 22, 1992; approved by Cabinet of Ministers decree #374 on May 7, 1993; and effective on July 7, 1998. It had a bilateral free trade agreement with Belarus signed on September 23, 1997. In addition, the CIS agreement of 1994 stipulated free trade among the

6. **Customs Union Future—Pessimistic Outlook:** In one extreme (a pessimistic extreme) we assume that Kazakhstan will fully implement the common external tariff by eliminating the remaining exceptions but does not realize any reduction of its trade-facilitation costs and NTBs are not reduced.

7. **Customs Union Future—Optimistic Outlook:** In the other extreme, we assume that Kazakhstan fully implements the common external tariff and that trade-facilitation costs and NTBs are substantially reduced in the customs union.

8. We develop a 57-sector modern computable general equilibrium model of Kazakhstan to assess the impacts of these policy changes. For changes in the tariff rates for our first two scenarios, we rely on the work of Shepotylo (2011), which is reproduced as appendix F of this report. For this project, he calculated the tariff changes Kazakhstan has implemented by the spring of 2011 in order to fulfill its obligations under the customs union and the tariff changes it will implement to eliminate the exceptions. He found that by weighted basis from its pre-customs union 2009 level, and that the dispersion of the tariff increased as well.³ According to this scenario, when the exceptions to the common external tariff are fully eliminated, tariffs will almost double on a trade-weighted basis from their 2009 level.

Impacts of the Scenarios

9. **Customs Union Current (as of spring 2011):** We estimate that, under spring 2011 conditions, Kazakhstan is losing about 0.2 percent in real income per year as a result of participation in the customs union.⁴ This is due to its increasing its external tariffs to implement the common external tariff, with exceptions, to the levels that prevail in the spring of 2011. As explained in appendix F, as a result of implementing the common external tariff of the customs union with exceptions, the tariffs of Kazakhstan have increased from an average of 6.7 percent to 11.1 percent on an unweighted basis (and 5.3 percent to 9.5 percent on a trade-weighted basis). We also estimate that collected tariff revenues in Kazakhstan approximately double, that the costs to businesses and consumers of imports increase, and that under the tariff umbrella resources are shifted to areas of inefficient production. Consequently, we estimate that the customs union has depressed real wages by 0.5 percent and depressed the real return on capital in Kazakhstan by 0.6 percent. Kazakhstan trades less with the rest of the world and more with Russia, Belarus, and the rest of the CIS, resulting in less imported technology from the more technologically advanced European Union and other countries—leading to a loss of productivity gains in the long run. Regarding expanding and contracting sectors, almost all service sectors decline, since they do not benefit from the increased protection and they become relatively less profitable compared with the sectors receiving increased protection. But we estimate that most of the manufacturing sectors expand, with wearing apparel, furniture, machinery and equipment, motor vehicles, and transport equipment expanding the most due to the increased

signatories, which included all the CIS states. Finally, the Eurasian Economic Community, under which free trade among the members was agreed, included Belarus, Russia, Kazakhstan, Kyrgyzstan, and Tajikistan (Uzbekistan dropped out).

³ This is based on a trade-weighted average measure; the calculated increase is 63 percent on a simple average measure. Shepotylo's results are consistent with the RAKURS study of Jondosov and Sabyrova (2011), who used a third defensible weighting method. The broad consistency of the results to the weighting methodologies gives added confidence that the results of the tariff calculations are accurate.

⁴ Vinhas de Souza (2011) found a similar result.

protection.⁵ The tobacco sector declines slightly due to lower protection. The sector changes imply some reallocation of capital and labor between sectors. Around 0.2 percent of the labor force will have to find jobs in another sector.

10. **Customs Union Future—Pessimistic Outlook:** We estimate that Kazakhstan will lose about 0.3 percent in real income per year as a result of fully implementing the common external tariff (compared to its 2009 tariffs). That is, eliminating the exceptions to the common external tariff will increase the losses. This is due to the fact that eliminating the exceptions will require that Kazakhstan further increase its external tariff rates to the non-CIS countries.⁶ Then, real wages and the real return to capital fall by more and the costs to consumers and businesses of their purchases increases by more than in our first scenario. The sector changes for imports and output are similar to the scenario with current 2011 tariffs. We estimate that a larger diversion of imports from the EU and the rest of the world results from imports from the customs union and the CIS and by domestic production, especially in agriculture and chemicals. Employment changes are also similar to the scenario with current 2011 tariffs. Again, 0.2 percent of the labor force moves to jobs in another sector.

11. **Customs Union Future—Optimistic Outlook:** In this scenario we make an optimistic assessment of how much the customs union may lower the trade-facilitation costs in importing to or exporting from Kazakhstan (to customs union members and to third countries) and how much Kazakhstan may benefit from a reduction of NTBs in the customs union. Among the NTBs that we consider are sanitary and phyto-sanitary conditions, which have been reported as significant barriers for exporters of Kazakhstan to Russia. We also assume that the common external tariff is fully implemented. We estimate that the real income of Kazakhstan would increase by about 1.5 percent of consumption per year in this scenario. We decompose our estimate into its components and find that our estimated real income (welfare) gains from reduced trade-facilitation costs are the largest component—they are rather substantial at about 1.4 percent of the value of Kazakhstani consumption. These estimated gains from reduced trade-facilitation costs are large since the reduced costs apply to both imports and exports as well as to existing and additional trade, and to some extent will apply on trade with third countries as well. The gains from reduced NTBs roughly offset the losses from the full implementation of the common external tariff, leaving the trade-facilitation impacts as the net impact in our optimistic scenario.

12. The output expansion in manufacturing is somewhat larger at the sector level due to lower trade-facilitation costs in importing to or exporting from Kazakhstan (to customs union members and to third countries) and to lower NTBs in the customs union. The chemical and leather products sectors expand much more than in the earlier scenarios. On the other hand, some manufacturing sectors contract that had expanded in the Pessimistic Scenario—including wood products, paper and printing, and rubber and plastic products. The larger sectoral impacts also imply larger adjustment costs for labor. Around 0.5 percent of the labor force will change employment to another sector.

⁵ A multiregion model that models Russia endogenously might find that some of these sectors contract rather than expand. The reason is that agglomeration externalities in Russia might allow the Russian firms to produce at lower costs and expand exports further.

⁶ Major examples of goods with transition periods are antibiotic medicine, where the tariff rate increases from 0 percent to 15 percent; apples (from 5 percent to 37.5 percent); and certain electrical parts (from 0 percent to 15 percent). When aggregated to the sectors of the model, the tariff rates increase by up to 4 percentage points in the agricultural and chemical sectors.

Diversification

13. Although some modest diversification of the economy of Kazakhstan is achieved by the import-substitution industrialization of the higher common external tariff, repeated international experience has shown that this is not a successful strategy for growth and economic development.⁷ Diversification of the Kazakhstani economy is a worthy goal. However, to achieve diversification, institutional reform to improve the business climate is necessary. Kazakhstan's ranking on some of the key indices of institutional development are as follows. It ranks 59 out of 183 on the Doing Business index; 62 out of 155 on the Logistics Performance Index; and 105 out of 178 on the Transparency International Corruption Perceptions Index. Small and medium enterprises depend crucially on the institutional environment for doing business. Further improvement in these areas is crucial for the diversification effort.

Caveats

14. The report ignores several issues relevant to the customs union that could be important in the future. Among the most important are the following:

1. The impact and interaction of the customs union on and with accession to the World Trade Organization (WTO) are not addressed.
2. The report does not address the impact on Kazakhstan of possible future deeper integration in a common economic space. It is not clear what might be included in such an agreement for such a space, but possibilities are preferential commitments of services, preferential access to government procurement contracts, and harmonized competition policy, including waiving of antidumping actions among the members.
3. Although, for the long run, all three countries are moving toward the technical regulations and sanitary and phyto-sanitary (SPS) conditions of the European Union, for the short run the report does not recommend whose technical regulations or SPS conditions should be adopted by the customs union, and whether these choices will affect the estimates of the gains or losses.

Summary

15. We estimate that implementation of the common external tariff of the customs union is a cost to Kazakhstan of joining the union—a cost that it has already begun to pay. The cost, however, could potentially be overcome and the customs union could produce a net benefit, provided the union can achieve a successful outcome on trade facilitation and NTBs, including SPS conditions.⁸ Crucially, we do not assume that these extremes will occur with equal probability or that any outcome between these extremes occurs with equal probability. Implementation of the common external tariff is the least difficult aspect of implementation of the customs union. Achievement of progress in trade facilitation and reduction in NTBs will require a serious commitment to improving institutions, which

⁷ For example, China and India began to experience rapid economic growth only after they liberalized.

⁸ In principle, both trade facilitation and NTBs could be addressed without the common external tariff or a customs union agreement. But the customs union agreement has energized these negotiations, and it may be what is required to get serious engagement by Russia on these issues. The question is, will there be enough progress in these areas to compensate Kazakhstan for the costs of the common external tariff?

in some member countries in some sectors are plagued by rent seeking. But these results indicate that in order for Kazakhstan to achieve a positive outcome from participating in the customs union, it is crucial for it to work together with its partners on the reduction of trade-facilitation and border cost barriers as well as on the reduction of NTBs, including SPS conditions as NTBs.

Comparison with and Relative Importance of WTO Accession

16. In previous work, we have estimated that WTO accession would result in real income gains to Kazakhstan of 6.7 percent of consumption (see box 1). These gains are between four and five times larger than the most optimistic projections for the customs union. The gains come mainly from reforms of barriers to foreign direct investments (FDIs) in the services sectors, but there are also gains from a reform of tariffs, from improved market access, and from reform of local content regulation. Even though these policies differ from the policies we analyze here, the relative size of the gains suggest that it is important for Kazakhstan to remain focused on integration in the world trading environment, especially through negotiating WTO accession.

Box 1: Comparison with Previous Analysis of WTO Accession for Kazakhstan

In previous work, we have analyzed the impacts of WTO accession on Kazakhstan (see Jensen and Tarr 2008). We argue that the gains to Kazakhstan from WTO accession derive from four principal effects. First would be improved access to the markets of non-CIS countries in selected products. Kazakhstan will have improved rights under antidumping and countervailing duty investigations in its export markets, which is the source of the improved access we analyze. Second, tariff reductions on goods will induce improved domestic resource allocation and increase the number of varieties of imports in imperfectly competitive sectors. The latter will increase total factor productivity in downstream sectors. Third, reduction in barriers against multinational service providers will increase the number of service varieties available in Kazakhstan. The increase in variety will raise total factor productivity in sectors that use business services. Fourth, would be elimination of local content policies in the oil sector and simultaneous exemption of the value-added tax(VAT) for multinational oil company purchases of Kazak inputs.

We estimate that the gains to Kazakhstan from WTO accession are 6.7 percent of Kazak consumption (or 3.7 percent of gross domestic product, GDP). FDI liberalization in services accounts for 70 percent of the total gains from Kazak WTO accession. Specifically, the gain of 6.7 percent can be disaggregated into gains from (1) improved market access—0.5 percent) (2) tariff reform—0.4 percent, (3) FDI liberalization in services—4.9 percent, and (4) combined VAT and local content reform in the oil sector—0.9 percent of consumption. Thus, while improving its offer to foreign service providers within the context of the General Agreement on Trade and Services (GATS) may be a difficult aspect of Kazakhstan’s negotiation for WTO accession, our estimates suggest that the most important component of WTO accession for Kazakhstan in terms of the welfare gains is liberalization of its barriers against FDI in services sectors. The improved business services in Kazakhstan will lead to better productivity and competitiveness of manufacturing in Kazakhstan.

Services commitments are fundamental to WTO accession but the customs union does not include them. Therefore, the major difference between the WTO accession study and the present one is that the latter does not include any assessment of liberalization of services barriers. Also, in the WTO study we analyzed a 50 percent reduction in the tariffs that applied in the year 2005. The current study analyzes an increase from 2009 tariffs to 2011 tariffs. Most 2011 tariffs are significantly higher than both the corresponding 2009 and 2005 tariffs. Higher tariffs impose larger welfare costs. Since WTO accession would result in greater tariff reductions today than in 2005, the estimated welfare gains from tariff reduction in a study of WTO accession would likely be larger if estimated with the tariffs of 2011.

The two studies also differ in their focus. The WTO study not only covered tariffs and services commitments but also examined regulations in the oil sector. It was based on assumptions of likely agreements without knowledge of actual commitments. The present study examines potential gains from trade facilitation and the reduction of nontariff barriers that were not considered in the WTO study.

Future Research

17. There are several areas where this type of analysis could be extended to obtain additional policy insights. We outline three potential projects here:

1. What are the likely impacts of a common economic space on Kazakhstan? Notably, it would be useful to assess the impact of preferential commitments in services or preferential access to government procurement in a possible common economic space among the members of the customs union.
2. How can the three major developments affecting the trade of Kazakhstan be combined and modified to maximize the benefits to the growth and development of the country and develop its industrial structure? Kazakhstan is (i) moving toward deep integration with Russia and Belarus, (ii) negotiating accession to the WTO, and (iii) expanding trade with the growing economic giant on its border, China. How will these multiple changes, separately and together, impact the likely future industrial structure, growth, and development of Kazakhstan? And how can these multiple changes be modified to yield maximum benefits to Kazakhstan?
3. How will the customs union impact industrial development in the Kyrgyz Republic and Tajikistan, and how will this feedback and impact Kazakhstan?

Outline of the Paper

18. The paper is organized as follows. In section II, we provide an overview of the model. We discuss data in section III and present central results in section IV. Sensitivity results, both piecemeal and systematic, where we execute the model 30,000 times, are presented in section V, and section VI offers conclusions. In appendix A, we discuss the trade data in some detail. We document our estimates of the Dixit-Stiglitz elasticities in goods and the estimation of the reduction in border costs in appendices B and C, respectively. Appendix D documents the estimation of nontariff barriers in Russia and Kazakhstan, and appendix E summarizes the literature on technology diffusion and trade. Appendix F is a detailed analysis of the changes in the tariff rates in Kazakhstan as a result of implementation of the common external tariff of the customs union, with and without exceptions. Crucially, it calculates the ad valorem equivalents of the specific tariffs.

1. Overview of the Model

1.1. Given the importance of our estimates of the possible gains from trade facilitation, border costs, and nontariff barriers, we begin this section with a summary of our estimates of these barriers and their possible reduction. We then continue with a discussion of the structure of the model.

Trade-facilitation and Border Costs

1.2. Kazakhstan ranks 176th in the world out of 183 countries when it comes trading across borders, according to the 2011 World Bank Doing Business Survey.⁹ The ranking is due mainly to high costs (measured in US dollars per container), the time it takes to export and import (measured in days), and also the large number of necessary documents.

1.3. The costs of exporting and importing in Kazakhstan are comparable to those in the other central Asian countries. Clearly, part of the higher border costs of Kazakhstan is due to the natural geographic disadvantage of being both landlocked and being far from the major markets of the world, notably the European Union. There is a Central Asia effect in the border costs of Kazakhstan, and we cannot expect Kazakhstani border costs to fall to the level of countries that are better situated. On the other hand, parts of the higher costs are due to weak institutions. Clearly, the poor score of Kazakhstan on the number of documents required for importing and exporting (which may also reflect red tape in the acquisition of documents) is unrelated to geography and potentially can be improved by a better institutional framework. Further, the geographic disadvantage is magnified by delays at the borders themselves and the alleged corruption on the roads by traffic police in the region, who extract bribes. The customs union has as its goal the elimination of trade borders among the members, European Union style, thereby eliminating delays at the borders for trade within the customs union. Further, to the extent that the bribes are extracted on trucks in transit in the union, we could assume in an optimistic scenario that this would improve. Since oil and gas are transported through pipelines, and are less susceptible to delays at the border or bribe payments in transit, we assume that the potential for the reduction of trade costs on the export and import of these goods is negligible. In sum, the customs union could lower border costs by (1) eliminating trade borders within the union, (2) reducing the number of documents required for importing and exporting and the difficulty in obtaining the documents, and (3) reducing corruption on the roads within the union.

1.4. Clearly, successfully addressing the challenge of reducing border costs is a major task that requires significant institutional development both within the customs union in general and within Kazakhstan in particular. It is very difficult to speculate on the success the customs union will have with the reduction of border costs. We assume two extremes, with the understanding that the ultimate result is likely to be between them, depending on the commitment and effectiveness of the customs union in addressing these issues. In one extreme (a pessimistic extreme) we assume that Kazakhstan does not realize any reduction of its border costs as a result of the customs union. In the other (optimistic) extreme, we assume that Kazakhstan could reduce its border costs by 25 percent for trade within the customs union on products other than oil, gas, and minerals. Since most oil and gas travels through pipelines, they are subject to much fewer border delays and less corruption in transit. Thus, there is less room for institutional improvement to reduce their transport

⁹ See www.doingbusiness.org/rankings.

and border costs, and we assume that these costs will not be reduced. For other products, we assume in the optimistic scenario that the customs union would reduce the border costs by 25 percent from 12 percent to 9 percent of the value of trade within the customs union. See appendix C for details of the calculations.

1.5. Some aspects of improved institutions for trade facilitation within the customs union may also reduce border costs on trade with third countries. For example, if Kazakhstan reduces red tape and the number of documents required for importing and exporting within the union, it may adopt similar more efficient procedures for trade with third countries. On the other hand, clearly Kazakhstan will maintain customs posts with countries not members of the union, even if they are eliminated among the union members. Further, given that the customs union authorities will monitor trade within the union much more carefully, it is possible that not all institutional reforms in trade facilitation will transmit to trade outside the union. So, in the optimistic scenario, we shall assume that the border costs of exporting to or importing from outside the customs union will fall by 10 percent on products other than oil, gas, and minerals. Details are in appendix C.

1.6. Crucially, we do not assume that these extremes will occur with equal probability or that any outcome between these extremes occurs with uniform probability.

Nontariff Barriers

1.7. The Russia-Belarus-Kazakhstan customs union has taken on the challenge of reducing nontariff barriers (NTBs) within the union borders. NTBs potentially include a wide range of measures. Among the most important are licensing or quotas on imports or exports; state control or monopoly control of imports or exports; state subsidies on production or exports; and technical regulations, including sanitary and phyto-sanitary (SPS) measures, that may be barriers to trade.

1.8. Although we do not exclude other NTBs in our estimation procedure, based on our interviews with the government and the business community in Kazakhstan, as well as written reports by experts such as Racine (2011) and Maliszewska et al. (2009), the most important NTBs are standards, technical regulations, and SPS measures used as a protective or rent-seeking measures. In international practice of developed market economies, the vast majority of standards are voluntary standards, typically developed by industries for the standards of their suppliers. In developed market countries, technical regulations of goods refer to mandatory regulations of the government necessary to ensure health and safety. If health and safety considerations are not present, developed market economies do not impose legally mandated regulations, but use voluntary market determined standards.

1.9. During the Soviet period, without a market to monitor quality, virtually all product standards were obligatory government regulations. As a legacy of the former Soviet Union, gosudarstvennyy standart (GOST) standards are still used in several CIS countries to varying degrees. Further, international technical regulations are generally much less prescriptive than the GOST regulations and less demanding in terms of certification (Racine 2011). For example, GOST regulations may stipulate how the product is produced, not just the health and safety aspects of the products.

1.10. Russia adopted the law “On Technical Regulations” in 2003, under which it announced its intention to convert its technical regulations to European Union and international standards and to

switch standards to a voluntary system. Progress, however, has been very slow. The Russian system still appears dominated by mandatory standards, and Maliszewska et al. (2009) reported that there were more than 25,000 such standards in 2008. Russia requires that many products imported into Russia have a certificate of conformity issued by its Federal Agency for Technical Regulation and Metrology. Russia does not recognize internationally accepted certified products and undertakes their testing and mandatory certification in accordance with Russian standards. Certificates of product conformity issued in Kazakhstan for Kazakhstani exporters will often not be recognized in Russia.¹⁰ Further, producers in Kazakhstan often have to produce to one standard for the domestic market, another standard for exports to Russia, and potentially other standards for other markets, raising their costs of production. Finally, some Kazakhstani food exporters have reported situations in which they were required to pay Russian agencies for inspections of their facilities, under threat of denial of market access, and they have alleged that the fees for the inspections appeared excessive.

1.11. Although Kazakhstan has also formally announced its intention to convert to EU standards, Kazakhstan has a mix of standards including domestic, GOST, EU and international standards. GOST standards, however, still dominate (Racine 2011). Kazakhstan and the other members of the customs union maintain their own lists of goods subject to mandatory regulation. The integration of these lists is very limited as of 2011. Thus, importers into Kazakhstan also face problems. Kazakhstani businessmen allege that the problems are less severe for imports into Kazakhstan than for their exports to Russia, but nonetheless they raise the costs of importing into Kazakhstan, which raises the costs of doing business in Kazakhstan.

1.12. The customs union is charged with the responsibility for defining common technical regulations and SPS conditions. Moreover, we could hope that the customs union will develop a system of mutual recognition of certificates of conformity. It will be necessary to develop the national quality infrastructure among the member countries and have the various laboratories and metrology facilities recognized throughout the union. The institutional development requires substantial resources, for example, for training of personnel and for purchasing testing equipment. So far, progress on defining common technical regulations and SPS conditions throughout the union has been very slow. But if progress could be made in this area, it would lead to substantial benefits in terms of reduced costs of production for exports and imports.

1.13. In appendix D, we present details of the quantitative estimate of the ad valorem equivalents of NTBs in Russia and Kazakhstan. We rely on the work of Kee et al. (2009) and the updating Kee and her colleagues present on the World Bank trade research website.¹¹ Estimates are available of the ad valorem equivalents of the NTBs in 101 countries, including Russia, Kazakhstan, and Belarus. For each of these countries, the NTBs are estimated for the more than 4,500 tariff lines in the Harmonized System and these are organized into aggregates for all manufacturing and all agriculture.

1.14. We assume that while Russia offers tariff free access to exporters from Kazakhstan, it does not offer preferences with respect to its NTBs. Then exporters from Kazakhstan, who want to sell in Russia, face the barriers that are present in Russia for all suppliers. We assume that these are lost resources to exporters from Kazakhstan. That is, either the rents from the NTBs are dissipated or, if there are any rents on the NTBs, they are not captured by exporters from Kazakhstan. Based on the

¹⁰ See Maliszewska et al. (2009) for more details on the Russian standards regime.

¹¹ See go.worldbank.org/FG1KHXP30.

development of institutions such as mutual recognition agreements, we assume in the optimistic scenario that these barriers are cut on exports from Kazakhstan to Russia by 50 percent. We assign zero barriers to oil, gas, and minerals on the presumption that these goods flow largely unencumbered by NTBs. The values of the barriers faced by exporters from Kazakhstan in the customs union in 2009 and in the optimistic scenario are listed in table 4. For example, Kazakhstani exporters of manufactured products, such as wood products, face a higher cost of exporting to Russia of 10 percent, which will be reduced to 5 percent in an optimistic scenario.

1.15. Similarly, the estimates indicate that there are NTBs on imports into Kazakhstan. Despite obtaining tariff-free access to the markets of Kazakhstan, we assume that exporters from Russia and Belarus do not obtain preferential access regarding the NTBs. We assume that the rents of these exports are either dissipated or not captured by Kazakhstani importers. We assign zero barriers to oil, gas, and minerals on the presumption that these goods flow largely unencumbered by NTBs. The values of the barriers faced by importers into Kazakhstan in the customs union in 2009 and in the optimistic scenario are listed in table 4. For example, Russian exporters of manufactured products to Kazakhstan (such as wood products) face an NTB that raises their costs by 5.7 percent in 2009, but will fall to 2.9 percent in the optimistic scenario.

Structure of the Model

1.16. Our model builds on the algebraic structure of the models of Jensen and Tarr (2010) and Balistreri and Tarr (2011). A full algebraic description of the model is available in the latter. Here we provide a general description of the structure described there and provide more details where we depart from that structure. There are 57 sectors in the model shown in table 1. These include 18 imperfectly competitive goods sectors and 39 competitive goods and services sectors. The cost, production, and pricing structures in the two categories of sectors differ widely.

1.17. Labor and capital are the two primary factors of production. In each imperfectly competitive sector there is sector-specific capital that is unique to production from each region in the model. The existence of sector-specific capital in the imperfectly competitive sectors implies that there are decreasing returns to scale in the use of the mobile factors and that supply curves in these sectors slope up. In our central model, we assume that 50 percent of the capital in each of the imperfectly competitive sectors is sector specific. As in Balistreri and Tarr (2011), we disaggregate the rest of the world into four regions. In this case the four regions are (1) the customs union (Belarus and Russia), (2) the rest of the CIS plus Georgia, (3) the EU, and (4) the rest of the world. In the imperfectly competitive sectors, this requires introducing different firm types with distinct cost structures for each region. We retain the small open economy model framework, so only Kazakhstan is modeled fully.

Perfectly Competitive Goods and Services Sectors

1.18. Regardless of sector, all firms minimize the cost of production. In the 39 competitive goods and services sectors, goods or services are produced under constant returns to scale and where price equals marginal costs with zero profits. In these sectors, products are differentiated by country of origin, i.e., we employ the Armington assumption. All goods-producing firms (including imperfectly competitive firms) can sell on the domestic market or export. Firms optimize their output decision between exports and domestic sales based on relative prices and their constant elasticity-of-

transformation production function. Having chosen how much to allocate between exports and domestic sales, firms also optimize their output decision between exports to the three possible export regions, based on relative prices in the three regions and their constant elasticity-of-transformation production function for shifting output between the regions.

Goods Produced Subject to Increasing Returns to Scale

1.19. We have 18 goods in this category in the model. These goods are differentiated at the firm level. We assume that these goods may be produced domestically or imported for firms in any region in the model. Firms in these industries set prices such that marginal cost (which is constant) equals marginal revenue, and there is free entry, which drives profits to zero. For domestic firms, costs are defined by observed primary factor and intermediate inputs to that sector in the base year data. Foreigners produce the goods abroad at constant marginal cost but incur a fixed cost of operating in Kazakhstan. The delivered import price of foreign goods is simply defined by the import price, and, by the zero profits assumption, in equilibrium the import price must cover fixed and marginal costs of foreign firms. Domestic firms set prices using the Chamberlinian large group monopolistic competition assumption within a Dixit-Stiglitz framework, which results in constant markups over marginal cost for both foreign firms and domestic firms.

1.20. Unlike Jensen, Rutherford, and Tarr (2007), but following Jensen, Rutherford, and Tarr (2010), all imperfectly competitive domestic firms (both goods and services producers) face a downward sloping demand curve in each of their three export markets. Consistent with firm level product differentiation, we assume that the elasticity of demand in each of the export markets is the Dixit-Stiglitz elasticity of demand. Firms set marginal revenue equal to marginal costs in each of the three export markets; then the export markets contribute to the quasi-rents of the firm and affect the entry and exit decisions of firms.

1.21. Introducing downward sloping demand curves into the model means that there are possible terms-of-trade effects to consider in this model that were not present in the Jensen, Rutherford, and Tarr (2007) model. Balistreri and Markusen (2009) have shown, however, that there should be virtually no role for optimal tariffs to exploit terms-of-trade effects. The reason is that, unlike perfectly competitive firms, imperfectly competitive firms are pricing such that marginal revenue equals marginal costs on export markets, which is the objective of optimal tariffs.

1.22. For simplicity we assume that the composition of fixed and marginal cost is identical in all firms producing under increasing returns to scale. This assumption in a Dixit-Stiglitz-based Chamberlinian large-group model ensures that output per firm for all firm types remains constant, i.e., the model does not produce rationalization gains or losses.

1.23. The number of varieties affects the productivity of the use of imperfectly competitive goods based on the standard Dixit-Stiglitz formulation. The effective cost function for users of goods produced subject to increasing returns to scale declines in the total number of firms in the industry.

2. Data of the Model and Evidence for Key Elasticities

Input-Output Matrix

2.1. The core of the model data consists of the official input-output table for 2009 from the Agency on Statistics of the Republic of Kazakhstan. The table has details for production, intermediate demand, and value added in 57 sectors. For each sector, the table also reports import supply and final demands by households, by the government, for investments and for exports. There are also accounts for both trade and transport margins. Table 2 shows the sectors' contributions to GDP, and table 3 reports their importance for imports and exports. The tables clearly show that crude oil and natural gas dominate, with respect to both production and exports. Other important sectors in Kazakhstan include agriculture, food and beverages, and the metallurgical industry.

Trade Data by Regional Partner and Sector

2.2. To obtain the shares of imports and exports from the different regions of our model, we used trade data provided by the Customs Control Committee of the Ministry of Finance of Kazakhstan. The data are for the year 2009 and show exports and imports by country and commodity.

2.3. The regions of our model are Kazakhstan, the customs union (Belarus and Russia), the rest of the CIS plus Georgia, the European Union, and the rest of the world. For the rest of the CIS, we include Armenia, Azerbaijan, Kyrgyzstan, Republic of Moldova, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. For the European Union, we took the 27 member countries as of 2007. "Rest of the world" is the residual. The data are reported at the 10-digit level. We mapped and aggregated the detailed trade data into the sectors of our model. See appendix A for further details.

2.4. The trade shares for imports and exports are reported in table 5. The importance of the four regions of our model depends on the sector. Overall, roughly half of all imports in 2009 came from other CIS countries, with around three-quarters originating in Russia and Belarus. Almost 85 percent of all exports in 2009 went outside the CIS, and half of the rest went to Russia. Exports to Belarus are a tiny proportion.

Tariff Data

2.5. For tariff rates by sector of our model we use data developed in Shepotylo (2011) and reproduced as appendix F. For this project, he calculated the tariff changes Kazakhstan has implemented to apply the common external tariff and the tariff changes it will implement to eliminate the exceptions. He found that by early 2011, the average external tariff of Kazakhstan increased by about 78 percent on a trade-weighted basis from its pre-customs union 2009 level; the dispersion of the tariff increased as well. When the exceptions to the common external tariff are fully eliminated, tariffs will almost double on a trade-weighted basis from their 2009 level.

2.6. Shepotylo calculates two sets of aggregate tariff rates at the level of sectors in our model. One is a set of simple (unweighted) averages, and the other is a set weighted averages, where the weights are the shares of the total value of imports of each tariff line. Both approaches have their merits as measures of economic distortions. When we apply the rates for 2009 to the 2009 imports from the EU

and the rest of world in our model we arrive at total tariff revenues in excess of the actual collected revenues for 2009 (85 billion tenge, or 0.5 percent of GDP).

2.7. We use the weighted averages as our central case. In this case, actual total revenue is 76 percent of total tariff revenue in the model. Consequently, we scale all tariff rates proportionately by 0.76 and arrive at the tariff rates reported in table 4.

Estimates of the Dixit-Stiglitz Elasticities of Substitution for Goods

2.8. To obtain estimates of the Dixit-Stiglitz elasticities for the imperfectly competitive sectors in our model we use data provided by Broda et al. (2006). They estimate Dixit-Stiglitz product-variety elasticities of substitution for 73 countries according to the Harmonized System (HS) classification at the three-digit level. There are no CIS countries in their sample, but they do estimate elasticities for Algeria. Like Kazakhstan, Algeria has an economy in which oil production and exports are dominant activities. We choose Algeria as our proxy for Kazakhstan.

2.9. We explain in appendix B how we mapped the three-digit elasticities for 130 goods sectors estimated by Broda et al. into the sectors of our model. The resulting elasticities by relevant sector in our model are shown in tables 18 and 19. Most estimates are between 3 and 7. For estimates above 12, we classify the sector as exhibiting constant returns to scale.

Elasticities of Varieties with Respect to Price

2.10. The literature shows that the purchase of intermediate inputs and FDI from industrialized countries is an important mechanism for the transmission of research and development (R&D) and productivity growth in developing countries. For small developing countries, trading with large technologically advanced countries is crucial for total factor productivity (TFP) growth.

2.11. In our model, the parameter that reflects the ability of a region to increase TFP through the transmission of new technologies is the elasticity of varieties with respect to the price. Schiff and Wang (2008) show that the average impact of trade-related R&D in developing countries on TFP growth is about a third of the average impact of trade-related R&D in developed countries. The impact of trade-related R&D in developed countries on TFP growth in Schiff and Wang (2008) is higher than the estimate reported in Coe et al. (1997) and lower than the estimate in Savvides and Zachariadis (2005).

2.12. Based on these considerations, we assume that trade by the customs union members with the CIS region is only one-fifth as valuable as trade with the rest of the world, while trade with the EU is two-thirds as valuable as trade with the rest of the world. This distinction between countries and regions reflects the allocation of the world's R&D expenditures. As discussed above, the overwhelming majority of R&D expenditures take place in industrial countries, which in our model are part of the EU and "rest of the world" regions. The estimates of supply in the model are reported in table 6. See appendix E for further details.

3. Results for the Customs Union

3.1. We execute three scenarios to assess the impacts of the customs union on Kazakhstan. The first, Customs Union Current (as of spring 2011), reflects the customs union with the common external tariffs as of 2011. Kazakhstan has implemented the common external tariff with exceptions, but has made very little progress on trade facilitation or nontariff trade barriers (NTBs).

3.2. For future possibilities, we present two extreme scenarios. One is the Customs Union Future—Pessimistic Outlook. In this pessimistic extreme we assume that Kazakhstan will fully implement the common external tariff by eliminating the remaining exceptions but that the country does not realize any reduction of its trade-facilitation costs, and NTBs are not reduced.

3.3. The other scenario is Customs Union Future—Optimistic Outlook. In this extreme, we assume that Kazakhstan fully implements the common external tariff, and we also assume that trade-facilitation costs and NTBs are substantially reduced in the customs union.

Overall Effects: Losses or Gains?

3.4. We find that the impact of raising the common external tariff changes in spring of 2011 is to reduce the real income of Kazakhstan by about 0.2 percent of consumption (see table 7 for a summary of the aggregate effects). As explained in appendix F, the average tariff rate increases by 78 percent, and tariff revenues roughly double (an increase of 94 percent). Higher costs of importing from outside the customs union and the CIS divert trade to these regions. This increases imports costs for businesses and consumers, and under the tariff umbrella resources are shifted to areas of inefficient production. Consequently, we estimate that the customs union has depressed real wages by 0.5 percent and depressed the real return on capital in Kazakhstan by 0.6 percent. Kazakhstan trades more with the members of the customs union and the CIS and less with the rest of the world, resulting in less imported technology from the more technologically advanced regions. This leads to a loss of long-run productivity gains.

3.5. Looking to the future, additional losses will come when the transition period for the tariffs on 409 product lines end in 2015. Tariffs will increase further for certain products, for example, antibiotic medicine, apples, and certain electrical parts. This leads to effects similar to the effects of the already implemented tariff changes. In the Customs Union Future—Pessimistic Outlook scenario, we find that this reduces the real income of Kazakhstan by another 0.06 percent of consumption to a total of 0.3 percent of consumption.

3.6. The future also offers potential gains that may or may not outweigh the losses from the tariff changes. In the Customs Union Future—Optimistic Outlook we not only include the common external tariff but also lower trade-facilitation costs in importing to or exporting from Kazakhstan (to customs union members and to third countries) and lower NTBs in the customs union. Lower trade-facilitation costs and NTBs both save resources and thus reduce the costs of importing and exporting. We estimate that the real income of Kazakhstan would increase by about 1.5 percent of consumption in this scenario. The reduced trade-facilitation costs contribute rather substantially, with about 1.4 percent of the value of Kazakhstani consumption. These gains are large since the reduced costs apply

to both imports and exports as well as to existing and additional trade, and to some extent they will apply on trade with third countries as well. The gains from reduced NTBs are around 0.4 percent and roughly offset the losses from the full implementation of the common external tariff.

3.7. Again, we do not assume that the two extremes—the pessimistic and the optimistic outlooks—will occur with equal probabilities or that any outcome between these extremes occurs with equal probability. Implementation of the common external tariff is the least difficult aspect of implementation of the customs union. Achievement of progress in trade facilitation and reduction in NTBs will require a serious commitment to improving the institutions, which in some member countries in some sectors are plagued by rent seeking. But these results indicate that in order for Kazakhstan to achieve a positive outcome from participating in the customs union, it is crucial for it to work together with its partners on the reduction of trade-facilitation and border costs barriers as well as on the reduction of NTBs.

Sector Impacts

3.8. In table 8, we present results for the percentage change in output and labor income by sector for our three main scenarios: Customs Union Current (as of spring 2011) and the two Customs Union Future scenarios. Details of what is included in these scenarios are explained in table 7.

3.9. Given that we assume that total employment and the capital stock are fixed in the medium term, if labor expands in some sectors, it must contract in others. And given the expansion in several sectors, we must have declines in others.

3.10. The sectors that expand depend on the scenario. In the scenario with 2011 tariffs only, we estimate that most of manufacturing sectors expand, with wearing apparel, furniture, machinery and equipment, motor vehicles, and transport equipment expanding the most due to the increased protection. The tobacco sector declines slightly due to lower protection. Most service sectors decline since they do not benefit from the increased protection and they become relatively less profitable compared with the sectors receiving increased protection.

3.11. Higher tariffs increase the costs of imports, and this reduces import demand, which in turn leads to an appreciation of the exchange rate. The appreciation reduces the return to exports and this affects the export-intensive sectors the most, most notably oil and gas exports.

3.12. The results are similar for most goods when the transition period ends (see the Customs Union Future—Pessimistic Outlook scenario). Major examples of goods with transition periods are antibiotic medicine, in which the tariff rate increases from 0 percent to 15 percent; apples (from 5 percent to 37.5 percent); and certain electrical parts (from 0 percent to 15 percent). When aggregated to the sectors of the model, the tariff rates increase by up to 4 percent in the agricultural and chemical sectors. The sector changes for imports and output are similar to the scenario with current 2011 tariffs. The major exceptions are the agricultural and chemicals sectors, where domestic production again benefits from increased protection, and where imports from customs union and the rest of the CIS and production in Kazakhstan replace imports from the EU and the rest of the world.

3.13. In the Customs Union—Optimistic Outlook scenario, the output expansion in manufacturing is somewhat larger at the sector level due to lower trade-facilitation costs in importing to or exporting from Kazakhstan (to customs union members and to third countries) and lower NTBs in the customs

union. The chemicals and leather products sectors expand much more than in the earlier scenarios. On the other hand, some manufacturing sectors that had expanded in the Pessimistic Scenario contract—including wood products, paper and printing, and rubber and plastic products.

3.14. Tables 9 through 17 report detailed results by region for imports, exports, and the number of firms. The results for imports for the Custom Union Current scenario shows the diversion of imports to producers in the customs union and the rest of the CIS as a result of the higher 2011 tariffs. The results for the number of firms show the loss of manufactured goods varieties from both the EU and from the rest of the world, with an associated loss of productivity from the loss of better technologies. The changes in imports and number of firms are magnified for the agricultural and chemical sectors when the transition period ends (reported in the customs union Future—Pessimistic Outlook scenario).

3.15. Imports and exports are different in the Customs Union—Optimistic Outlook scenario. This scenario includes lower NTBs, which drives a shift in both imports and exports toward the members of the customs union. The scenario also includes lower trade-facilitation costs, and as these costs also decrease for trade with third countries, imports from and exports to all countries benefit.

4. Sensitivity Analysis

4.1. In this section we assess the impact of parameter values and key modeling assumptions on the results. Through our “piecemeal sensitivity analysis” we will determine the most important parameters for the results, and we will assess how important the results are for rent capture or additional varieties from reform in services sectors under increasing returns to scale. In the piecemeal sensitivity analysis, we change the value of a single parameter while holding the values of all other parameters unchanged at our central elasticity values. We present piecemeal sensitivity analysis of the two most relevant policy scenarios. In table 18 we examine the pessimistic and in table 19 we examine the optimistic scenarios for the customs union.

4.2. Given the uncertainty of parameter values, point estimates of the results may be viewed with skepticism. In our “systematic sensitivity analysis,” we execute 30,000 simulations. In each simulation, we allow the computer to randomly select the values of all parameters, subject to the specified probability distributions of the parameters. Through the systematic sensitivity analysis we will be able to assess how robust the results are and obtain confidence intervals of the results.

Piecemeal Sensitivity Analysis

4.3. Two parameters stand out as having a strong impact on the results. The elasticity of substitution between firm varieties in imperfectly competitive goods sectors, $\sigma(q_i, q_j)$ has a very strong impact. Following from the Le Chatelier principle, larger elasticities typically lead to larger welfare gains in response to welfare-improving reforms, as the economy can adapt more readily. Unlike other elasticities, however, a lower value of $\sigma(q_i, q_j)$ increases can, and usually does, increase the welfare gains. This is because lower values of this elasticity imply that varieties are less close to each other, so additional varieties are worth more.

4.4. For the customs union scenarios, a strong impact comes from changes in the supply elasticities ε . Larger values of these parameters mean the new tariff policies that open new opportunities for firms to provide new varieties (mainly firms from Kazakhstan, Russia, and Belarus) will not be so quickly choked by the increased cost of the specific factor required for expansion. Similarly, the new tariff policies that reduce opportunities for EU and rest-of-the-world firms will reduce the supply of varieties to a larger extent with large values of these parameters.

Systematic Sensitivity Analysis

4.5. In the systematic sensitivity analysis, we execute the model 30,000 times and harvest the results for desired variables. In each individual simulation, we allow the computer to select values of all the parameters in the model (the parameters in table 18), based on the specified probability density functions (PDFS) of the parameters. We assume uniform probability density functions, with upper and lower values of the PDFS given by the upper and lower values in the piecemeal sensitivity analysis table.

4.6. Figure 1 shows the welfare results for the Customs Union Future—Pessimistic Outlook scenario. A 95 percent confidence interval for the gain in equivalent variation as a percentage of consumption is -0.23 percent to -0.32 percent. There are no simulations with positive estimated welfare changes. In figure 2 and figure 3, we show “box and whisker” diagrams for the sample distribution of the percentage change in output and labor income by sector. Sectors are on the horizontal axis and the percentage change in output is shown on the vertical axis. The bars in the box are the means of the distributions. Fifty percent confidence intervals are depicted by the boxes, while the vertical lines show 95 percent confidence intervals.

4.7. The means of the systematic sensitivity results show a similar pattern to the point estimates. While the confidence intervals are rather tight for most sectors (95 percent confidence intervals for the significantly expanding sectors are virtually all positive), they reveal some uncertainty for the sectors expanding and contracting the most.

4.8. The results for the Customs Union Future—Optimistic Outlook scenario on welfare, output, and labor are shown in figures 4 through 6. A 95 percent confidence interval for welfare (equivalent variation as a percentage of consumption) is 1.44 to 1.63. There are no simulations with negative value for equivalent variation. Regarding output and labor by sector impacts, the sensitivity analysis again shows rather tight confidence intervals for most sectors.

5. Conclusions and Extensions

5.1. For this report we have developed an innovative, small, open economy computable general equilibrium model of the Kazakhstan economy, with which we have assessed the impact on Kazakhstan of its participation in the customs union with Belarus and Russia. We estimate that implementation of the common external tariff of the customs union is a cost to Kazakhstan of joining the customs union—a cost that it has already begun to pay. The cost, however, could potentially be overcome, and the customs union could produce a net benefit, provided it can achieve a successful outcome on trade facilitation and reductions in NTBs. Kazakhstan has already implemented the common external tariff with exceptions. But achievement of progress in trade facilitation and reduction in NTBs poses enormous challenges. It will require a serious commitment from the authorities in all the member countries to improve the relevant institutions, which in some member countries in some sectors are plagued by rent seeking. These results indicate that in order for Kazakhstan to achieve a positive outcome from participating in the customs union, it is crucial for it to work together with its partners on the reduction of trade-facilitation and border-costs barriers as well as on the reduction of NTBs.

5.2. In previous work, we have estimated that WTO accession would result in real income gains to Kazakhstan of 6.7 percent of consumption (Jensen and Tarr 2008). These gains are between four and five times larger than the most optimistic projections for the customs union. The gains suggest that it is important for Kazakhstan to remain focused on integration in the world trading environment, including negotiating WTO accession.

5.3. Finally, there are plans for the customs union to evolve toward a common economic space. Although it is not clear precisely what would be involved in this space, it is natural to consider commitments to foreign investors in services as part of that deeper preferential agreement. The implications of preferential commitments in services have not been analyzed as part of this analysis, but they would be a useful extension of the analysis for future work.

5.4. In appendix G, we discuss further this potential extension as well as the two additional projects mentioned in the Executive Summary. The latter two projects would require the development of a multiregion trade model.

Table 1: List of Sectors, Factors, and Regions in the Model of Kazakhstan

Dixit-Stiglitz Goods	Other Goods and Services
Other mining	Agriculture and hunting
Tobacco products	Forestry
Textiles	Fishing
Wearing apparel	Mining of coal and lignite
Wood products	Crude oil and natural gas
Refined petroleum	Mining of metals
Chemical industry	Food and beverages
Rubber and plastic	Leather products
Other mineral products	Pulp and paper
Metallurgical industry	Publishing and printing
Metal products	Office machinery
Machinery and equipment	Recycling
Electrical machinery	Electricity, gas, and hot water
Radio and television	Water
Precision instruments	Construction
Motor vehicles and trailers	Trade in motor vehicles
Other transport equipment	Wholesale trade
Furniture and other products	Retail trade
	Hotels and restaurants
Factors of Production	Land transport
Labor	Water transport
Capital	Air transport
	Auxiliary transport services
Regions	Communications
Kazakhstan	Financial intermediation
Customs Union: Russia and Belarus	Insurance
Other CIS plus Georgia	Auxiliary financial services
EU: The 27 members of the European Union	Real estate
Rest of the World: All other countries	Renting of machinery
	Computer technologies
	Research and development
	Other services
	Government
	Education
	Health and social services
	Sewage and waste
	Public associations
	Recreation, culture, and sports
	Personal service

Table 2: Sectoral Value-Added

	Capital (%)	Labor (%)	GDP	
			Bn Tenge	% of total
Agriculture and hunting	83.0	17.0	1121.7	6.4
Forestry	49.4	50.6	6.8	0.0
Fishing	70.5	29.5	11.0	0.1
Mining of coal and lignite	70.1	29.9	135.3	0.8
Crude oil and natural gas	88.5	11.5	2816.3	16.2
Mining of metals	65.4	34.6	396.4	2.3
Other mining	39.2	60.8	38.7	0.2
Food and beverages	70.6	29.4	496.0	2.8
Tobacco products	68.8	31.2	59.1	0.3
Textiles	46.2	53.8	16.1	0.1
Wearing apparel	43.9	56.1	6.0	0.0
Leather products	68.9	31.1	3.4	0.0
Wood products	65.8	34.2	8.4	0.0
Pulp and paper	49.7	50.3	10.2	0.1
Publishing and printing	47.4	52.6	36.9	0.2
Refined petroleum	78.2	21.8	256.8	1.5
Chemical industry	53.1	46.9	50.4	0.3
Rubber and plastic	55.3	44.7	24.4	0.1
Other mineral products	45.7	54.3	82.0	0.5
Metallurgical industry	65.2	34.8	636.4	3.7
Metal products	67.2	32.8	54.0	0.3
Machinery and equipment	41.0	59.0	72.0	0.4
Office machinery	78.6	21.4	4.1	0.0
Electrical machinery	37.7	62.3	24.9	0.1
Radio and television	43.7	56.3	6.9	0.0
Precision instruments	61.4	38.6	5.7	0.0
Motor vehicles and trailers	70.2	29.8	4.3	0.0
Other transport equipment	32.5	67.5	63.3	0.4
Furniture and other products	74.6	25.4	6.5	0.0
Recycling	92.7	7.3	21.8	0.1
Electricity, gas, and hot water	55.5	44.5	326.7	1.9
Water	25.1	74.9	26.9	0.2
Construction	57.8	42.2	1581.2	9.1
Trade in motor vehicles	34.7	65.3	344.5	2.0
Wholesale trade	56.8	43.2	1587.2	9.1
Retail trade	25.9	74.1	499.0	2.9
Hotels and restaurants	52.2	47.8	155.3	0.9
Land transport	70.1	29.9	1080.5	6.2

	Capital (%)	Labor (%)	GDP	
			Bn Tenge	% of total
Water transport	67.8	32.2	12.7	0.1
Air transport	49.9	50.1	50.6	0.3
Auxiliary transport services	63.2	36.8	421.4	2.4
Communications	70.6	29.4	436.2	2.5
Financial intermediation	84.0	16.0	697.9	4.0
Insurance	64.8	35.2	72.4	0.4
Auxiliary financial services	73.9	26.1	26.4	0.2
Real estate	93.5	6.5	1524.7	8.8
Renting of machinery	54.9	45.1	90.8	0.5
Computer technologies	40.6	59.4	51.8	0.3
Research and development	20.9	79.1	63.6	0.4
Other services	44.2	55.8	685.5	3.9
Government	23.8	76.2	327.6	1.9
Education	24.3	75.7	388.4	2.2
Health and social services	26.6	73.4	232.3	1.3
Sewage and waste	55.2	44.8	30.1	0.2
Public associations	4.7	95.3	96.4	0.6
Recreation, culture, and sports	46.4	53.6	91.8	0.5
Personal service	71.1	28.9	46.6	0.3

Table 3: Trade Flows

	Imports			Exports		
	BnTenge	% of total	% of supply	BnTenge	% of total	% of supply
Agriculture and hunting	146.2	2.6	6.1	114.5	1.9	6.1
Forestry	0.0	0.0	0.0	0.0	0.0	0.0
Fishing	0.1	0.0	0.5	0.2	0.0	1.2
Mining of coal and lignite	3.1	0.1	1.0	13.1	0.2	5.2
Crude oil and natural gas	305.7	5.3	13.4	3492.9	59.3	70.1
Mining of metals	12.1	0.2	1.8	213.5	3.6	30.9
Other mining	6.6	0.1	8.5	23.7	0.4	32.2
Food and beverages	341.6	6.0	20.1	103.9	1.8	9.8
Tobacco products	20.8	0.4	14.6	3.8	0.1	5.4
Textiles	29.5	0.5	36.9	3.1	0.1	8.9
Wearing apparel	20.8	0.4	48.9	0.6	0.0	4.6
Leather products	11.9	0.2	57.5	49.3	0.8	93.3
Wood products	63.3	1.1	65.1	0.1	0.0	0.6
Pulp and paper	89.5	1.6	63.6	2.9	0.0	13.5
Publishing and printing	47.6	0.8	30.7	1.3	0.0	1.7
Refined petroleum	188.7	3.3	28.4	405.2	6.9	57.5
Chemical industry	476.1	8.3	65.2	39.0	0.7	33.8
Rubber and plastic	148.4	2.6	54.1	6.1	0.1	9.3
Other mineral products	125.6	2.2	34.8	21.7	0.4	12.6
Metallurgical industry	251.3	4.4	19.5	706.5	12.0	47.8
Metal products	221.4	3.9	49.6	6.1	0.1	4.6
Machinery and equipment	935.8	16.3	68.3	23.1	0.4	17.5
Office machinery	57.5	1.0	72.2	1.1	0.0	33.7
Electrical machinery	250.7	4.4	66.1	5.1	0.1	11.7
Radio and television	83.3	1.5	70.9	2.4	0.0	27.2
Precision instruments	123.3	2.2	73.5	2.1	0.0	30.9
Motor vehicles and trailers	261.2	4.6	74.7	4.9	0.1	75.0
Other transport equipment	229.1	4.0	52.9	10.3	0.2	7.6
Furniture and other products	72.0	1.3	60.9	0.3	0.0	1.7
Recycling	0.0	0.0	0.0	0.0	0.0	0.0
Electricity, gas, hot water	14.1	0.2	2.0	6.3	0.1	0.9
Water	0.0	0.0	0.0	0.0	0.0	0.0
Construction	303.4	5.3	8.3	0.9	0.0	0.0
Trade in motor vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Wholesale trade	0.6	0.0	0.4	0.4	0.0	0.3
Retail trade	0.0	0.0	0.0	0.0	0.0	0.0
Hotels and restaurants	162.0	2.8	55.5	141.6	2.4	53.9

	Imports			Exports		
	BnTenge	% of total	% of supply	BnTenge	% of total	% of supply
Land transport	9.6	0.2	1.3	252.5	4.3	26.0
Water transport	0.6	0.0	2.8	0.0	0.0	0.0
Air transport	3.4	0.1	4.1	29.4	0.5	26.9
Auxiliary transport services	51.5	0.9	8.1	55.8	0.9	8.9
Communications	18.1	0.3	2.7	17.8	0.3	2.7
Financial intermediation	42.4	0.7	4.1	7.2	0.1	0.7
Insurance	47.9	0.8	35.5	16.9	0.3	16.4
Auxiliary financial services	0.0	0.0	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	48.8	0.8	2.1
Renting of machinery	79.4	1.4	38.6	16.9	0.3	12.1
Computer technologies	16.6	0.3	15.4	0.7	0.0	0.8
Research and development	4.7	0.1	4.3	3.8	0.1	3.5
Other services	427.6	7.5	26.8	35.2	0.6	3.0
Government	9.5	0.2	1.2	0.0	0.0	0.0
Education	4.8	0.1	0.7	0.4	0.0	0.1
Health and social services	0.0	0.0	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0	0.0	0.0
Recreation, culture, sports	9.3	0.2	4.7	0.8	0.0	0.4
Personal service	0.0	0.0	0.0	0.0	0.0	0.0

Table 4: Benchmark and Counterfactual Distortions (%)

	Tariffs			Border costs		Ad-valorem equivalents of NTBs				Other distortions ^c	
	2009	2011 ^a	2015 ^b	Benchmark	Optimistic ^c	Imports		Exports		Output	Sales tax
						Benchmark	Optimistic ^d	Benchmark	Optimistic ^d		
Agriculture and hunting	4.7	6.9	11.1	12.0	9.0	22.6	11.3	20.0	10.0	0.4	-0.3
Forestry	3.6	12.4	12.4	12.0	9.0	22.6	11.3	20.0	10.0	0.4	0.3
Fishing	5.0	7.4	7.4	12.0	9.0	22.6	11.3	20.0	10.0	0.9	0.1
Mining of coal and lignite	5.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8
Crude oil and natural gas	4.2	4.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.5
Mining of metals	3.3	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.7	10.4
Other mining	5.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	8.1
Food and beverages	19.6	21.5	21.5	12.0	9.0	5.7	2.9	10.0	5.0	0.8	1.4
Tobacco products	28.8	27.8	27.8	12.0	9.0	5.7	2.9	10.0	5.0	0.9	19.5
Textiles	10.4	14.4	14.4	12.0	9.0	5.7	2.9	10.0	5.0	1.6	-0.4
Wearing apparel	6.4	16.3	16.3	12.0	9.0	5.7	2.9	10.0	5.0	0.9	-0.4
Leather products	11.6	15.8	15.8	12.0	9.0	5.7	2.9	10.0	5.0	0.7	-1.8
Wood products	5.7	16.0	16.0	12.0	9.0	5.7	2.9	10.0	5.0	1.0	1.4
Pulp and paper	7.0	10.2	11.0	12.0	9.0	5.7	2.9	10.0	5.0	1.0	0.5
Publishing and printing	2.2	4.5	4.5	12.0	9.0	5.7	2.9	10.0	5.0	1.1	2.4
Refined petroleum	4.5	5.0	5.0	12.0	9.0	5.7	2.9	10.0	5.0	0.7	2.6
Chemical industry	3.1	5.0	8.9	12.0	9.0	5.7	2.9	10.0	5.0	0.9	0.9
Rubber and plastic	9.9	12.8	13.2	12.0	9.0	5.7	2.9	10.0	5.0	1.1	-0.2
Other mineral products	7.9	14.7	14.7	12.0	9.0	5.7	2.9	10.0	5.0	1.4	1.9
Metallurgical industry	4.9	10.8	12.4	12.0	9.0	5.7	2.9	10.0	5.0	1.2	0.8
Metal products	11.1	13.7	14.1	12.0	9.0	5.7	2.9	10.0	5.0	1.0	-0.8
Machinery and equipment	1.2	4.3	4.4	12.0	9.0	5.7	2.9	10.0	5.0	1.0	1.6
Office machinery	0.0	2.6	2.6	12.0	9.0	5.7	2.9	10.0	5.0	2.0	3.3
Electrical machinery	1.6	7.2	8.4	12.0	9.0	5.7	2.9	10.0	5.0	1.3	1.6
Radio and television	0.0	3.7	4.1	12.0	9.0	5.7	2.9	10.0	5.0	1.3	2.9
Precision instruments	1.3	1.7	3.4	12.0	9.0	5.7	2.9	10.0	5.0	0.7	1.5
Motor vehicles and trailers	5.3	23.2	23.2	12.0	9.0	5.7	2.9	10.0	5.0	3.8	0.5
Other transport equipment	1.8	8.2	9.8	12.0	9.0	5.7	2.9	10.0	5.0	1.2	1.6
Furniture and other products	12.0	27.9	27.9	12.0	9.0	5.7	2.9	10.0	5.0	1.1	-0.9
Recycling	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5
Electricity, gas, hot water	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.7
Water	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-0.7
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.5
Trade in motor vehicles	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	85.4
Wholesale trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	24.6

	Tariffs			Border costs		Ad-valorem equivalents of NTBs				Other distortions ^e	
	2009	2011 ^a	2015 ^b	Benchmark	Optimistic ^c	Imports		Exports		Output	Sales tax
						Benchmark	Optimistic ^d	Benchmark	Optimistic ^d		
Retail trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	32.1
Hotels and restaurants	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	3.0
Land transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	-0.7
Water transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.6
Air transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	-1.5
Auxiliary transport services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5
Communications	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.6
Financial intermediation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
Insurance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9
Auxiliary financial services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.1
Real estate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Renting of machinery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.7
Computer technologies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.0
Research and development	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.9
Other services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.0
Government	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Education	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Health and social services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Sewage and waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.1
Public associations	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Recreation, culture, sports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.9
Personal service	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.2

Notes:

- (a) Tariffs as of 2011 (in the transition period).
- (b) Tariffs after 2015 (after the transition period).
- (c) For trade with Russia and Belarus. For trade with other countries reduction to only 10.8%.
- (d) For trade with Russia and Belarus only. No reduction for trade with other countries
- (e) Unchanged in all scenarios

Table 5: Trade Flows by Trading Partner (%)

	Imports				Exports			
	Customs Union	Other CIS	European Union	Rest of the World	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	17.7	6.5	10.9	64.9	18.0	29.2	12.9	39.9
Forestry	45.7	0.2	25.6	28.4	0.0	23.5	0.0	76.5
Fishing	22.5	0.0	8.4	69.1	89.4	10.6	0.0	0.0
Mining of coal and lignite	93.6	4.1	0.7	1.6	76.3	21.4	2.3	0.0
Crude oil and natural gas	87.6	12.4	0.0	0.0	1.8	4.5	65.5	28.2
Mining of metals	30.4	40.3	0.1	29.3	45.0	1.5	0.0	53.5
Other mining	49.9	4.3	10.4	35.3	23.0	26.5	5.1	45.4
Food and beverages	51.6	16.6	9.7	22.1	5.0	57.2	1.3	36.6
Tobacco products	87.1	0.6	1.0	11.4	0.0	77.5	0.0	22.5
Textiles	26.7	7.7	23.5	42.1	25.6	9.5	59.6	5.3
Wearing apparel	12.9	0.6	25.8	60.7	8.2	37.6	6.7	47.5
Leather products	17.2	6.0	19.3	57.5	0.2	0.7	3.9	95.2
Wood products	76.6	4.9	11.4	7.0	27.0	36.7	2.9	33.4
Pulp and paper	37.5	11.3	41.2	10.1	15.5	63.4	0.5	20.6
Publishing and printing	54.3	5.8	21.7	18.1	35.8	39.1	8.9	16.2
Refined petroleum	78.8	3.3	7.3	10.6	8.7	17.4	30.6	43.3
Chemical industry	28.7	3.6	42.0	25.6	21.7	21.5	49.2	7.6
Rubber and plastic	42.6	4.9	21.4	31.1	47.1	29.3	18.3	5.4
Other mineral products	47.2	11.4	13.4	28.0	5.1	7.1	17.0	70.8
Metallurgical industry	31.2	27.3	9.5	31.9	15.2	3.1	21.0	60.7
Metal products	24.1	5.9	41.6	28.4	42.8	29.5	8.9	18.8
Machinery and equipment	15.1	3.8	43.7	37.4	51.0	15.0	16.4	17.7
Office machinery	7.5	0.9	31.6	60.0	1.1	21.3	74.3	3.3
Electrical machinery	22.5	8.7	40.5	28.3	52.6	31.6	8.5	7.3
Radio and television	8.5	2.3	23.9	65.3	67.4	18.1	12.0	2.4
Precision instruments	15.9	1.2	41.3	41.6	12.6	21.6	43.0	22.8
Motor vehicles and trailers	15.8	1.7	31.0	51.5	13.0	55.9	10.1	20.9
Other transport equipment	25.5	20.5	33.9	20.1	6.6	4.3	58.8	30.4
Furniture and other products	38.7	12.3	20.1	28.8	9.4	24.3	20.9	45.3
Recycling	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Electricity, gas, and hot water	43.5	56.5	0.0	0.0	93.5	6.5	0.0	0.0
Water	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Construction	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Trade in motor vehicles	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Wholesale trade	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Retail trade	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Hotels and restaurants	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0

	Imports				Exports			
	Customs Union	Other CIS	European Union	Rest of the World	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Water transport	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Air transport	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Auxiliary transport services	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Communications	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Financial intermediation	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Insurance	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Auxiliary financial services	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Real estate	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Renting of machinery	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Computer technologies	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Research and development	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Other services	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Government	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Education	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Health and social services	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Sewage and waste	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Public associations	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Recreation, culture, and sports	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Personal service	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0

Table 6: Estimates of Supply Elasticity of Firms with Respect to Price

	Kazakhstan	Customs Union	Other CIS	European Union	Rest of the World
Other mining	3	3	3	10	15
Tobacco products	3	3	3	10	15
Textiles	3	3	3	10	15
Wearing apparel	3	3	3	10	15
Wood products	3	3	3	10	15
Refined petroleum	3	3	3	10	15
Chemical industry	3	3	3	10	15
Rubber and plastic	3	3	3	10	15
Other mineral products	3	3	3	10	15
Metallurgical industry	3	3	3	10	15
Metal products	3	3	3	10	15
Machinery and equipment	3	3	3	10	15
Electrical machinery	3	3	3	10	15
Radio and television	3	3	3	10	15
Precision instruments	3	3	3	10	15
Motor vehicles and trailers	3	3	3	10	15
Other transport equipment	3	3	3	10	15
Furniture and other products	3	3	3	10	15

Table 7: Summary of Results (results are percentage change from initial equilibrium, unless otherwise indicated)

	Benchmark 2009 tariffs	Customs Union Immediate Impact 2011 tariffs Transition rates	Customs Union Outlook		Decomposition of Optimistic Customs Union Scenario	
			Pessimistic: Future tariffs	Optimistic: Future tariffs Regional cuts in NTBs and Border Costs	Regional cuts in Border Costs	Regional cuts in NTBs
Aggregate welfare (real income)						
Welfare (EV as % of consumption)		-0.2	-0.3	1.5	1.4	0.4
Welfare (EV as % of GDP)		-0.1	-0.1	0.7	0.7	0.2
Government budget						
Tariff revenue (% of GDP)	0.5	1.0	1.1	1.0	0.5	0.5
Tariff revenue		94.2	114.4	105.2	-1.3	-3.1
Aggregate trade						
Real exchange rate		-0.5	-0.6	0.1	0.5	0.2
Aggregate exports		-0.5	-0.6	1.0	1.2	0.3
Factor Earnings						
Capital		-0.6	-0.8	0.1	0.7	0.2
Labor		-0.5	-0.7	0.3	0.6	0.4
Factor adjustments						
Capital		0.1	0.2	0.6	0.3	0.2
Labor		0.2	0.2	0.5	0.4	0.1

Source: Authors' estimates.

Table 8: Output and Employment Impacts
(% change from benchmark)

	Customs Union		Customs Union		Customs Union	
	2011 tariffs only		Pessimistic Outlook		Optimistic Outlook	
	Output	Labor income	Output	Labor income	Output	Labor income
Agriculture and hunting	0.5	-0.1	1.1	0.3	2.2	2.4
Forestry	0.5	-0.1	0.4	-0.3	0.0	0.2
Fishing	0.1	-0.5	0.1	-0.6	2.2	2.3
Mining of coal and lignite	0.0	-0.6	0.0	-0.7	0.8	0.9
Crude oil and natural gas	-0.3	-1.0	-0.5	-1.3	-1.9	-1.8
Mining of metals	0.0	-0.6	0.0	-0.8	1.9	2.1
Other mining	-0.2	-0.7	-0.3	-1.0	0.4	0.6
Food and beverages	0.3	-0.3	0.2	-0.5	0.1	0.3
Tobacco products	-0.1	-0.7	-0.1	-0.9	-0.8	-0.6
Textiles	2.9	2.3	2.3	1.5	2.0	2.2
Wearing apparel	9.1	8.5	9.0	8.2	7.7	8.0
Leather products	3.0	2.4	1.9	1.1	11.4	11.5
Wood products	2.8	2.2	2.5	1.7	-3.6	-3.4
Pulp and paper	1.9	1.3	1.9	1.2	-0.9	-0.7
Publishing and printing	0.7	0.1	0.6	-0.1	-2.8	-2.6
Refined petroleum	0.1	-0.5	0.1	-0.7	1.2	1.4
Chemical industry	0.7	0.2	2.7	1.9	4.0	4.3
Rubber and plastic	1.8	1.2	0.2	-0.6	-0.5	-0.3
Other mineral products	3.1	2.5	2.9	2.1	1.1	1.4
Metallurgical industry	0.7	0.1	0.9	0.1	3.4	3.6
Metal products	1.6	1.0	1.8	1.0	0.5	0.7
Machinery and equipment	2.8	2.2	2.7	2.0	3.0	3.3
Office machinery	3.6	2.9	3.5	2.7	6.0	6.2
Electrical machinery	4.5	3.9	5.1	4.4	4.5	4.7
Radio and television	2.4	1.8	2.6	1.8	5.3	5.6
Precision instruments	-0.5	-1.0	0.9	0.1	1.1	1.3
Motor vehicles and trailers	6.7	6.0	6.3	5.5	12.2	12.4
Other transport equipment	4.8	4.2	5.9	5.1	4.0	4.2
Furniture and other products	13.4	12.7	13.2	12.4	11.1	11.3
Recycling	1.8	1.1	2.2	1.4	3.5	3.6
Electricity, gas, hot water	0.0	-0.5	0.1	-0.7	0.7	0.9
Water	0.1	-0.5	0.1	-0.6	0.9	1.2
Construction	-0.1	-0.7	-0.1	-0.9	0.1	0.3
Trade in motor vehicles	-0.2	-0.8	-0.3	-1.0	-1.2	-1.0
Wholesale trade	-0.3	-0.8	-0.3	-1.1	-1.2	-1.1

	Customs Union 2011 tariffs only		Customs Union Pessimistic Outlook		Customs Union Optimistic Outlook	
	Output	Labor income	Output	Labor income	Output	Labor income
Retail trade	-0.2	-0.7	-0.2	-1.0	-1.5	-1.2
Hotels and restaurants	-0.3	-0.9	-0.4	-1.1	3.1	3.3
Land transport	-0.5	-1.1	-0.5	-1.3	-0.6	-0.4
Water transport	0.1	-0.5	0.1	-0.7	-0.3	-0.1
Air transport	-0.5	-1.1	-0.6	-1.3	0.3	0.5
Auxiliary transport services	-0.1	-0.7	-0.1	-0.9	-0.3	-0.1
Communications	0.0	-0.6	0.0	-0.7	0.4	0.6
Financial intermediation	0.0	-0.6	0.0	-0.7	0.1	0.3
Insurance	0.1	-0.5	0.1	-0.7	1.1	1.2
Auxiliary financial services	0.0	-0.6	0.0	-0.8	0.0	0.1
Real estate	0.2	-0.4	0.3	-0.5	1.1	1.2
Renting of machinery	-2.5	-3.1	-2.5	-3.2	-2.0	-1.8
Computer technologies	-0.1	-0.6	-0.1	-0.8	-0.1	0.1
Research and development	-0.1	-0.6	-0.2	-0.9	0.7	0.9
Other services	-0.1	-0.7	-0.1	-0.9	-0.1	0.1
Government	0.0	-0.6	0.0	-0.7	0.1	0.3
Education	0.0	-0.5	0.0	-0.7	0.3	0.5
Health and social services	0.0	-0.6	-0.1	-0.8	0.2	0.5
Sewage and waste	-0.1	-0.7	-0.1	-0.9	0.3	0.5
Public associations	0.2	-0.3	0.2	-0.5	1.3	1.6
Recreation, culture, sports	0.0	-0.6	0.0	-0.7	0.8	1.0
Personal service						

Source: Authors' estimates.

Table 9: Impacts on Imports of Customs Union Current
(% change from benchmark)

	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	4.4	4.4	-5.6	-5.6
Forestry	0.0	0.0	0.0	0.0
Fishing	4.8	0.0	-6.1	-6.1
Mining of coal and lignite	0.9	0.9	0.9	0.9
Crude oil and natural gas	-0.2	-0.2	-0.5	-0.5
Mining of metals	0.6	0.6	5.4	5.4
Other mining	1.0	1.0	2.3	3.0
Food and beverages	2.0	2.0	-5.8	-5.8
Tobacco products	0.2	0.2	4.6	6.0
Textiles	5.2	5.2	-6.7	-9.2
Wearing apparel	12.8	12.8	-10.5	-13.3
Leather products	12.2	12.2	-6.5	-6.5
Wood products	4.2	4.2	-17.7	-20.1
Pulp and paper	7.1	7.1	-7.2	-7.2
Publishing and printing	3.3	3.3	-7.4	-7.4
Refined petroleum	0.2	0.2	-1.7	-2.2
Chemical industry	2.8	2.8	-1.4	-1.8
Rubber and plastic	3.8	3.8	-4.6	-6.4
Other mineral products	5.3	5.3	-16.2	-20.6
Metallurgical industry	2.8	2.8	-10.8	-12.4
Metal products	3.3	3.3	-2.5	-3.1
Machinery and equipment	5.6	5.6	-1.7	-2.4
Office machinery	10.4	10.4	-2.0	-2.0
Electrical machinery	8.9	8.9	-4.7	-6.2
Radio and television	6.2	6.2	-1.8	-2.4
Precision instruments	0.8	0.8	0.0	-0.1
Motor vehicles and trailers	32.9	32.9	-9.1	-12.5
Other transport equipment	8.7	8.7	-12.5	-16.3
Furniture and other products	17.7	17.7	-26.8	-34.6
Recycling	0.0	0.0	0.0	0.0
Electricity, gas, and hot water	0.8	0.8	0.0	0.0
Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	0.8
Trade in motor vehicles	0.0	0.0	0.0	0.0
Wholesale trade	0.0	0.0	0.0	-0.3
Retail trade	0.0	0.0	0.0	0.0
Hotels and restaurants	0.0	0.0	0.0	0.2

	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	1.8
Water transport	0.0	0.0	0.0	1.6
Air transport	0.0	0.0	0.0	1.4
Auxiliary transport services	0.0	0.0	0.0	0.1
Communications	0.0	0.0	0.0	0.2
Financial intermediation	0.0	0.0	0.0	-0.2
Insurance	0.0	0.0	0.0	0.2
Auxiliary financial services	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	0.0
Renting of machinery	0.0	0.0	0.0	2.4
Computer technologies	0.0	0.0	0.0	0.0
Research and development	0.0	0.0	0.0	0.5
Other services	0.0	0.0	0.0	0.0
Government	0.0	0.0	0.0	0.9
Education	0.0	0.0	0.0	0.4
Health and social services	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0
Recreation, culture, and sports	0.0	0.0	0.0	0.6
Personal service	0.0	0.0	0.0	0.0

Source: Authors' estimates.

Table 10: Impacts on Exports of Customs Union Current
(% change from benchmark)

	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	0.6	0.6	0.6	0.6
Forestry	0.0	0.0	0.0	0.0
Fishing	-0.4	-0.4	0.0	0.0
Mining of coal and lignite	-1.1	-1.1	-1.1	-1.1
Crude oil and natural gas	-0.4	-0.4	-0.4	-0.4
Mining of metals	-0.9	-0.9	-0.9	-0.9
Other mining	-0.8	-0.8	-0.8	-0.8
Food and beverages	-0.1	-0.1	-0.1	-0.1
Tobacco products	0.0	-0.4	-0.4	-0.4
Textiles	-4.3	-4.3	-4.3	-4.3
Wearing apparel	-1.8	-1.8	-1.8	-1.8
Leather products	0.2	0.2	0.2	0.2
Wood products	0.3	0.3	0.3	0.3
Pulp and paper	0.6	0.6	0.6	0.6
Publishing and printing	0.1	0.1	0.1	0.1
Refined petroleum	-0.1	-0.1	-0.1	-0.1
Chemical industry	-1.0	-1.0	-1.0	-1.0
Rubber and plastic	-3.1	-3.1	-3.1	-3.1
Other mineral products	-1.6	-1.6	-1.6	-1.6
Metallurgical industry	-0.3	-0.3	-0.3	-0.3
Metal products	-0.8	-0.8	-0.8	-0.8
Machinery and equipment	-4.1	-4.1	-4.1	-4.1
Office machinery	2.9	2.9	2.9	2.9
Electrical machinery	-3.7	-3.7	-3.7	-3.7
Radio and television	-1.8	-1.8	-1.8	-1.8
Precision instruments	-1.1	-1.1	-1.1	-1.1
Motor vehicles and trailers	-11.8	-11.8	-11.8	-11.8
Other transport equipment	-4.0	-4.0	-4.0	-4.0
Furniture and other products	-11.4	-11.4	-11.4	-11.4
Recycling	0.0	0.0	0.0	0.0
Electricity, gas, and hot water	-0.7	-0.7	0.0	0.0
Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	-1.0
Trade in motor vehicles	0.0	0.0	0.0	0.0
Wholesale trade	0.0	0.0	0.0	-0.1
Retail trade	0.0	0.0	0.0	0.0
Hotels and restaurants	0.0	0.0	0.0	-0.4

	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	-2.1
Water transport	0.0	0.0	0.0	-1.2
Air transport	0.0	0.0	0.0	-1.7
Auxiliary transport services	0.0	0.0	0.0	-0.3
Communications	0.0	0.0	0.0	-0.2
Financial intermediation	0.0	0.0	0.0	0.2
Insurance	0.0	0.0	0.0	0.0
Auxiliary financial services	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	0.2
Renting of machinery	0.0	0.0	0.0	-6.2
Computer technologies	0.0	0.0	0.0	-0.1
Research and development	0.0	0.0	0.0	-0.6
Other services	0.0	0.0	0.0	-0.2
Government	0.0	0.0	0.0	0.0
Education	0.0	0.0	0.0	-0.4
Health and social services	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0
Recreation, culture, and sports	0.0	0.0	0.0	-0.5
Personal service	0.0	0.0	0.0	0.0

Source: Authors' estimates.

Table 11: Impacts on Number of Firms of Customs Union Current
(% change from benchmark)

	Kazakhstan	Customs Union	Other CIS	European Union	Rest of the World
Other mining	-0.1	0.8	0.8	1.8	2.4
Tobacco products	-0.1	0.2	0.2	3.7	4.8
Textiles	2.7	4.2	4.2	-5.4	-7.4
Wearing apparel	8.2	10.2	10.2	-8.5	-10.8
Wood products	2.4	3.3	3.3	-14.2	-16.2
Refined petroleum	0.1	0.1	0.1	-1.4	-1.7
Chemical industry	0.7	2.2	2.2	-1.2	-1.5
Rubber and plastic	1.6	3.1	3.1	-3.7	-5.2
Other mineral products	2.8	4.3	4.3	-13.0	-16.6
Metallurgical industry	0.6	2.2	2.2	-8.6	-9.9
Metal products	1.4	2.6	2.6	-2.0	-2.5
Machinery and equipment	2.6	4.5	4.5	-1.4	-1.9
Electrical machinery	4.2	7.1	7.1	-3.8	-5.0
Radio and television	2.2	4.9	4.9	-1.5	-1.9
Precision instruments	-0.4	0.6	0.6	0.0	0.0
Motor vehicles and trailers	5.8	25.4	25.4	-7.3	-10.1
Other transport equipment	4.5	6.8	6.8	-9.9	-13.0
Furniture and other products	11.5	14.0	14.0	-21.8	-28.1

Source: Authors' estimates.

Table 12: Impacts on Imports of Customs Union Future—Pessimistic Outlook
(% change from benchmark)

	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	12.8	12.8	-15.8	-15.8
Forestry	0.0	0.0	0.0	0.0
Fishing	4.8	0.0	-6.1	-6.1
Mining of coal and lignite	1.1	1.1	1.1	1.1
Crude oil and natural gas	-0.3	-0.3	-0.6	-0.6
Mining of metals	1.0	1.0	5.8	5.8
Other mining	1.2	1.2	2.9	3.7
Food and beverages	2.2	2.2	-5.6	-5.6
Tobacco products	0.4	0.4	5.0	6.6
Textiles	5.5	5.5	-6.0	-8.3
Wearing apparel	12.9	12.9	-10.5	-13.2
Leather products	12.4	12.4	-6.3	-6.3
Wood products	4.2	4.2	-17.6	-20.1
Pulp and paper	9.0	9.0	-9.1	-9.1
Publishing and printing	3.4	3.4	-7.3	-7.3
Refined petroleum	0.2	0.2	-1.6	-2.1
Chemical industry	8.0	8.0	-5.2	-6.6
Rubber and plastic	4.6	4.6	-4.3	-6.0
Other mineral products	5.5	5.5	-15.8	-20.1
Metallurgical industry	3.5	3.5	-13.7	-15.7
Metal products	3.8	3.8	-2.9	-3.5
Machinery and equipment	5.8	5.8	-1.7	-2.4
Office machinery	10.5	10.5	-2.0	-2.0
Electrical machinery	10.8	10.8	-5.6	-7.4
Radio and television	6.7	6.7	-2.0	-2.5
Precision instruments	3.7	3.7	-0.7	-0.9
Motor vehicles and trailers	32.9	32.9	-9.0	-12.5
Other transport equipment	10.8	10.8	-15.4	-20.0
Furniture and other products	17.7	17.7	-26.7	-34.5
Recycling	0.0	0.0	0.0	0.0
Electricity, gas, and hot water	1.0	1.0	0.0	0.0
Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	1.0
Trade in motor vehicles	0.0	0.0	0.0	0.0
Wholesale trade	0.0	0.0	0.0	-0.3
Retail trade	0.0	0.0	0.0	0.0
Hotels and restaurants	0.0	0.0	0.0	0.3

	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	2.1
Water transport	0.0	0.0	0.0	1.7
Air transport	0.0	0.0	0.0	1.6
Auxiliary transport services	0.0	0.0	0.0	0.0
Communications	0.0	0.0	0.0	0.2
Financial intermediation	0.0	0.0	0.0	-0.2
Insurance	0.0	0.0	0.0	0.3
Auxiliary financial services	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	0.0
Renting of machinery	0.0	0.0	0.0	2.3
Computer technologies	0.0	0.0	0.0	-0.1
Research and development	0.0	0.0	0.0	1.4
Other services	0.0	0.0	0.0	0.1
Government	0.0	0.0	0.0	1.0
Education	0.0	0.0	0.0	0.6
Health and social services	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0
Recreation, culture, and sports	0.0	0.0	0.0	0.6
Personal service	0.0	0.0	0.0	0.0

Source: Authors' estimates.

Table 13: Impacts on Exports of Customs Union Future—Pessimistic Outlook
(% change from benchmark)

	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	0.8	0.8	0.8	0.8
Forestry	0.0	0.0	0.0	0.0
Fishing	-0.3	-0.3	0.0	0.0
Mining of coal and lignite	-1.3	-1.3	-1.3	-1.3
Crude oil and natural gas	-0.5	-0.5	-0.5	-0.5
Mining of metals	-1.2	-1.2	-1.2	-1.2
Other mining	-1.1	-1.1	-1.1	-1.1
Food and beverages	-0.5	-0.5	-0.5	-0.5
Tobacco products	0.0	-0.5	-0.5	-0.5
Textiles	-5.2	-5.2	-5.2	-5.2
Wearing apparel	-1.9	-1.9	-1.9	-1.9
Leather products	0.1	0.1	0.1	0.1
Wood products	0.0	0.0	0.0	0.0
Pulp and paper	-0.1	-0.1	-0.1	-0.1
Publishing and printing	-0.2	-0.2	-0.2	-0.2
Refined petroleum	-0.1	-0.1	-0.1	-0.1
Chemical industry	-2.2	-2.2	-2.2	-2.2
Rubber and plastic	-5.4	-5.4	-5.4	-5.4
Other mineral products	-1.9	-1.9	-1.9	-1.9
Metallurgical industry	-0.3	-0.3	-0.3	-0.3
Metal products	-1.0	-1.0	-1.0	-1.0
Machinery and equipment	-4.4	-4.4	-4.4	-4.4
Office machinery	2.9	2.9	2.9	2.9
Electrical machinery	-4.6	-4.6	-4.6	-4.6
Radio and television	-2.0	-2.0	-2.0	-2.0
Precision instruments	-2.1	-2.1	-2.1	-2.1
Motor vehicles and trailers	-12.0	-12.0	-12.0	-12.0
Other transport equipment	-5.1	-5.1	-5.1	-5.1
Furniture and other products	-11.6	-11.6	-11.6	-11.6
Recycling	0.0	0.0	0.0	0.0
Electricity, gas, and hot water	-0.9	-0.9	0.0	0.0
Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	-1.2
Trade in motor vehicles	0.0	0.0	0.0	0.0
Wholesale trade	0.0	0.0	0.0	-0.2
Retail trade	0.0	0.0	0.0	0.0
Hotels and restaurants	0.0	0.0	0.0	-0.6

	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	-2.4
Water transport	0.0	0.0	0.0	-1.3
Air transport	0.0	0.0	0.0	-1.8
Auxiliary transport services	0.0	0.0	0.0	-0.3
Communications	0.0	0.0	0.0	-0.2
Financial intermediation	0.0	0.0	0.0	0.3
Insurance	0.0	0.0	0.0	-0.1
Auxiliary financial services	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	0.1
Renting of machinery	0.0	0.0	0.0	-6.1
Computer technologies	0.0	0.0	0.0	-0.1
Research and development	0.0	0.0	0.0	-1.6
Other services	0.0	0.0	0.0	-0.3
Government	0.0	0.0	0.0	0.0
Education	0.0	0.0	0.0	-0.6
Health and social services	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0
Recreation, culture, and sports	0.0	0.0	0.0	-0.6
Personal service	0.0	0.0	0.0	0.0

Source: Authors' estimates.

Table 14: Impacts on Number of Firms of Customs Union Future—Pessimistic Outlook
(% change from benchmark)

	Kazakhstan	Customs Union	Other CIS	European Union	Rest of the World
Other mining	-0.3	0.9	0.9	2.3	2.9
Tobacco products	-0.1	0.3	0.3	4.0	5.3
Textiles	2.1	4.4	4.4	-4.8	-6.7
Wearing apparel	8.1	10.2	10.2	-8.4	-10.7
Wood products	2.1	3.4	3.4	-14.1	-16.1
Refined petroleum	0.1	0.2	0.2	-1.3	-1.7
Chemical industry	2.4	6.4	6.4	-4.2	-5.3
Rubber and plastic	0.1	3.7	3.7	-3.5	-4.8
Other mineral products	2.6	4.4	4.4	-12.8	-16.2
Metallurgical industry	0.8	2.8	2.8	-11.0	-12.6
Metal products	1.6	3.0	3.0	-2.3	-2.8
Machinery and equipment	2.6	4.6	4.6	-1.4	-1.9
Electrical machinery	4.8	8.6	8.6	-4.5	-6.0
Radio and television	2.4	5.3	5.3	-1.6	-2.0
Precision instruments	0.8	3.0	3.0	-0.6	-0.8
Motor vehicles and trailers	5.5	25.5	25.5	-7.3	-10.1
Other transport equipment	5.5	8.4	8.4	-12.2	-15.9
Furniture and other products	11.4	14.0	14.0	-21.7	-28.0

Source: Authors' estimates.

Table 15: Impacts on Imports of Customs Union Future—Optimistic Outlook
(% change from benchmark)

	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	155.6	2.3	-24.1	-24.1
Forestry	0.0	0.0	0.0	0.0
Fishing	136.4	0.0	-15.0	-15.0
Mining of coal and lignite	1.2	1.2	1.2	1.2
Crude oil and natural gas	-0.6	-0.6	-0.9	-0.9
Mining of metals	1.6	1.6	6.4	6.4
Other mining	0.4	0.4	0.8	1.1
Food and beverages	32.5	-5.0	-13.3	-13.3
Tobacco products	12.0	1.8	7.4	9.7
Textiles	18.7	6.5	-4.2	-5.8
Wearing apparel	25.0	13.8	-9.3	-11.8
Leather products	51.3	9.0	-9.9	-9.9
Wood products	6.1	-1.7	-26.6	-30.1
Pulp and paper	35.0	-3.3	-19.8	-19.8
Publishing and printing	29.8	-7.2	-17.0	-17.0
Refined petroleum	9.8	-0.2	-2.9	-3.8
Chemical industry	17.7	7.1	-7.7	-9.7
Rubber and plastic	15.2	3.4	-8.2	-11.2
Other mineral products	16.2	4.9	-17.6	-22.4
Metallurgical industry	11.8	3.4	-14.2	-16.3
Metal products	13.6	3.5	-4.1	-5.1
Machinery and equipment	17.5	5.4	-3.0	-4.2
Office machinery	52.5	9.5	-3.0	-3.0
Electrical machinery	21.4	9.8	-8.5	-11.1
Radio and television	18.1	7.0	-1.4	-1.8
Precision instruments	14.5	3.1	-2.5	-3.4
Motor vehicles and trailers	46.9	32.8	-10.5	-14.4
Other transport equipment	22.9	9.7	-18.2	-23.6
Furniture and other products	28.9	16.3	-30.3	-38.7
Recycling	0.0	0.0	0.0	0.0
Electricity, gas, and hot water	1.0	1.0	0.0	0.0
Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	0.0
Trade in motor vehicles	0.0	0.0	0.0	0.0
Wholesale trade	0.0	0.0	0.0	-1.0
Retail trade	0.0	0.0	0.0	0.0
Hotels and restaurants	0.0	0.0	0.0	-0.1

	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	1.5
Water transport	0.0	0.0	0.0	1.0
Air transport	0.0	0.0	0.0	1.6
Auxiliary transport services	0.0	0.0	0.0	-0.1
Communications	0.0	0.0	0.0	0.6
Financial intermediation	0.0	0.0	0.0	0.1
Insurance	0.0	0.0	0.0	1.1
Auxiliary financial services	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	0.0
Renting of machinery	0.0	0.0	0.0	2.3
Computer technologies	0.0	0.0	0.0	0.0
Research and development	0.0	0.0	0.0	1.5
Other services	0.0	0.0	0.0	0.2
Government	0.0	0.0	0.0	-0.1
Education	0.0	0.0	0.0	0.2
Health and social services	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0
Recreation, culture, and sports	0.0	0.0	0.0	1.2
Personal service	0.0	0.0	0.0	0.0

Source: Authors' estimates.

Table 16: Impacts on Exports of Customs Union Future—Optimistic Outlook
(% change from benchmark)

	Customs Union	Other CIS	European Union	Rest of the World
Agriculture and hunting	99.8	8.6	8.6	8.6
Forestry	0.0	0.0	0.0	0.0
Fishing	100.2	8.5	0.0	0.0
Mining of coal and lignite	0.2	0.2	0.2	0.2
Crude oil and natural gas	-2.2	-2.2	-2.2	-2.2
Mining of metals	1.6	1.6	1.6	1.6
Other mining	0.1	0.1	0.1	0.1
Food and beverages	51.4	7.3	7.3	7.3
Tobacco products	0.0	5.2	5.2	5.2
Textiles	53.3	5.0	5.0	5.0
Wearing apparel	27.6	3.6	3.6	3.6
Leather products	13.1	2.6	2.6	2.6
Wood products	15.3	1.5	1.5	1.5
Pulp and paper	49.9	6.3	6.3	6.3
Publishing and printing	46.7	4.3	4.3	4.3
Refined petroleum	28.5	4.0	4.0	4.0
Chemical industry	27.3	3.8	3.8	3.8
Rubber and plastic	50.4	5.9	5.9	5.9
Other mineral products	31.9	4.5	4.5	4.5
Metallurgical industry	18.7	4.2	4.2	4.2
Metal products	23.8	3.8	3.8	3.8
Machinery and equipment	52.2	5.2	5.2	5.2
Office machinery	57.9	12.1	12.1	12.1
Electrical machinery	32.4	2.8	2.8	2.8
Radio and television	28.6	3.3	3.3	3.3
Precision instruments	36.1	4.9	4.9	4.9
Motor vehicles and trailers	45.3	-5.2	-5.2	-5.2
Other transport equipment	37.7	3.6	3.6	3.6
Furniture and other products	44.8	0.8	0.8	0.8
Recycling	0.0	0.0	0.0	0.0
Electricity, gas, and hot water	0.3	0.3	0.0	0.0
Water	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	0.2
Trade in motor vehicles	0.0	0.0	0.0	0.0
Wholesale trade	0.0	0.0	0.0	-0.9
Retail trade	0.0	0.0	0.0	0.0
Hotels and restaurants	0.0	0.0	0.0	4.1

	Customs Union	Other CIS	European Union	Rest of the World
Land transport	0.0	0.0	0.0	-0.6
Water transport	0.0	0.0	0.0	-1.0
Air transport	0.0	0.0	0.0	-0.3
Auxiliary transport services	0.0	0.0	0.0	-0.4
Communications	0.0	0.0	0.0	0.2
Financial intermediation	0.0	0.0	0.0	0.1
Insurance	0.0	0.0	0.0	1.0
Auxiliary financial services	0.0	0.0	0.0	0.0
Real estate	0.0	0.0	0.0	1.3
Renting of machinery	0.0	0.0	0.0	-5.2
Computer technologies	0.0	0.0	0.0	-0.2
Research and development	0.0	0.0	0.0	-0.1
Other services	0.0	0.0	0.0	-0.4
Government	0.0	0.0	0.0	0.0
Education	0.0	0.0	0.0	0.4
Health and social services	0.0	0.0	0.0	0.0
Sewage and waste	0.0	0.0	0.0	0.0
Public associations	0.0	0.0	0.0	0.0
Recreation, culture, and sports	0.0	0.0	0.0	0.4
Personal service	0.0	0.0	0.0	0.0

Source: Authors' estimates.

Table 17: Impacts on Number of Firms of Customs Union Future—Optimistic Outlook
(% change from benchmark)

	Kazakhstan	Customs Union	Other CIS	European Union	Rest of the World
Other mining	0.4	0.3	0.3	0.7	0.9
Tobacco products	-0.7	12.1	1.4	5.9	7.7
Textiles	1.8	17.4	5.2	-3.4	-4.7
Wearing apparel	7.0	22.3	10.9	-7.5	-9.5
Wood products	-3.1	7.3	-1.4	-21.4	-24.2
Refined petroleum	1.1	10.4	-0.2	-2.4	-3.1
Chemical industry	3.7	16.6	5.7	-6.2	-7.8
Rubber and plastic	-0.5	14.7	2.8	-6.6	-9.0
Other mineral products	1.0	15.4	3.9	-14.2	-18.0
Metallurgical industry	3.0	11.8	2.7	-11.4	-13.1
Metal products	0.5	13.3	2.8	-3.3	-4.0
Machinery and equipment	2.8	16.4	4.3	-2.4	-3.4
Electrical machinery	4.2	19.5	7.8	-6.8	-9.0
Radio and television	4.9	16.9	5.6	-1.1	-1.5
Precision instruments	1.0	14.0	2.5	-2.0	-2.7
Motor vehicles and trailers	10.5	38.8	25.4	-8.5	-11.7
Other transport equipment	3.7	20.3	7.5	-14.5	-18.7
Furniture and other products	9.6	25.3	12.9	-24.7	-31.5

Source: Authors' estimates.

Table 18: Piecemeal Sensitivity of Impact of Customs Union Future—Pessimistic Outlook

Results are estimated changes in welfare (Hicksian EV) as a percentage of consumption

Parameter	Parameter Value			Results for EV		
	Lower	Central	Upper	Piecemeal Sensitivity Analysis Lower	Central	Upper
$\sigma(q_i, q_j)$ – goods sectors	See below			-0.27	-0.28	-0.28
$\sigma(D, M)$	2	4	6	-0.27	-0.28	-0.28
$\sigma(M, M)$	4	8	12	-0.27	-0.28	-0.29
$\sigma(L, K)$	0.5	1	1.5	-0.28	-0.28	-0.27
$\sigma(A_1, \dots, A_n)$	NA	0	0.25	NA	-0.28	-0.29
$\sigma(D, E)$	2	4	6	-0.27	-0.28	-0.28
ε_{KAZ}	Central values of all 5 sets of ε parameters are listed in table 6. Lower and upper values are 0.5 and 1.5 times central values.			-0.32	-0.28	-0.24
ε_{CU}				-0.32	-0.28	-0.24
ε_{CIS}				-0.29	-0.28	-0.26
ε_{EU}				-0.21	-0.28	-0.31
ε_{ROW}				-0.19	-0.28	-0.32
$\sigma(q_i, q_j)$ – goods sectors						
Other mining	3.5	3.9	4.3			
Tobacco products	3.6	4.0	4.4			
Textiles	6.1	6.5	6.9			
Wearing apparel	3.6	4.0	4.4			
Wood products	2.2	2.6	3.0			
Refined petroleum	3.6	4.0	4.4			
Chemical industry	3.5	3.9	4.3			
Rubber and plastic	5.9	6.3	6.7			
Other mineral products	4.0	4.4	4.8			
Metallurgical industry	2.2	2.7	3.1			
Metal products	3.0	3.4	3.8			
Machinery and equipment	6.3	6.7	7.1			
Electrical machinery	4.3	4.7	5.1			
Radio and television	3.7	4.1	4.5			
Precision instruments	4.4	4.9	5.3			
Motor vehicles and trailers	7.1	7.6	8.0			
Other transport equipment	4.6	5.0	5.4			
Furniture and other products	6.1	6.5	6.9			

$\sigma(q_i, q_j)$: Elasticity of substitution between firm varieties in imperfectly competitive sectors

$\sigma(va, bs)$: Elasticity of substitution between value-added and business services

$\sigma(D, M)$: Elasticity of substitution between domestic production and imports

$\sigma(M, M)$: Elasticity of substitution between imported varieties

$\sigma(L, K)$: Elasticity of substitution between primary factors of production in value added

$\sigma(A_1, \dots, A_n)$: Elasticity of substitution in intermediate production between composite Armington aggregate goods

$\sigma(D, E)$: Elasticity of transformation (domestic output versus exports)

ε_{KAZ} : Elasticity of national service firm supply with respect to price of output

ε_{CU} : Elasticity of CU firm supply with respect to price of output

ε_{CIS} : Elasticity of other CIS firm supply with respect to price of output

ε_{EU} : Elasticity of EU firm supply with respect to price of output

ε_{ROW} : Elasticity of Rest of World service firm supply with respect to price of output

Source: Authors' estimates.

Table 19: Piecemeal Sensitivity of Impact of Customs Union Future—Optimistic Outlook

Results are estimated changes in welfare (Hicksian EV) as a percentage of consumption

Parameter	Parameter Value			Results for EV		
	Lower	Central	Upper	Lower	Central	Upper
$\sigma(q_i, q_j)$ – goods sectors		See below		1.59	1.52	1.48
$\sigma(D, M)$	2	4	6	1.50	1.52	1.55
$\sigma(M, M)$	4	8	12	1.54	1.52	1.51
$\sigma(L, K)$	0.5	1	1.5	1.52	1.52	1.53
$\sigma(A_1, \dots, A_n)$	NA	0	0.25	NA	1.52	1.53
$\sigma(D, E)$	2	4	6	1.52	1.52	1.52
ϵ_{KAZ}	Central values of all 5 sets of ϵ parameters are listed in table 6. Lower and upper values are 0.5 and 1.5 times central values.			1.45	1.52	1.58
ϵ_{CU}				1.36	1.52	1.67
ϵ_{CIS}				1.51	1.52	1.53
ϵ_{EU}				1.61	1.52	1.48
ϵ_{ROW}				1.63	1.52	1.47
$\sigma(q_i, q_j)$ – goods sectors						
Other mining	3.5	3.9	4.3			
Tobacco products	3.6	4.0	4.4			
Textiles	6.1	6.5	6.9			
Wearing apparel	3.6	4.0	4.4			
Wood products	2.2	2.6	3.0			
Refined petroleum	3.6	4.0	4.4			
Chemical industry	3.5	3.9	4.3			
Rubber and plastic	5.9	6.3	6.7			
Other mineral products	4.0	4.4	4.8			
Metallurgical industry	2.2	2.7	3.1			
Metal products	3.0	3.4	3.8			
Machinery and equipment	6.3	6.7	7.1			
Electrical machinery	4.3	4.7	5.1			
Radio and television	3.7	4.1	4.5			
Precision instruments	4.4	4.9	5.3			
Motor vehicles and trailers	7.1	7.6	8.0			
Other transport equipment	4.6	5.0	5.4			
Furniture and other products	6.1	6.5	6.9			

$\sigma(q_i, q_j)$: Elasticity of substitution between firm varieties in imperfectly competitive sectors

$\sigma(va, bs)$: Elasticity of substitution between value-added and business services

$\sigma(D, M)$: Elasticity of substitution between domestic production and imports

$\sigma(M, M)$: Elasticity of substitution between imported varieties

$\sigma(L, K)$: Elasticity of substitution between primary factors of production in value added

$\sigma(A_1, \dots, A_n)$: Elasticity of substitution in intermediate production between composite Armington aggregate goods

$\sigma(D, E)$: Elasticity of transformation (domestic output versus exports)

ϵ_{KAZ} : Elasticity of national service firm supply with respect to price of output

ϵ_{CU} : Elasticity of CU firm supply with respect to price of output

ϵ_{CIS} : Elasticity of other CIS firm supply with respect to price of output

ϵ_{EU} : Elasticity of EU firm supply with respect to price of output

ϵ_{ROW} : Elasticity of Rest of World service firm supply with respect to price of output

Source: Authors' estimates.

**Figure 1: Sample Distribution of the Welfare Results from Customs Union Future—
Pessimistic Outlook, 30,000 Simulations**

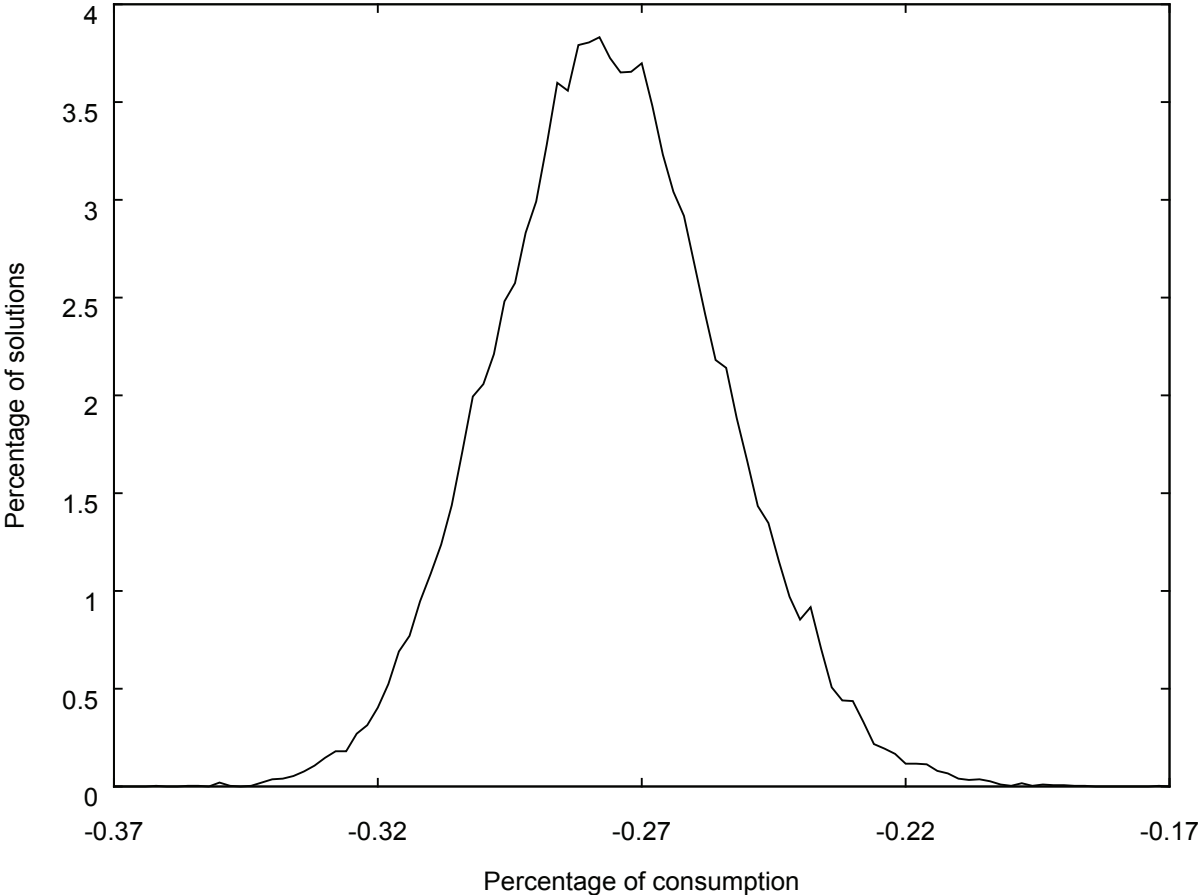
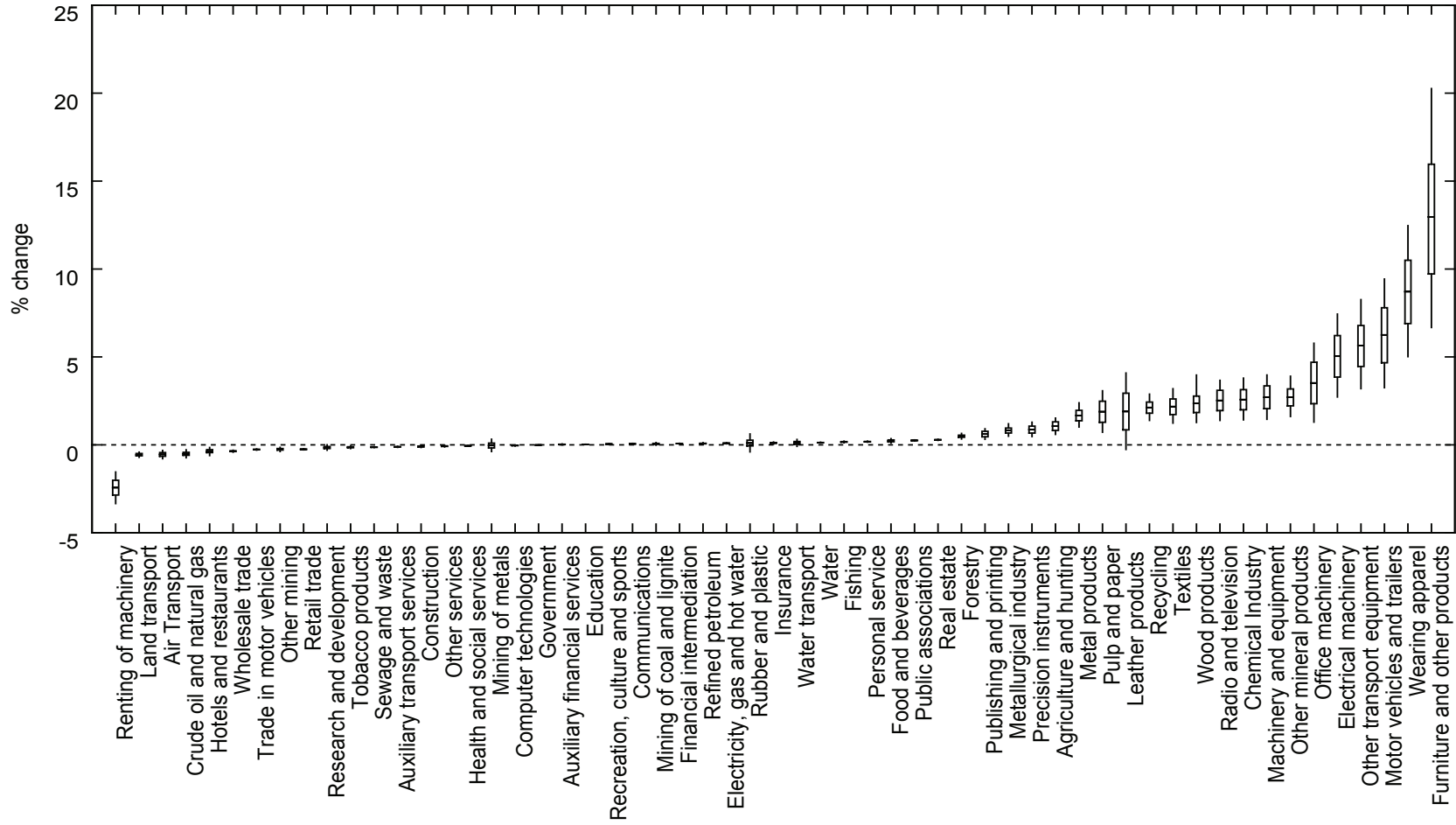
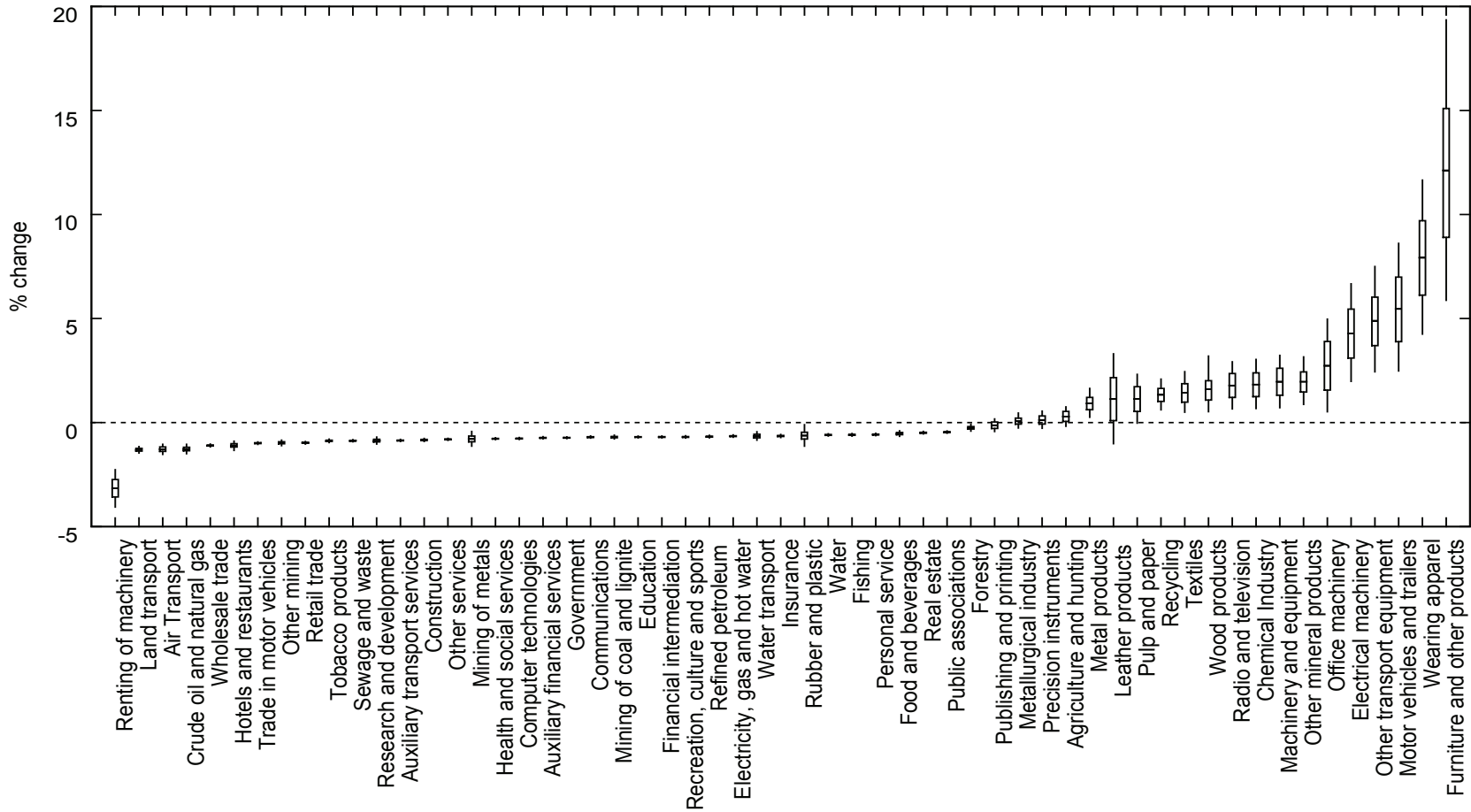


Figure 2: Means, 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Output Changes by Sector from Customs Union Future—Pessimistic Outlook, 30,000 Simulations



Note: The boxes are limited vertically by the 25% and 75% quartiles. The bars in the box are the means. The vertical lines extend to the 2.5% and 97.5% percentiles.

Figure 3: Means, 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Labor Payment Changes by Sector from Customs Union Future—Pessimistic Outlook, 30,000 Simulations



Note: The boxes are limited vertically by the 25% and 75% quartiles. The bars in the box are the means. The vertical lines extend to the 2.5% and 97.5% percentiles.

**Figure 4: Sample Distribution of the Welfare Results from Customs Union Future—
Optimistic Outlook, 30,000 Simulations**

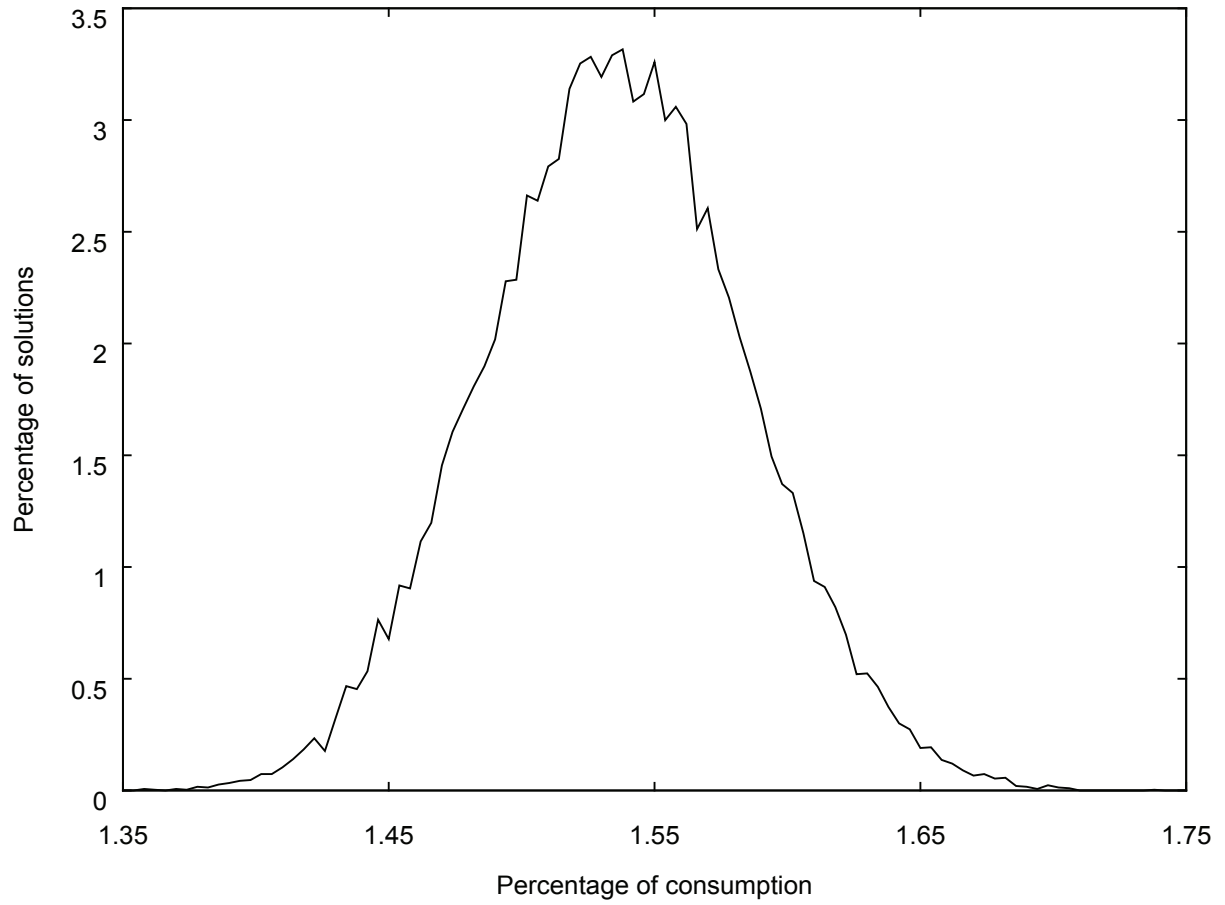
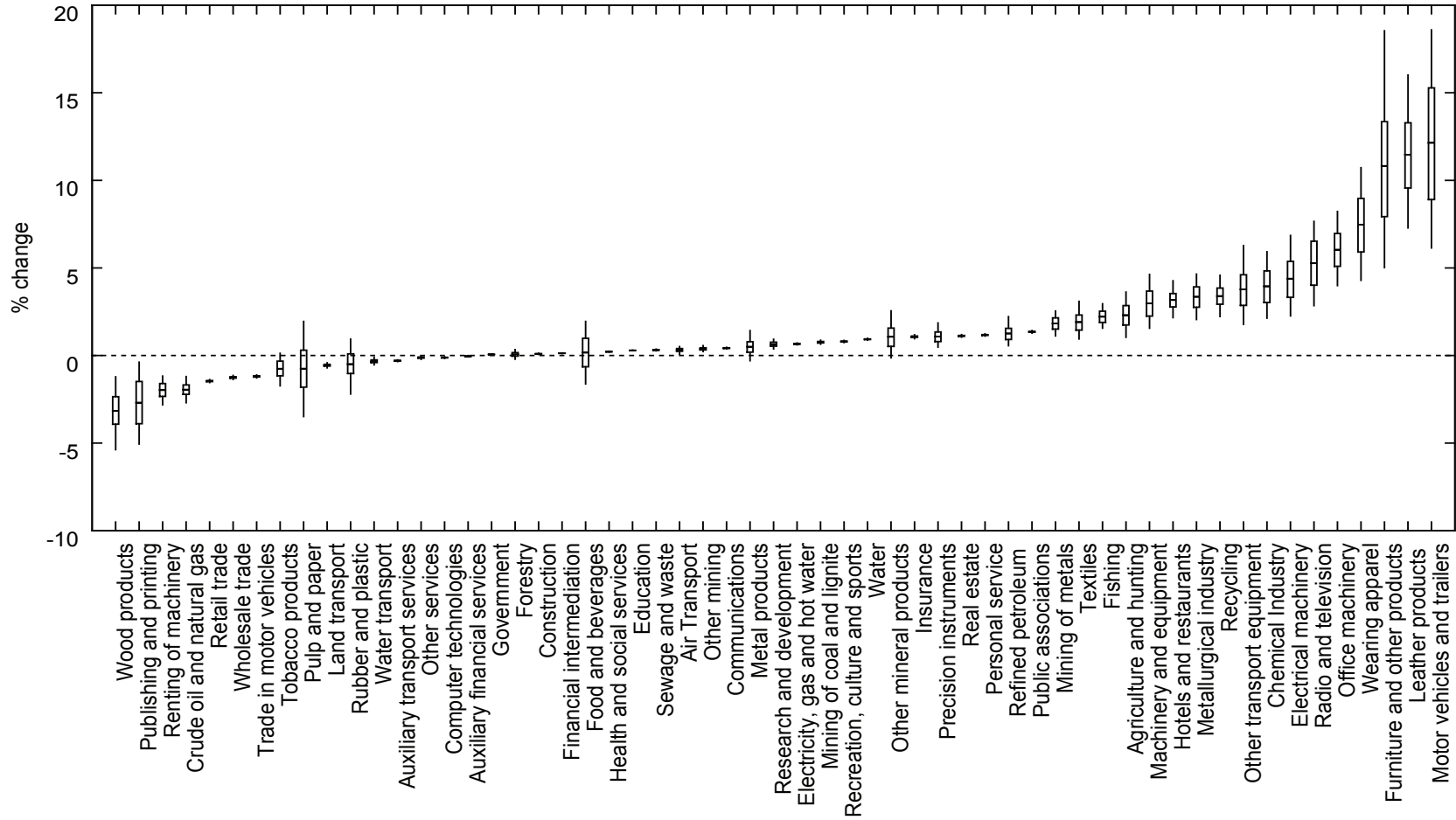
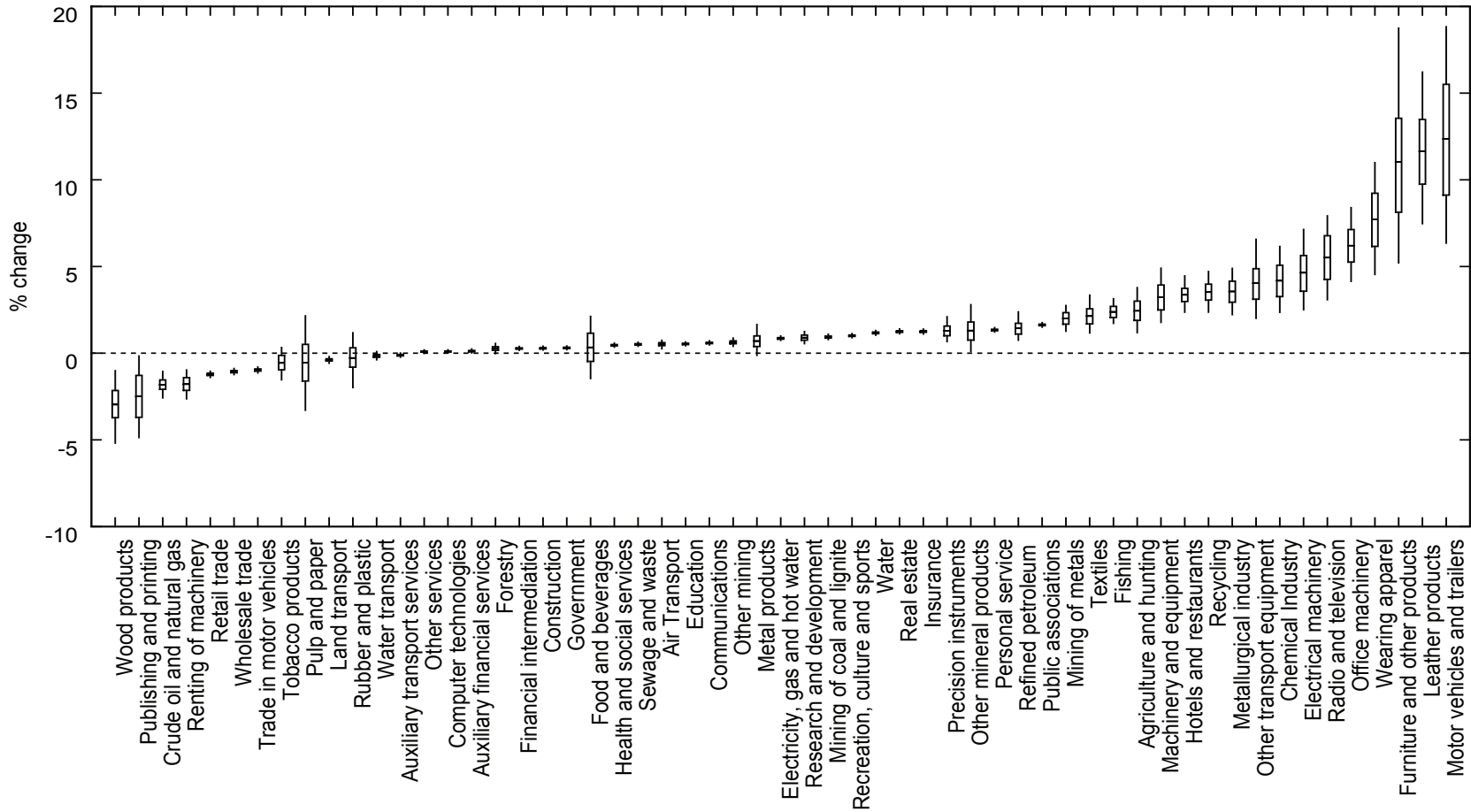


Figure 5: Means, 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Output Changes by Sector from Customs Union Future—Optimistic Outlook, 30,000 Simulations



Note: The boxes are limited vertically by the 25% and 75% quartiles. The bars in the box are the means. The vertical lines extend to the 2.5% and 97.5% percentiles.

Figure 6: Means, 50 and 95 Percent Confidence Intervals of the Sample Distributions of the Labor Payment Changes by Sector from Customs Union Future—Optimistic Outlook, 30,000 Simulations



Note: The boxes are limited vertically by the 25% and 75% quartiles. The bars in the box are the means. The vertical lines extend to the 2.5% and 97.5% percentiles.

Appendix A: Trade Data for Kazakhstan

Trade Data by Regional Partner and Sector

1. To obtain the shares of imports and exports from the different regions of our model, we use trade data provided the Customs Control Committee of the Ministry of Finance of Kazakhstan. The data is for the year 2009 and shows exports and imports by country and commodity.

2. The regions of our model are Kazakhstan, the other member of the customs union (Russia and Belarus), the rest of the CIS plus Georgia, the European Union, and the “rest of the world.” For the EU, we took the 27 member countries as of 2007. For rest of the CIS, we include Armenia, Azerbaijan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. “Rest of the world” is the residual.

3. The data is reported at the 10-digit level. We map the data into the sectors of our model in two steps. First, we aggregate the 10-digit data to the 6-digit level of the Harmonized System (HS). Second, we use two concordance tables from the World Bank’s World Integrated Trade Solution.¹ One table maps the 6-digit level HS classification to revision 3 of the International Standard Industrial Classification of All Economic Activities (ISIC). In turn, ISIC revision 3 coincides with revision 1 of the Statistical Classification of Economic Activities in the European Community (NACE) at the 2-digit level. Revision 1 of NACE at the 2-digit level corresponds to the classification used in the input output table for Kazakhstan.

¹ Also known as WITS. The tables are available at wits.worldbank.org.

Appendix B: Dixit-Stiglitz Elasticities of Substitution for Goods

1. To obtain estimates of the Dixit-Stiglitz elasticities for the imperfectly competitive sectors in our model, we use data provided by Broda et al. (2006). They estimate Dixit-Stiglitz product-variety elasticities of substitution for 73 countries according to the Harmonized System (HS) classification at the 3-digit level. There are no Commonwealth of Independent States (CIS) countries in their sample, but they do estimate elasticities for Algeria. Algeria, like Kazakhstan, is an economy where oil production and exports are dominant activities. We chose Algeria as our proxy for Kazakhstan.
2. Broda et al. estimate elasticities for 130 goods at the 3-digit level of the HS. Following the procedures and data documented in appendix A, we aggregate the data from Broda et al. in several steps to obtain estimates at the level of sectors of our model.
3. First, we aggregate the 10-digit trade data (see appendix A) to the 3-digit level. Second, we aggregate one of the concordance tables from WITS so that it maps from the 3-digit level HS classification to International Standard Industrial Classification of All Economic Activities (ISIC) revision 3, which coincides with the classification used in the input-output table for Kazakhstan. Finally, we use the 3-digit level trade data to aggregate the 3-digit level data from Broda et al. In this step we also use the maps providing the correspondence between the 3-digit level and the sectors in our model.
4. We use both export and import data in the aggregation. There are several reasons for this. A larger share of a subcategory in imports reflects more imports, and more likely there are more varieties of imports. So weighting by the import share of a subcategory is better than using an unweighted measure. Domestic varieties are also important. Since we do not have production data for the subcategories, we use export shares as a proxy for domestic production by subcategory. Analogously, weighting subcategories by export shares is better than using unweighted categories. Since both import shares and export shares are useful in the weighting, we take one-half the shares of both exports and imports as the weights. The resulting elasticities are reported in tables 18 and 19.
5. For the sensitivity analysis, we need upper and lower bounds of the elasticities. Unfortunately, Broda et al. report only point estimates in their on-line Excel file. In the paper itself, however, Broda et al. (2006, 36, table 4) list the standard error of the median Dixit-Stiglitz estimate for the country. The standard errors are rather small for most countries. In the case of Algeria, the median Dixit-Stiglitz elasticity is 3.6 with a standard error (of the median estimate) of 0.14.
6. Although we do not have standard errors at the product line level, we use the overall estimate of the standard error to guide our choice of upper and lower values of the estimates. The low standard error suggests that we do not need to take very large ranges to check for robustness. We took plus or minus three times the average standard error of 0.14.

Appendix C: Trade-facilitation and Border Costs

1. Exporting and importing goods requires documentation, time, and money. Clearance at the border involves bank, transport, and customs clearance documents. Obtaining the documents takes time, as does transportation, inspections, and waiting for clearance. Finally, the documents, the transport, the inspections, and the clearance may all involve monetary costs and fees. In short, there are costs associated with international trade, which we call border costs, although not all these costs occur at the border.

2. Given the focus of the customs union on institutional development for trade facilitation, the customs union may reduce these costs. Early complaints by freight forwarders indicate that the customs union has not yet achieved much success. We consider a pessimistic and an optimistic scenario for the success of the customs union with trade-facilitation and border costs. In the pessimistic scenario, we assume there will be no progress on reducing trade-facilitation costs. In this appendix, we explain our estimate for the optimistic scenario.

3. We need an estimate of the share of the value of exports and imports that are due to border costs. While we shall use data on border costs in Kazakhstan from the World Bank Doing Business Project,¹ in our estimation, we are not aware of any estimates for Kazakhstan border costs in ad valorem terms relative to export costs. Consequently, we begin with a survey among firms of border costs in Ukraine by Jakubiak et al. (2006). Jakubiak et al. estimated that Ukrainian border costs of exporting to the EU on average amount to 6 percent of the value of exports.

4. We then convert this estimate by comparing data for Ukraine and Kazakhstan from the World Bank Doing Business Project. We use three types of data, namely the cost per container in US dollars, the number of documents required, and the time involved in crossing the border. For each data type, we look at both exports and imports and we thus have six data points for each country for the year 2010 (see table C1). For each data point, we calculate the ratio of the estimates for Kazakhstan and Ukraine. We find that the data for Kazakhstan are between 1.6 and 2.9 times greater, with four out of six data points being close to two times greater. Our estimate of Kazakhstani Border Costs is thus 12 percent (2 x 6 percent). We assume that this estimate applies to all sectors in Kazakhstan, both for exports and imports.

5. To estimate the extent of a reduction in these costs, we compare the border costs in Kazakhstan with those of several countries in the CIS, including Russia and Belarus, and with China, Bulgaria, and Romania (table C1). For the cost per container in US dollars and the time involved in exporting and importing, Kazakhstan is among the highest. The cost per container in Kazakhstan is around five times higher than in China and around twice as high as in Belarus, Russia, Ukraine, Bulgaria, and Romania. The time involved in exporting and importing in Kazakhstan is around twice as high as in Russia and Ukraine and more than five times higher than in Romania.

6. The costs of exporting and importing in Kazakhstan are comparable to those in the other central Asian countries in the countries of the former Soviet Union. Clearly part of the

¹ See <http://www.doingbusiness.org/Data/ExploreTopics/trading-across-borders>.

higher border costs of Kazakhstan is due to the natural geographic disadvantage of being both landlocked and being far from the major markets of the world, notably the European Union.

7. Parts of the higher costs are also due to institutions. The poor score of Kazakhstan on the number of documents required for importing and exporting (which may also reflect red tape in the acquisition of documents) is clearly unrelated to geography and can be potentially improved by a better institutional framework. Further, the geographic disadvantage is magnified by the alleged corruption on the roads by traffic police who extract bribes, and to delays at the borders themselves. The customs union has as its goal the elimination of borders within the union, EU style, thereby eliminating delays at the borders for trade within the customs union as early as July 1, 2011. Further, to the extent that the bribes are extracted in the customs union, this is one issue that in an optimistic scenario, one we could assume would improve. In sum, the customs union could lower border costs through (i) eliminating borders within the customs union, (ii) reducing the number of documents required for importing and exporting and the difficulty in obtaining the documents, and (iii) reducing corruption on the roads within the union.

8. Successfully addressing the challenge of reducing border costs is a major task that requires significant institutional development both within the customs union in general and within Kazakhstan in particular. It is very difficult to speculate on the impact the customs union may have on the reduction of border costs. We assume two extremes (which do not occur with equal probability), although the ultimate result is likely to be between them, depending on commitment and effectiveness of the customs union in addressing these issues. In one extreme, a pessimistic scenario, we assume that Kazakhstan does not realize any reduction of its border costs as a result of the customs union. In the other extreme, an optimistic scenario, we assume that Kazakhstan could reduce its border costs by 25 percent for trade within the customs union on products other than oil, gas, and minerals. Since most oil and gas travels through pipelines, it is subject to fewer border delays and corruption on the roads. Thus, there is less room for institutional improvement to reduce its transport and border costs, and we assume no decline in border costs on oil, gas, and extend this assumption to minerals. For products other than oil, gas, and minerals, this scenario would reduce the difference between Kazakhstan and Russia, Ukraine, and Belarus by around 50 percent. We assume, therefore, that the union would reduce the border costs on these products by 25 percent from 12 percent to 9 percent of the value of trade within the union.

9. Some aspects of improved institutions for trade facilitation within the customs union may also reduce border costs on trade with third countries. For example, if Kazakhstan is reducing red tape and the number of documents required for importing and exporting within the customs union, it may adopt similar more efficient procedures for trade with third countries. On the other hand, clearly Kazakhstan will maintain customs posts with third countries that are not members of the customs union, even if they are eliminated internally. Further, given that the customs union will monitor its internal trade much more carefully, it is possible that not all institutional reforms in trade facilitation will transmit to trade outside the customs union. So we shall assume that the border costs of exporting to or importing from outside the customs union on products other than oil, gas, and minerals will fall by 10 percent in the optimistic scenario. That is, we assume that exporters and importers save 1.2 percent of trade value from outside the customs union in the optimistic scenario.

Table C1: Border Costs, 2009

	Kazakhstan	Ukraine	Belarus	Russia	Kyrgyzstan	Tajikistan	Uzbekistan	China	Bulgaria	Romania
Items in absolute value										
Cost to export (US\$ per container)	3005	1560	1772	1850	3000	3350	3100	460	1626	1275
Cost to import (US\$ per container)	3055	1680	1770	1850	3250	4550	4600	545	1776	1175
Documents to export (number)	11	6	8	8	13	10	7	7	5	5
Documents to import (number)	13	8	8	13	13	10	9	6	7	6
Time to export (days)	89	31	18	36	64	82	80	21	23	12
Time to import (days)	76	36	25	36	75	83	104	24	21	13
Items relative to Kazakhstan										
Cost to export (index)	1	0.52	0.59	0.62	1.00	1.11	1.03	0.15	0.54	0.42
Cost to import (index)	1	0.55	0.58	0.61	1.06	1.49	1.51	0.18	0.58	0.38
Documents to export (index)	1	0.55	0.73	0.73	1.18	0.91	0.64	0.64	0.45	0.45
Documents to import (index)	1	0.62	0.62	1.00	1.00	0.77	0.69	0.46	0.54	0.46
Time to export (index)	1	0.35	0.20	0.40	0.72	0.92	0.90	0.24	0.26	0.13
Time to import (index)	1	0.47	0.33	0.47	0.99	1.09	1.37	0.32	0.28	0.17

Source: The World Bank Doing Business Project and authors' calculations.

Appendix D: Nontariff Barriers in Russia and Kazakhstan

Estimation of the Ad Valorem Equivalents of the Nontariff Barriers in Russia and Kazakhstan, and the Possible Impact of the Customs Union

1. The Russia-Belarus-Kazakhstan customs union has taken on the challenge of reducing nontariff barriers (NTBs) within the union. NTBs potentially include a wide range of measures. Among the most important are licensing or quotas on imports or exports; state control or monopoly control of imports or exports; state subsidies on production or exports; and technical regulations, including sanitary and phyto-sanitary (SPS) measures that may be barriers to trade.

2. Although we do not focus exclusively on standards in our estimation procedure, we have explained in the main text that, based on our interviews with the government and the business community in Kazakhstan, as well as written reports by experts, the most important NTBs of concern are standards, technical regulations, and SPS measures used as protective or rent-seeking measures. Although the challenge of addressing the standards problems and other NTBs is very large, reduction of the NTBs could potentially bring substantial benefits to the member countries.

3. In order to estimate the potential benefits to the member countries, it is first necessary to estimate the ad valorem equivalents of the NTBs. Estimation of such equivalents has historically been a notoriously difficult endeavor. The inability of international trade economists to be able to systematically assess the ad valorem equivalents of NTBs has seriously hindered the efforts to assess the impacts of changes in trade policy.

4. At the theoretical level, in a series of papers, Anderson and Neary (1994, 1996, and 2003) developed new measures and techniques for the measurement of the ad valorem equivalents of NTBs. Building on these theoretical contributions, Kee et al. (2009) have developed a procedure for estimation. Kee et al. estimated the ad valorem equivalents of NTBs in 78 countries, including Kazakhstan, Russia, and Belarus. In August 2010, Kee and colleagues updated and expanded the estimates to include 23 additional countries.¹ We utilize the updated estimates of Kee and colleagues as the basis of our estimates.

5. It is necessary to define several variables. In order for the reader to go the source of the data on the World Bank website, we use the terminology available there:

OTRI is the uniform tariff of country M that would keep imports of country M at their observed levels, taking into account the applied tariffs of country M and its NTBs.

¹The updated estimates are available on the World Bank trade research website at <http://go.worldbank.org/FG1KHXSP30>.

TTRI is the uniform tariff of country M that would keep imports of country M at their observed levels, taking into account the applied tariffs of country M, but excluding its NTBs.

AVE is the uniform tariff of country M that would keep imports of country M at their observed levels, taking into account the NTBs of country M, but excluding its tariffs.

As in equation 15 of Kee et al. (2009), at the tariff line level, we have that:

$$\text{OTRI}_i = \text{TTRI}_i + \text{AVE}_i \quad \text{or}$$

$$\text{AVE}_i = \text{OTRI}_i - \text{TTRI}_i.$$

6. Kee et al. (2009) estimate the OTRI and the TTRI at the tariff line level for the Harmonized System (for over 4,500 tariff lines) for 78 countries, which allows them to calculate AVE_i , the ad valorem equivalent of the NTBs at the tariff line level.²

7. OTRI is the overall trade restrictiveness for the economy or group of products. It is defined as the weighted sum of the product-level protection levels OTRI_i where the weights are given by the trade-weighted shares of the product and the elasticities of import demand (Kee et al., 2009,180). TTRI is defined analogously, based on the over 4,500 estimated TTRI_i for each country; and the overall AVE is calculated as in equation 2, dropping the subscript i.

8. Based on these definitions, we present the estimates for Kazakhstan and for Russia. In table D1, we reproduce the TTRI and OTRI data from the World Bank website for aggregates of agricultural products, manufacturing products, and all products, and calculate the AVE for these three groups of products as the difference between OTRI and TTRI. The estimates in our model are in the two columns on the far right of Table D1.

9. We assume that, while Russia offers tariff-free access to exporters from Kazakhstan, it does not offer preferences with respect to its NTBs, for example technical regulation. Then exporters from Kazakhstan face the barriers that are present in Russia. We apply the estimates of table D1 to all manufactured products, and the estimate for agricultural products to agriculture, forestry, and fisheries. We assign zero barriers to mining on the presumption that these goods flow largely unencumbered by NTBs. For example, we assume that exporters of metal products from Kazakhstan to Russia face an NTB on their exports equivalent to 10 percent of the value of their exports. This is a real cost of exporting from Kazakhstan. We assume that these are lost resources to exporters from Kazakhstan. That is, either the rents from the NTBs are dissipated or if there are any rents on the NTBs they are not captured by exporters from Kazakhstan. Kazakhstani exporters of agricultural goods to Russia face a barrier that raises their costs by 20 percent.

² Kee et al. (2009) selected four NTBs from among the more than 30 different types of NTBs identified in the UNCTAD database. They call these four Core NTBs: price control measures, quantity restrictions, monopolistic measures, and technical regulations. Their Core NTB variable used in their estimation equation takes the value 1 when a given country imposes one of the Core NTB measures in a 6-digit tariff line, and zero otherwise.

10. Similarly, the estimates indicate that there are NTBs on imports into Kazakhstan. We assume that, despite obtaining tariff-free access to the markets of Kazakhstan, exporters from Russia and Belarus do not obtain preferential access regarding the NTBs. Then metal producers from Russia, for example, selling in Kazakhstan face an NTB on their exports equivalent to 5.7 percent of the value of their exports. We assume that the rents of these exports are either dissipated or not captured by Kazakhstani importers. Russian exporters of agricultural products to Kazakhstan face a NTB that raises their costs by 22.6 percent.

11. All estimates used in the model are presented in table 4.

Table D1: Estimated Ad Valorem Equivalents of the Nontariff Barriers Imposed by Kazakhstan and Imposed by Russia

Country	Year of estimate	OTRI (tariff and NTB barriers)			TTRI (tariff barriers)			Ad valorem equivalents of NTBs		
		All products	Agriculture	Manufactured products	All products	Agriculture	Manufactured products	All products	Agriculture	Manufactured products
Kazakhstan	2008	8.7%	26.5%	7.2%	1.7%	3.9%	1.5%	7.1%	22.6%	5.7%
Russian Federation	2008	16.0%	25.2%	14.8%	4.8%	5.2%	4.8%	11.2%	20.0%	10.0%

Source: Authors' calculations from data available at <http://go.worldbank.org/FG1KHXP30> and based on Kee et al. (2009)

Appendix E: Technology Diffusion and Trade

1. Technological spillovers via international trade are an important source of economic development. For example, Grossman and Helpman (1991) have developed models of economic growth that have highlighted the role of trade in a greater variety of intermediate goods as a vehicle for technological spillovers that allow less developed countries to close the technological gap with industrialized countries. Similarly, Romer (1994) has argued that product variety is a crucial and often overlooked source of gains from trade liberalization.

2. In our model, it is the greater availability of varieties that is the engine of productivity growth, but we believe there are other mechanisms as well through which trade may increase productivity. For example, trade or services liberalization may increase growth indirectly through its positive impact on the development of institutions (see Rodrik, Subramanian, and Trebbi 2004). It may also induce firms to move down their average cost curves, import higher quality products, or shift production to more efficient firms within an industry (Tybout and Westbrook 1995). Consequently, we take variety as a metaphor for the various ways increased trade can increase productivity.

3. Winters et al. (2004) summarize the empirical literature by concluding that “the recent empirical evidence seems to suggest that openness and trade liberalization have a strong influence on productivity and its rate of change.” Some of the key articles regarding product variety are the following: Broda and Weinstein (2004) find that increased product variety contributes to a fall of 1.2 percent per year in the “true” import price index. Hummels and Klenow (2005) and Schott (2004) have shown that product variety and quality are important in explaining trade between nations. Feenstra et al. (1999) show that increased variety of exports in a sector increases total factor productivity in most manufacturing sectors in Taiwan (China) and Korea, and they have some evidence that increased input variety also increases total factor productivity. In business services, because of the high cost of using distant suppliers, the close availability of a diverse set of business services may be even more important for growth than in goods.¹⁶

4. Beginning with the path-breaking work of Coe and Helpman (1995), a rich literature now exists that has empirically investigated the transmission of knowledge through the purchase of imported intermediate goods and through foreign direct investment (FDI). Coe and Helpman found that OECD countries benefit from foreign research and development (R&D), that they benefit more from trading with countries that have a larger stock of research and development, and that the benefits are greater the more open the country is to foreign trade. Moreover, while in large countries the elasticity of total factor productivity (TFP) with respect to domestic R&D capital stocks is larger than that with respect to foreign R&D capital stocks, the opposite holds in small countries; that is, foreign R&D is more important for small countries. Coe et al. (1997) extend these results based on a sample of 77 developing countries. They find developing countries that do little R&D on their own have benefited substantially from industrialized country R&D through trade in intermediate products and capital equipment with industrialized countries. They find that R&D spillovers through trade with the United States are the largest, since the US stock of R&D is the highest and it is the most

¹⁶ For example, see Arnold et al. (forthcoming), Fernandes (2009), and Fernandes and Paunov (forthcoming) for econometric estimates of the gains from services liberalization.

important trading partner for many developing countries. A 1 percent increase in the R&D stock of the United States raises total factor productivity for all 77 developing countries in their sample by 0.03 percent. By comparison, a 1 percent increase in the R&D stock of Japan, Germany, France, or the UK raises total factor productivity only between 0.004 percent and 0.008 percent. Crucially, they find that countries that trade more with the United States, such as the Latin American countries, get more productivity spillover increases from the US R&D stocks. And the relatively more open East Asian countries have benefited the most from foreign R&D through trade. Keller (2000) also finds that trade is an important conveyor of R&D and is especially important for small countries. Several other studies, including Lumenga-Neso et al. (2005), Schiff et al. (2002), and Falvey et al. (2002), confirm these results. Lumenga-Neso et al. show that technological spillovers can occur from indirect trade with technologically advanced countries, i.e., imports from the UK embody some US technology due to UK imports from the United States.

5. Data show that OECD countries have the vast majority of R&D stocks. For example, Coe et al. (1997) calculate that 96 percent of the world's R&D expenditures took place in industrial countries in 1990; this number stood at 94.5 percent in 1995. This implies that it is important for small developing countries to trade with large technologically rich countries or regions, such as the United States and the EU, at least indirectly.

6. Schiff and Wang (2008) estimate the relative importance for technology diffusion to developing countries of trade with industrialized versus developing countries. They note that technology from the industrialized countries may indirectly diffuse to a developing country through trade with another developing country, if the other developing country has traded with industrialized countries. They conclude that trade with industrialized countries has a stronger impact on productivity in developing countries and that spillovers from developing-country trade occurs with more of a lag.

7. In summary, this literature shows that the purchase of intermediate inputs and FDI from industrialized countries is an important mechanism for the transmission of R&D and productivity growth in developing countries. For small developing countries, trading with large technologically advanced countries is crucial for TFP growth.

8. In our model, the parameter that reflects the ability of a region to increase total factor productivity through the transmission of new technologies is the elasticity of varieties with respect to the price. Schiff and Wang (2008) show that the average impact of trade-related R&D in developing countries on TFP growth is about one-third of the average impact of trade-related R&D in developed countries. The impact of trade-related R&D in developed countries on TFP growth in Schiff and Wang (2008) is higher than the estimate reported in Coe et al. (1997) and lower than the estimate in Savvides and Zachariadis (2005).

9. Based on these considerations, we assume that trade with the customs union members and the CIS region is only one-fifth as valuable as trade with the rest of the world, while trade with the EU is two-thirds as valuable as trade with the rest of the world. This distinction between countries and regions reflects the allocation of the world's R&D expenditures. As discussed above, the overwhelming majority of R&D expenditures take place in industrial countries, which in our model are part of the EU and "rest of the world" regions. The estimates of supply in the model are reported in table 6.

References for Appendix E

- Arnold, Jens M., Beata S. Javorcik, and Aaditya Matoo. Forthcoming. “Does services liberalization benefit manufacturing firms: Evidence from the Czech Republic.” *Journal of International Economics*.
- Coe, David T., and Elhanen Helpman. 1995. “International R&D spillovers.” *European Economic Review* 39(5):859–887.
- Coe, David T., Elhanen Helpman, and Alexander W. Hoffmaister. 1997. “North-south r&d spillovers.” *Economic Journal* 107:134–149.
- Coe, David T., and Alexander W. Hoffmaister. 1999. “Are there international r&d spillovers among randomly matched trade partners? A response to Keller.” Washington, DC: International Monetary Fund Working Paper.
- Falvey, R., N. Foster, and D. Greenaway. 2002. “Imports, exports, knowledge spillovers and growth.” *Economic Letters* 85:209–13.
- Feenstra, R., D. Madani, T. H. Yang, and C. Y. Liang. 1999. “Testing endogenous growth in South Korea and Taiwan.” *Journal of Development Economics* 60:317–341.
- Fernandes, Ana M. 2009. “Structure and Performance of the Services Sector in Transition Economies.” *Economies of Transition* 17(3):467–501.
- Fernandes, Ana M., and Caroline Paunov. Forthcoming. “Foreign direct investment in services and manufacturing productivity: evidence for Chile.” *Journal of Development Economics*.
- Hummels, D., and P. Klenow. 2005. “The variety and quality of a nation’s trade.” *American Economic Review* 95:704–23.
- Jabbour, Liza, and Jean Louis Mucchielli. 2007. “Technology transfer through vertical linkages: The case of the Spanish manufacturing industry.” *Journal of Applied Economics* 10(1):115–136.
- Javorcik, Beata S. 2004. “Does foreign investment increase productivity of domestic firms? In search of spillovers through backward linkages.” *American Economic Review* 94(3):605–27.
- Javorcik, Beata S., and Mariana Spatareanu. 2008. “To Share or not to share: Does local participation matter for spillovers from foreign direct investment?” *Journal of Development Economics* 85(1-2):194–217.
- Keller, Wolfgang. 1998. “Are international r&d spillovers trade related? Analyzing spillovers among randomly matched trade partners.” *European Economic Review* 42:1469–491.
- Keller, Wolfgang. 2000. “Do trade patterns and technology flows affect productivity growth?” *World Bank Economic Review* 14(1):17–47.
- Keller, Wolfgang. 2002. “Trade and the transmission of technology.” *Journal of Economic Growth* 7: 5–24.
- Lumenga-Neso, Olivier, Marcelo Olarreaga, and Maurice Schiff. 2005. “On ‘indirect’ trade-related research and development spillovers.” *European Economic Review* 49(7):1785–798.

- Rodrik, D., A. Subramanian, and F. Trebbi. 2004. "Institutions rule: The primacy of institutions over geography and integration in economic development." *Journal of Economic Growth* 9:131–165.
- Saggi, Kamal. 2006. "Foreign direct investment, linkages, and technology spillovers." In *Global Integration and Technology Transfer*, Bernard Hoekman and Beata Smarzynska Javorcik, eds. New York: Palgrave Macmillan and the World Bank.
- Savvides, Andreas, and Marios Zachariadis. 2005. "International technology diffusion and the growth of tpp in the manufacturing sector of developing economies." *Review of Development Economics* 9(4):482–501.
- Schiff, Maurice, and Yanling Wang. 2006. "North-south and south-south trade-related technology diffusion: An industry-level analysis of direct and indirect effects." *Canadian Journal of Economics* 39(3):831–844.
- Schiff, Maurice, Yanling Wang, and Marcelo Olarreaga. 2002. "Trade-related technology diffusion and the dynamics of north-south and south-south integration." World Bank Policy and Research Working Paper 2861, June.
- Schott, P. 2004. "Across-product versus within-product specialization in international trade." *Quarterly Journal of Economics* 119:647–678.
- Tybout, J., and D. Westbrook. 1995. "Trade liberalization and the dimensions of efficiency change in Mexican manufacturing industries." *Journal of International Economics* 39:53–78.
- Wang, Yanling. Forthcoming. "FDI productivity and growth: The role of inter-industry linkages." *Canadian Journal of Economics*.
- Winters, L., N. McCulloch, and A. McKay. 2004. "Trade liberalization and poverty: The evidence so far." *Journal of Economic Literature* 42:72–115.

Appendix F: Tariff Rates before and after the Customs Union

by Oleksandr Shepotylo

1. Introduction

1. In order to assess the impact on Kazakhstan of joining in the customs union with Russia and Belarus, it is necessary to assess the tariff regime in Kazakhstan before and after the imposition of the customs union tariff. Given the existence of the mixed tariff system (1,455 tariff lines in 2009 and 1,960 tariff lines in 2010 out of more than 11,000 tariff lines had a specific component), we estimate the tariffs in Kazakhstan in 2009–2010 based on the methodology developed by Shepotylo and Tarr (2008).

2. The main findings, which are detailed in table F.2 below, are as follows. First, the average effective rate has increased from 6.72 percent in 2009 to 11.08 percent in 2010. If the transition period rates were eliminated, the average effective rate would have been 11.51 percent. Second, the dispersion of tariff rates measured by standard deviation of the average effective rate has increased from 9.8 to 15.97. Third, the rates have increased the most for the following sectors: manufacture of motor vehicles by 19.54 percentage points, manufacture of wearing apparel, dressing and dyeing of fur by 10.38 percentage points, forestry by 9.78 percentage points, manufacture of furniture by 8.83 percentage points. We also find a very substantial increase in the variance of the tariffs.

3. These findings are in broad agreement with calculations of pre- and post-customs union tariff rates carried out by the excellent RAKURS recently completed report on this subject (see Jandosov and Sabyrova 2011). The RAKURS study also finds that the tariffs in Kazakhstan have approximately doubled in 2011, and that the variance of the tariffs has very substantially increased. Although this study and the RAKURS study used different weighting methodologies (both of which are defensible), the consistency of the results across the two studies to the weighting methodology gives added confidence that the results are accurate.¹⁷

4. ATF Bank also produced a study of the change in tariff rates in April 2010. The ATF Bank (2010, 3) acknowledges, however, that it ignored the 1950 specific tariffs in their calculations of the tariffs, that is, they computed the tariff rates as if only ad valorem tariffs apply. The ATF study found that the unweighted tariff rates in Kazakhstan will increase by 3.9 percentage points. The smaller estimated increase in the unweighted tariff average by the ATF Bank study compared to this study or the RAKURS study is explained by the fact the ATF Bank study ignored the specific tariffs. We show (in table F.2) that ignoring the specific tariffs significantly biases the results toward finding less increase in the tariff. The ATF results for the ad valorem component of the tariffs are consistent with our results for the ad valorem component of the tariffs, but the actual tariff increase is significantly larger.¹⁸

¹⁷ The RAKURS study used 2009 weights for the tariff rates in both periods, while in this study we used 2009 trade data for the weights in 2009, but trade data from the first half of 2010 for the trade weights for the customs union tariffs. This study has also examined the impact of eliminating the exceptions, something that remains on the research agenda of RAKURS. It will be useful to see if their results are consistent with ours regarding the elimination of the exceptions.

¹⁸ The ATF study calculates that the “weighted average” tariff of Kazakhstan will increase by only 1.2 percentage points as a result of the customs union. They obtain this result because they assume that Kazakhstan applied MFN tariffs

5. In section 2, I provide documentation of the data sources and explain the methodology. In section 3, I discuss the transition tariff rates and provide a table of all tariff lines for which the tariff rates will have to increase by at least 15 percentage points and the value of imports is above a threshold level. The main results are presented in section 4. Although I calculate effective tariff rates at the tariff line level, I present results at the 2-digit level, the level of the input-output table of Kazakhstan and at the overall aggregate level.

2. Data and Methodology

Data Sources

Trade Data (Values and Quantities of Imports)

6. Data on the quantity of imports in kilograms and in additional units¹⁹ and value of imports in US dollars at 10-digit HS code level in 2009 and in the first half of 2010 are provided by the Customs Control Committee of the Ministry of Finance of Kazakhstan.²⁰

Tariff Data

7. The source of information on tariff rates for 2009 are from the government decree of the Republic of Kazakhstan #1317 on customs tariffs and classification of commodities of foreign economic activity of the Republic of Kazakhstan,²¹ introduced on December 28, 2007, with changes that took place by June 27, 2009. The document remained effective until the Customs Code of the customs union came into force on July 6, 2010. The source of information on the tariff rates of the customs union is the Customs Code which is available from the official website of the customs union of Belarus, Kazakhstan, and Russia.²² The website also has the tariff rates of the Republic of Kazakhstan during the transition period, described in the next section. It includes special tariff rates for 409 tariff lines, for which Kazakhstan may set rates different from the rates of the customs union during a transition period. We calculate the tariff rates as they prevail in 2010–2011 and after the transition period when all exceptions are eliminated. We refer to those rates as the transition period rates.

against Russia prior to the customs union and will initiate tariff-free trade with Russia and Belarus only after the customs union is implemented. Thus, they assume tariffs of Kazakhstan against Russia decline significantly after the customs union and this results in lower estimated increase in their weighted average tariff. In fact, Kazakhstan had tariff-free trade with Russia and Belarus prior to the formation of the customs union based on multiple agreements. Kazakhstan had a bilateral free trade agreement with Russia (signed on October 22, 1992; approved by Cabinet of Ministers decree #374 on May 7, 1993; and effective on July 7, 1998) and a bilateral free trade agreement with Belarus was signed on September 23, 1997. In addition, the Commonwealth of Independent States (CIS) agreement of 1994 stipulated free trade among the signatories, which included all the CIS states. Finally, the Eurasian Economic Community included Belarus, Russia, Kazakhstan, Kyrgyzstan, and Tajikistan (Uzbekistan dropped out) under which free trade among the members was agreed.

¹⁹ Additional units are usually the same as units for which the specific tariff rate is computed. For example, if the specific rate is 1 euro per meter squared, the additional unit of measurement is in square meters.

²⁰ I have chosen to use import data for the first half of 2010 only, because of the changes in the methodology of reporting trade flows that had occurred after the customs union became active in July 2011. As a result of the change, the import data for the whole year is reported without taking into account trade flows within the customs union. The advantage of ignoring the second half of 2010 is consistency in estimations—we report the impact of the new tariffs without the effect of changes in composition of import flows.

²¹ Постановление Правительства Республики Казахстан от 28 декабря 2007 года № 1317 “О Таможенном тарифе и Товарной номенклатуре внешнеэкономической деятельности Республики Казахстан.”

²² The document is publicly available at <http://www.tsouz.ru/db/ettr/Pages/default.aspx>.

Methodology

8. Most tariffs in Kazakhstan are simple ad valorem tariffs. For these tariff lines, the effective tariff is straightforward and no calculations are necessary. However, 1,455 tariff lines in 2009 and 1,960 tariff lines in 2010 out of more than 11,000 tariff lines have a specific tariff component. For products with the ad valorem and specific components, the maximum of the ad valorem and ad valorem equivalent of the specific component is the tariff that applies. We refer to the maximum rate as the effective rate.

9. The methodology of computing the effective rates is as follows. Suppose that v_t^h and q_t^h are the value and quantity of imports of tariff line h at time t . Suppose further that a_t^h and b_t^h are the ad valorem and specific components of the tariff applied to the tariff line h at time t . Ad valorem and specific components are measured in percent and in euros per unit of quantity, respectively.

10. First, the ad valorem equivalent of the specific part of the tariff, ae_t^h , is computed according to the following formula

$$ae_t^h = \frac{q_t^h b_t^h EX_t}{v_t^h} 100\%,$$

where EX_t is the average exchange rate between euros and USD, measured in US dollars per euro.²³ Second, the effective tariff for line h at time t is determined as

$$tariff_t^h = \max\{a_t^h, ae_t^h\}$$

Trade-weighted Average Effective Tariff Rates

11. For the MFN tariff rates at aggregated levels, we take both a simple average of the tariff rates on the tariff lines as well as a weighted average, where the weights are the shares of the total value of imports of each tariff line. With the weighted average calculation the more important import categories receive higher weights. The problem with the weighted average approach is that very high tariffs discourage and may eliminate imports. Then the weight of these high tariffs will be zero. Although both approaches have their merits and problems, unless otherwise stated, our results are based on simple averages.

²³ Average annual exchange rate is computed based on historical data available at www.oanda.com.

3. Transition Period Rates for Kazakhstan

12. Kazakhstan has negotiated transition period rates for 409 product lines. For those lines the tariff rates of the customs union are applied only after the transition period, which for some products may change gradually and last till 2015. The transition rates and schedule are available from the document called “Transition period rates” adopted according to the Customs Union Committee decision #130 on November 27, 2009.²⁴

13. For some lines—i.e. fruits (HS codes 0808 10, 0808 20)—the transition period ends on July 1, 2011. The transition period for certain medicine and pharmaceutical products (HS codes 3001 20-90, 3002 10-90, 3004 10-90, 3006 10-94)—i.e. human organs and blood, antibiotics—lasts till 2015.

14. Table F.1 presents a list of 15 lines with the difference between the effective rates during and after the transition period is at least 15 percentage points and for which the value of import in the first half of 2010 exceeded 3 million of USD.

²⁴ The document is publicly available at <http://www.tsouz.ru/db/ettr/Pages/Perehodny.aspx>.

Table F.1: Transition Period Rates for 15 Product Lines

10 digit code	Description	Value of import in 1st half of 2010, mln USD	Effective rate in 2010	Effective rate after transition period	Transition ends	Difference
853590000	Electrical apparatus for switching/protecting electrical circuits,/for making connections to/in electrical circuits, n.e.s. in 85.35, for a voltage >1000V	17	0	15		15
808108001	Apples, fresh, January 1-March 31	15	5	37.5	July 2011	32.5
808108002	Apples, fresh, April 1 - June 30	14	5	32.6	July 2011	27.6
9406008009	Prefabricated buildings - others	9.7	0	20	2013	20
8535210000	Automatic circuit breakers, for a voltage of <72.5kV	6.1	0	15	2013	15
8536490000	Relays (excl. of 8536.41), for a voltage not >1000V	5.5	0	15	2013	15
3004201001	Medicaments containing other antibiotics (excl. of 3004.10), put up in measured doses/forms/packings for RS	5.4	0	15	2015	15
9406003100	Prefabricated buildings - greenhouses	4.4	0	20	2013	20
7604299000	Bars, rods & profiles (excl. hollow profiles) of aluminium alloys	4.2	5	202.3	July 2011	197.3
9018311009	Syringes, with/without needles	4.2	0	15	2014	15
8536209008	Automatic circuit breakers, for a voltage not >1000V, for current >63A	3.8	0	15	2013	15
8536508000	Switches other than isolating switches & make-&-break switches, for a voltage not >1000V	3.7	0	15	2013	15
3004501001	Medicaments containing vitamins/other products of 29.36 (excl. of 3004.10-3004.40), put up in measured doses/forms/packings for RS	3.4	0	15	2015	15
8534001900	Printed circuits	3	0	15	2013	15
8536201008	Automatic circuit breakers, for a voltage not >1000V, for current not >63A	3	0	15	2013	15

Note: The product lines presented in the table have the difference between transition period effective rates and effective rates after the transition more than or equal to 15 percentage points. In addition the value of import to the Republic of Kazakhstan in the first half of 2010 exceeded 3 million USD.

4. Results

15. Table F.2 presents the average tariff rate in Kazakhstan in 2009 (prior to the imposition of the customs union rates) and with the customs union rates that become effective in July 2010, calculated both as a simple average and as a trade-weighted average. In addition, I calculate the rates after the transition period is completed, taking into account special transition rates for 409 tariff lines. Finally, to show the impact of the specific tariffs clearly, I calculate the average tariff rate based on the ad valorem tariffs rates only and I present the effective tariff rates (which includes the impact of the specific tariff rates).

Table F.2: Effective Tariff Rates in Kazakhstan before and after Joining the Customs Union

Year	Tariff	Number of tariff lines (number of specific tariff lines)	<u>Mean tariff rate</u>				Minimum rate	Maximum rate
			Trade		Trade			
			Simple	weighted	Simple	weighted		
2009-pre-customs union tariffs	Effective rate	10853 (1455)	6.72	5.33	9.8	8.3	0	530
	Ad valorem rate only		6.08	4.84	5.8	5.4	0	30
Transition rates-post customs union tariffs in 2010-2011	Effective rate	11172 (1950)	11.08	9.47	15.97	11.41	0	424
	Ad valorem rate only		9.69	8.33	10.15	8.13	0	100
Rates with all exceptions eliminated	Effective rate	11171 (1960)	11.51	10.43	16.3	12.2	0	424
	Ad valorem rate only		10.04	9.08	10.0	7.8	0	100

Notes:

Table F.2 presents summary statistics based on calculations done at the 10-digit level

The ad-valorem-rate-only calculations ignore the impact of the specific tariffs, in effect assuming zero specific tariffs.

16. Table F.3 presents rates calculated at the level of sectors of the IO table. The sectors of the model correspond to 2-digit codes of NACE Revision 1 product classification. The NACE classification at the 2-digit level, in turn, coincides with the 2-digit level of ISIC Revision 3 classification of products. The mapping from HS codes to ISIC revision 3 is taken from World Integrated Trade Solution (WITS) produced by the World Bank.

17. Table F.4 reports effective rates at the level of 2 digits of HS classification.

Table F.3: Average Effective Tariff Rates in Kazakhstan at Industry Level

IO sector	Industry	Year					
		2009		2010 with transition rates		2010, No exceptions after transition	
		Simple mean	Weighted mean	Simple mean	Weighted mean	Simple mean	Weighted mean
1	Agriculture	6.34	4.70	7.36	6.88	8.10	11.11
2	Forestry	2.86	3.59	12.64	12.42	12.64	12.42
3	Fishing	5.00	5.00	9.87	7.40	9.87	7.40
4	Mining of coal and lignite; extraction of peat	5.00	5.00	5.00	5.00	5.00	5.00
	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction	4.00	4.18	4.17	4.25	4.17	4.25
5	Mining of metal ores	3.91	3.26	2.83	2.28	2.83	2.28
6	Other mining and quarrying	5.00	5.00	5.19	5.04	5.19	5.04
7	Manufacture of food products and beverages	14.14	19.63	19.69	21.51	19.69	21.51
8	Manufacture of tobacco products	24.20	28.76	23.14	27.79	23.14	27.79
9	Manufacture of textiles	8.05	10.38	12.43	14.43	12.43	14.43
10	Manufacture of wearing apparel; dressing and dyeing of fur	7.82	6.38	18.19	16.32	18.19	16.32
11	Tanning and dressing of leather; manufacture of luggage	14.69	11.56	13.13	15.80	13.13	15.80
12	Manufacture of wood and of products of wood and cork	6.34	5.74	14.40	15.97	14.40	15.97
13	Manufacture of pulp	5.71	7.01	10.68	10.17	12.74	11.02
14	Publishing	2.18	2.17	8.08	4.47	8.08	4.47
15	Manufacture of coke	4.84	4.48	4.71	4.98	4.71	4.98
16	Manufacture of chemicals and chemical products	4.19	3.05	5.13	4.97	6.12	8.89
17	Manufacture of rubber and plastic products	8.85	9.89	10.21	12.83	10.45	13.18
18	Manufacture of other non-metallic mineral products	8.70	7.90	14.11	14.70	14.11	14.70
19	Manufacture of basic metals	4.50	4.85	8.46	10.75	9.85	12.44
20							

IO sector	Industry	Year					
		2009		2010 with transition rates		2010, No exceptions after transition	
		Simple mean	Weighted mean	Simple mean	Weighted mean	Simple mean	Weighted mean
21	Manufacture of fabricated metal products	7.69	11.05	10.87	13.70	10.97	14.10
22	Manufacture of machinery and equipment n.e.c.	1.44	1.18	3.91	4.30	4.10	4.39
23	Manufacture of office machinery and computers	0.00	0.00	4.67	2.56	4.67	2.56
24	Manufacture of electrical machinery and apparatus n.e.c.	2.55	1.56	8.17	7.24	9.32	8.42
25	Manufacture of radio	0.00	0.00	6.68	3.73	6.95	4.05
26	Manufacture of medical	3.56	1.29	6.37	1.71	7.88	3.40
27	Manufacture of motor vehicles	1.47	5.30	21.01	23.22	21.01	23.22
28	Manufacture of other transport equipment	2.09	1.76	8.95	8.21	9.49	9.84
29	Manufacture of furniture; manufacturing n.e.c.	7.39	12.01	16.22	27.88	16.22	27.88
31	Electricity	5.00	5.00	3.33	0.00	3.33	0.00
	Total	6.74	5.33	11.13	9.47	11.57	10.43

Table F.4: Average Effective Tariff Rates in Kazakhstan by HS 2-digit Codes

HS code	Year					
	2009		2010 with transition rates		2010, no exceptions after transition	
	Simple mean	Weighted mean	Simple mean	Weighted mean	Simple mean	Weighted mean
1	0.00	0.00	5.94	0.32	5.94	0.32
2	25.60	67.19	41.93	46.86	41.93	46.86
3	5.45	5.36	10.19	10.49	10.19	10.49
4	16.27	16.26	17.90	17.61	17.90	17.61
5	5.00	5.00	7.58	5.07	7.58	5.07
6	4.88	4.94	11.89	14.80	11.89	14.80
7	14.92	14.38	15.39	16.18	15.39	16.18
8	4.96	5.00	6.82	5.39	9.88	18.53
9	5.18	2.40	6.09	4.02	6.09	4.02
10	16.35	11.46	14.50	22.35	14.50	22.35
11	10.55	10.95	10.90	13.33	10.90	13.33
12	5.00	5.00	4.45	4.37	4.45	4.37
13	5.00	5.00	5.00	5.00	5.00	5.00
14	15.00	15.00	13.00	15.00	13.00	15.00
15	11.22	15.09	10.57	17.22	10.57	17.22
16	21.00	24.07	27.18	27.36	27.18	27.36
17	13.43	7.52	7.95	25.46	7.95	25.46
18	14.66	16.63	17.33	21.76	17.33	21.76
19	14.71	13.31	17.32	13.70	17.32	13.70
20	13.96	13.80	14.00	13.71	14.00	13.71
21	12.68	13.19	19.81	16.59	19.81	16.59
22	9.97	46.42	17.33	28.17	17.33	28.17
23	2.88	0.80	7.73	13.62	7.73	13.62
24	11.20	21.24	10.85	20.49	10.85	20.49
25	4.66	1.57	5.01	5.01	5.01	5.01
26	4.41	3.31	3.82	2.29	3.82	2.29
27	4.86	4.31	4.83	4.40	4.83	4.40
28	5.08	5.26	5.14	6.18	5.14	6.18
29	4.65	3.92	4.76	4.70	4.76	4.70
30	0.00	0.00	0.76	0.10	8.35	9.75
31	0.00	0.00	10.00	10.00	10.00	10.00
32	5.00	5.72	4.34	5.71	4.34	5.71

HS code	Year					
	2009		2010 with transition rates		2010, no exceptions after transition	
	Simple mean	Weighted mean	Simple mean	Weighted mean	Simple mean	Weighted mean
33	4.29	4.65	9.02	13.92	9.02	13.92
34	5.00	5.00	12.16	13.97	12.16	13.97
35	4.86	4.66	6.29	6.44	6.29	6.44
36	20.00	20.00	17.50	18.95	17.50	18.95
37	4.74	3.41	6.64	6.60	6.64	6.60
38	4.93	4.91	5.95	5.33	5.95	5.33
39	5.79	5.91	6.77	7.77	10.09	11.50
40	7.22	10.39	9.28	12.35	9.28	12.35
41	5.00	5.00	3.38	4.56	3.38	4.56
42	7.81	7.51	23.24	21.94	23.24	21.94
43	5.60	9.67	9.53	13.58	9.53	13.58
44	4.73	5.63	15.00	16.00	15.00	16.00
45	5.00	5.00	5.00	5.00	5.00	5.00
46	10.00	10.00	15.00	15.00	15.00	15.00
47	0.00	0.00	2.69	2.58	7.40	7.42
48	6.28	7.01	11.73	10.41	13.30	11.17
49	1.35	1.76	6.35	2.67	6.35	2.67
50	5.00	5.00	4.80	5.00	4.80	5.00
51	6.64	9.53	8.29	14.04	8.29	14.04
52	7.91	9.18	11.01	12.53	11.01	12.53
53	4.73	4.99	7.84	10.63	7.84	10.63
54	4.77	4.39	9.20	8.86	9.20	8.86
55	4.90	4.77	7.95	9.46	7.95	9.46
56	6.38	5.30	8.92	8.54	8.92	8.54
57	24.06	28.35	26.90	33.81	26.90	33.81
58	10.00	10.00	15.00	15.00	15.00	15.00
59	5.97	13.28	7.09	11.46	7.09	11.46
60	5.00	5.00	10.00	10.00	10.00	10.00
61	9.06	5.98	23.23	13.20	23.23	13.20
62	7.64	6.28	16.19	16.05	16.19	16.05
63	15.00	15.00	28.35	24.69	28.35	24.69
64	21.19	13.64	17.38	14.54	17.38	14.54
65	5.00	5.00	10.53	10.02	10.53	10.02
66	10.00	10.00	15.00	15.00	15.00	15.00

HS code	Year					
	2009		2010 with transition rates		2010, no exceptions after transition	
	Simple mean	Weighted mean	Simple mean	Weighted mean	Simple mean	Weighted mean
67	10.00	10.00	12.93	16.16	12.93	16.16
68	9.73	9.94	14.61	14.74	14.61	14.74
69	10.58	11.15	18.43	20.00	18.43	20.00
70	8.48	7.48	13.63	14.56	13.63	14.56
71	4.92	5.00	17.97	19.31	17.97	19.31
72	3.58	2.66	5.41	5.58	5.41	5.58
73	8.23	7.31	13.63	14.58	13.63	14.58
74	5.00	5.00	4.92	5.17	4.92	5.17
75	5.00	5.00	7.92	9.84	7.92	9.84
76	4.92	4.52	7.38	12.65	21.12	36.88
78	5.00	5.00	5.00	5.00	5.00	5.00
79	5.00	5.00	5.00	5.00	5.00	5.00
80	5.00	5.00	5.00	5.00	5.00	5.00
81	5.14	3.86	11.06	4.36	11.06	4.36
82	5.00	5.00	8.03	6.86	8.03	6.86
83	10.20	10.67	14.59	14.80	14.59	14.80
84	0.64	0.88	3.32	3.89	3.51	3.98
85	1.51	1.15	7.32	6.32	8.22	7.30
86	0.00	0.00	4.33	2.68	6.33	8.09
87	1.98	5.57	21.06	23.91	21.06	23.91
88	0.00	0.00	12.73	11.86	12.73	11.86
89	5.00	5.00	11.18	6.13	11.18	6.13
90	2.34	1.20	3.51	1.23	5.35	3.01
91	10.00	10.00	21.38	21.14	21.38	21.14
92	5.00	5.00	7.86	7.66	7.86	7.66
93	20.00		20.00		20.00	
94	12.45	14.23	20.43	28.95	20.78	30.46
95	5.00	5.00	12.94	12.06	12.94	12.06
96	5.00	5.00	14.16	14.54	14.16	14.54
97	0.00	0.00	0.00	0.00	0.00	0.00

References

- ATF Bank. 2010. “Customs Union: No Big Inflation Shock, but Efforts Needed to Offset Impact on Non-resource Sectors,” Kazakhstan: April.
- Jandosov, Oraz, and Lyaziza Sabyrova. 2011. “Indicative Tariff Protection Level in Kazakhstan: before and after the Customs Union (Part I),” Rakurs discussion paper 5.3, March.
- Tarr, David G., and Oleksandr Shepotylo. 2008. “Specific tariffs, tariff simplification and the structure of import tariffs in Russia: 2001–2005,” *Eastern European Economics* 46(5):49–58.

Appendix G: Suggestions for Extensions and Follow-up Work

In this note we discuss suggestions for possible extensions and follow-up work to the study of the impact of the customs union on Kazakhstan. We outline three potential projects.

1. What are the likely impacts of a common economic space on Kazakhstan?

1. The customs union is a first step toward development of a common economic space among Kazakhstan, Russia, and Belarus. At this time, what would be involved in a common economic space has not been precisely defined. The common economic policy could entail national or preferential treatment in government procurement, coordination of competition policy including limitations on state subsidies and exclusion of antidumping actions against member countries, and preferential commitments on trade and foreign direct investment in services.

2. It would thus be natural to extend the existing assessment of the customs union to assess the impacts of a common economic space. It would be possible to analyze commitments to foreign investors of member countries in services. In previous work, we have analyzed the impacts of accession to the World Trade Organization (WTO) on Kazakhstan (see Jensen and Tarr 2008). This analysis showed that the main gains from WTO accession are likely to come from reforms of barriers to foreign direct investments in the services sectors, which would increase the productivity and competitiveness of manufacturing in Kazakhstan. The WTO analysis assumed unilateral commitments in services that extended to all WTO members, whereas the common economic space would imply preferential commitments, which may be limited to customs union members.

3. This analysis could also include an assessment of preferential or national treatment in government procurement. The member countries of the customs union are not likely to sign the WTO plurilateral Government Procurement Agreement. Nonetheless, preferential rights in government procurement for firms that are members of the common economic space may become a policy matter for discussion within the common economic space on which policy makers should be usefully informed of the likely consequences.

4. Other policy issues such as competition policy, limitations on state subsidies, and exclusion of antidumping could be assessed in the same analysis.

2. How can the three major developments affecting the trade of Kazakhstan be combined and modified to maximize the benefits to the growth and development of Kazakhstan and develop its industrial structure?

5. Kazakhstan is facing three major developments that impact its trade. It is (i) moving toward deep integration with Russia and Belarus, (ii) negotiating accession to the WTO, and (iii) expanding trade with the growing economic giant on its border, China. Some are hopeful that the customs union will facilitate diversification of the economy of Kazakhstan, possibly leading to investment in Kazakhstan for export to Russia. On the other hand, Russian industries may expand their exports to Kazakhstan. Similarly, as trade with China expands, will this lead to greater concentration or diversification of the industrial structure of Kazakhstan? Further, will WTO accession lead to a lowering of manufacturing costs from services liberalization and diversification, or rather further concentration? How will these multiple changes, separately and together, impact on the likely future

industrial structure, growth, and development of Kazakhstan? And how can these multiple changes be modified or effectively combined to yield maximum benefits to Kazakhstan?

6. To address the interrelated issues, it would be necessary to develop a modern multiregion model that assesses changes within China, Russia, and the other major trading partners of Kazakhstan. The model would also contain some modeling features that are not in the present model. Notably, it would include some features of agglomeration externalities in countries outside of Kazakhstan that are only modeled within Kazakhstan in the present model.

3. What are the impacts of the customs union on Kyrgyzstan and Tajikistan?

7. There are several changes of the customs union that could affect Kyrgyzstan and Tajikistan both positively and negatively, which in turn will impact on their trade with Kazakhstan. Will the increased protection of the customs union encourage investment and output expansion in Kyrgyzstan and Tajikistan for export to Kazakhstan and Russia? Will changing standards and technical regulations in the customs union along with increased controls on rules of origin restrain exports from these two countries to the customs union? Will Kazakhstan gain and Kyrgyzstan and Tajikistan lose from terms of trade effects due to the increased protection of the customs union? What would be the impact of extending deep integration preferences of a common economic space, such as in government procurement or services to these two neighboring countries? These and related questions could be addressed with the development of a multiregion trade model.

References

- Anderson, James E., and J. Peter Neary. 1994. "Measuring the restrictiveness of trade policy." *World Bank Economic Review* 8(2): 51–169.
- Anderson, James, and J. Peter Neary. 1996. "A new approach to evaluating trade policy." *Review of Economic Studies* 63(1):107–125.
- Anderson, James, and J. Peter Neary. 2003. "The mercantilist index of trade policy." *International Economic Review* 44:627–649.
- Balistreri, Edward J., and James Markusen. 2009. "Sub-national differentiation and the role of the firm in optimal international pricing." *Economic Modeling* 26(1):47–62.
- Balistreri, Edward J., Thomas F. Rutherford, and David G. Tarr. 2009. "Modeling services liberalization: The case of Kenya." *Economic Modeling* 26(3):668–679.
- Balistreri, Edward J., and David G. Tarr. 2011. "Services liberalization in preferential trade arrangements: The case of Kenya." World Bank Policy and Research Working Paper No. 5552, January.
- Broda, Christian, and David Weinstein. 2004. "Variety, growth and world welfare." *American Economic Review* 94(2):139–144.
- Broda, Christian, Josh Greenfield, and David Weinstein. 2006. "From groundnuts to globalization: A structural estimate of trade and growth." National Bureau of Economic Research Working Paper No. 12512. Available at <http://faculty.chicagobooth.edu/christian.broda/website/research/unrestricted/BrodaGroundnuts.pdf>.
- Coe, David T., and Elhanan Helpman. 1995. "International r&d spillovers." *European Economic Review* 39(5):859–887.
- Coe, David T., Elhanan Helpman, and Alexander W. Hoffmaister. 1997. "North-south r&d spillovers." *Economic Journal* 107:134–149.
- Dixit, A., and J. Stiglitz. 1977. "Monopolistic competition and optimum product diversity." *American Economic Review* 76(1):297–308.
- Falvey, R., N. Foster, and D. Greenaway. 2002. "Imports, exports, knowledge spillovers and growth." *Economic Letters* 85:209–13.
- Grossman, Gene and Elhanan Helpman. 1991. *Innovation and growth in the world economy*. Cambridge, MA: MIT Press
- Jakubiak, M., Maryla Maliszewska, M. Orlova, M. Rokicka, and V. Vavryschuk. 2006. "Non-tariff barriers in Ukrainian exports to the E.U." Case Network Report No. 68. Available at http://www.case.com.pl/upload/publikacja_plik/13388202_rc68.pdf.
- Jandosov, Oraz ,and Lyaziza Sabyrova. 2011. "Indicative tariff protection level in Kazakhstan: Before and after the customs union (part I)." Rakurs Discussion Paper 5.3. March.
- Jensen, Jesper, Thomas Rutherford, and David Tarr. 2007. "The impact of liberalizing barriers to foreign direct investment in services: The case of Russian accession to the World Trade Organization." *Review of Development Economics* 11(3):482–506.

- Jensen, Jesper, Thomas Rutherford, and David Tarr. 2010. "Modeling services liberalization: The case of Tanzania." *Journal of Economic Integration* 25(4):644–675. Also available as World Bank Policy and Research Working Paper No. 4801.
- Jensen, Jesper, and David Tarr. 2008. "Impact of local content restrictions and barriers against foreign direct investment in services: The case of Kazakhstan accession to the WTO." *Eastern European Economics* 46(5):5–26.
- Jensen, Jesper, and David G. Tarr. 2010. "Regional trade policy options for Tanzania: the importance of services commitments." World Bank Policy and Research Working Paper No. 5481, November.
- Kee, Hiau Looi, Alessandro Nicita, and Marcelo Olarreaga. 2008. "Import demand elasticities and trade distortions." *Review of Economics and Statistics* 90(4):666–682.
- Kee, Hiau Looi, Alessandro Nicita, and Marcelo Olarreaga. 2009. "Estimating trade restrictiveness indices." *Economic Journal* 119(January):172–199.
- Keller, Wolfgang. 2000. "Do trade patterns and technology flows affect productivity growth?" *World Bank Economic Review* 14(1):17–47.
- Lumenga-Neso, Olivier, Marcelo Olarreaga, and Maurice Schiff. 2005. "On indirect trade related research and development spillovers." *European Economic Review* 49(7):1785–798.
- Maliszewska, Maryla, Irina Orlova, and Svitlana Taran. 2009. "Deep integration with the EU and its likely impact on selected ENP countries and Russia." CASE Network Report No. 88. Warsaw: CASE.
- Markusen, James R, Thomas Rutherford, and David Tarr. 2005. "Trade and direct investment in producer services and the domestic market for expertise." *Canadian Journal of Economics* 38(3):758–777.
- Racine, Jean-Louis, ed. 2011. *Harnessing quality for global competitiveness in Eastern Europe and Central Asia*. Washington, DC: World Bank.
- Romer, Paul. 1994. "New goods, old theory and the welfare costs of trade restrictions." *Journal of Development Economics* 43(1):5–38.
- Savvides, Andreas, and Marios Zachariadis. 2005. "International technology diffusion and the growth of tpp in the manufacturing sector of developing economies." *Review of Development Economics* 9(4):482–501.
- Schiff, Maurice, and Yanling Wang. 2006. "North-south and south-south trade-related technology diffusion: An industry-level analysis of direct and indirect effects." *Canadian Journal of Economics* 39(3):831–844.
- Schiff, Maurice, and Yanling Wang. 2008. "North-south and south-south trade-related technology diffusion: How important are they in improving tff growth?" *Journal of Development Studies* 44(1):49–59.
- Schiff, Maurice, and L. Alan Winters. 2003. *Regional integration and development*. Oxford, UK: Oxford University Press.

- Shepotylo, Oleksandr. 2011. "Calculation of the tariff rates of Kazakhstan before and after the imposition of the customs union common external tariff in 2010." Mimeo. Washington, DC: World Bank.
- Shepotylo, Oleksandr, and David G. Tarr. 2008. "Specific tariffs, tariff simplification and the structure of import tariffs in Russia: 2001–2005." *Eastern European Economics* 46(5):49–58.
- Tarr, David. 2002. "On the design of tariff policy: Arguments for and against uniform tariffs." In B. Hoekman, A. Mattoo, and P. English, eds., *Development, trade and the WTO: A handbook*. Washington, DC: World Bank.
- Vinhas de Souza, Lucio. 2011. "An initial estimation of the economic effects of the creation of EurAsEC Customs Union on its members." *Economic Premise* 47(January). Available at <http://siteresources.worldbank.org/INTPREMNET/Resources/EP47.pdf>.
- World Bank. 2007. *Food safety and agricultural health management in CIS countries: Completing the transition*. Washington DC: Agriculture and Rural Development Department, World Bank.