



UNIVERSITY OF CENTRAL ASIA
GRADUATE SCHOOL OF DEVELOPMENT
Institute of Public Policy and Administration

Kyrgyzstan's Accession to the Eurasian Economic Union: Measuring Economy-Wide Impacts and Uncertainties

Roman Mogilevskii
James Thurlow
Adeline Yeh



UNIVERSITY OF CENTRAL ASIA
GRADUATE SCHOOL OF DEVELOPMENT
Institute of Public Policy and Administration

WORKING PAPER #44, 2018

Kyrgyzstan's Accession to the Eurasian Economic Union: Measuring Economy-Wide Impacts and Uncertainties

Roman Mogilevskii
James Thurlow
Adeline Yeh

Abstract

Joining the Eurasian Economic Union (EEU) has major economic implications for Kyrgyzstan, a small economy in which foreign remittances and profits from re-export trade generate almost a third of the national income. Most EEU studies overlook Kyrgyzstan or focus on specific impact channels, such as changes in tariffs, re-exporting, or migration. We use a computable general equilibrium model to estimate the net impact of multiple channels. We incorporate uncertainty into our analysis using a stochastic simulation procedure and empirically-informed impact distributions. The results indicate that accession is expected to reduce national welfare, because falling profits from re-exporting outweigh higher migrant remittances and tariff revenues. There is, however, a one-in-four chance that national welfare increases, as well as a strong likelihood that poor households benefit from accession. Achieving these gains depends on the successful integration of regional labor markets, not just product markets, and on the proposed Russia-Kyrgyzstan Development Fund. Our recommendations apply to other small Central Asian economies considering joining the EEU.

Key words: Eurasian Economic Union, Kyrgyzstan, economy-wide model

JEL Codes: F15, O17, O53

The Institute of Public Policy and Administration was established in 2011 to promote systematic and in-depth research on issues related to the socio-economic development of Central Asia, and to explore policy alternatives.

The Institute of Public Policy and Administration is part of the Graduate School of Development, University of Central Asia. The University of Central Asia (UCA) was founded in 2000. The Presidents of Kazakhstan, the Kyrgyz Republic, and Tajikistan, and His Highness the Aga Khan signed the International Treaty and Charter establishing this secular and private university, ratified by the respective parliaments, and registered with the United Nations.

The Institute of Public Policy and Administration's Working Papers is a peer-reviewed series that publishes original contributions on a broad range of topics dealing with social and economic issues, public administration and public policy as they relate to Central Asia. It is intended as a dynamic avenue for authors to share ideas with audiences concerned with current and emerging issues facing the wider Central Asian region. Comments on papers or questions about their content should be sent to ippa@ucentralasia.org. 'Working Papers' may be cited without seeking prior permission.

IPPA Working Paper Series Editors: Dr Bohdan Krawchenko and Dr Roman Mogilevskii.

About the authors:

Dr. Roman Mogilevskii is a Senior Research Fellow and Associate Director of the Institute of Public Policy and Administration, University of Central Asia. He has extensive experience in research on agricultural economics, trade policy, public finance and macroeconomics of the countries of Central Asia and Eastern Europe.

Dr. James Thurlow is a Senior Research Fellow at International Food Policy Research Institute, Washington DC, USA. His research focuses on the interactions between policies, economic growth and poverty, primarily using computable general equilibrium and micro-simulation modeling.

Adeline Yeh is a PhD Student at Dyson School of Applied Economics and Management, Cornell University, USA.

ISSN: 2617-9245

Copyright © 2018

University of Central Asia

138 Toktogul Street, Bishkek 720001, Kyrgyz Republic

Tel.: +996 (312) 910 822, E-mail: ippa@ucentralasia.org

www.ucentralasia.org

The findings, interpretations and conclusions expressed in this paper are entirely those of the authors and do not necessarily represent the view of the University of Central Asia.

Text and data in this publication may be reproduced as long as the source is cited.

Contents

1. Introduction	5
2. Structure of the Kyrgyz Economy	6
3. Impact Channels	7
3.1. Channel 1: Import tariffs and tax revenues.....	7
3.2. Channel 2: Unrecorded re-export trade.....	9
3.3. Channel 3: Regional migration and remittances.....	10
3.4. Channel 4: Development fund.....	11
4. Economy-Wide Model	12
4.1. Model specification and data.....	12
4.2. Simulating impact channels under uncertainty	13
5. Simulation Results	16
5.1. Changes to import tariffs and VAT collections	16
5.2. Contraction of unrecorded re-export trade.....	18
5.3. Increased migration and remittances.....	19
6. Combined impacts under uncertainty	20
7. Conclusions	21
8. References	22
9. Appendix	24

Tables

Table 1. Structure of Kyrgyzstan's Economy, 2011.....	6
Table 2. Pre-Accession Trade Flows and Import Tariffs.....	7
Table 3. Model Simulations.....	14
Table 4. Mean Outcomes from the CGE Model Simulations.....	16
Table A1. Estimated Profit Margin per Kilogram of Unrecorded TCF Re-exports, 2011	24

Figures

Figure 1. Price Decomposition and Profit Margin of Unrecorded Re-exports, 2011 (\$ per kilogram).....	9
Figure 2. Uncertainty Distributions for Major Impact Channels	15
Figure 3. Distribution of Total Absorption Impacts	18
Figure 4. Distribution of Macro Impacts in the Combined Simulation.....	20
Figure 5. Distribution of Household Impacts in the Combined Simulation.....	21

Abbreviations

CET	Common External Tariff
CGE	Computable general equilibrium
CSRK	Committee on Statistics of the Republic of Kazakhstan
EEU	Eurasian Economic Union
FMSRF	Federal Migration Service of the Russian Federation
GDP	Gross domestic product
KIHS	Kyrgyz Integrated Household Survey
NSCKR	National Statistical Committee of the Kyrgyz Republic
RKDF	Russian-Kyrgyz Development Fund
SAM	Social accounting matrix
TCF	Textiles, clothing and footwear
UNCTAD	United Nations Conference on Trade and Development
UNSD	United Nations Statistics Division
VAT	Value-added tax

1. Introduction

The Eurasian Economic Union (EEU) is the culmination of more than two decades of increasing formal integration between the post-Soviet Russian and Central Asian economies. When the EEU became operational in January 2015 it included four member states: Armenia, Belarus, Kazakhstan and Russia. Kyrgyzstan's accession to the EEU took place in August 2015, and other countries in Central Asia and Eastern Europe have been invited to join. The primary aim of the EEU is to establish a single regional market for goods, services, capital and labor. In principle, this involves unrestricted trade and labor migration between member states, and the establishment of a Common External Tariff (CET) structure and unified customs procedures. It does not, as yet, involve a common regional currency.

Kyrgyzstan is a small member state – it accounts for 3.3% of the EEU's population and 0.3% of its combined gross domestic product (GDP) (World Bank 2015). It is therefore unlikely that Kyrgyzstan's accession will greatly affect the EEU as a whole or any of the original member states. There could, however, be substantial economic implications for Kyrgyzstan. There are at least four major impact channels. First, Kyrgyz import tariffs prior to accession were lower than the CETs and so joining the EEU raises the price of non-EEU imports and may increase tariff revenues (Wentworth et al. 2015). Secondly, Kyrgyzstan relies on remittances from migrants working in Russia. Joining the EEU should ensure that these migrants do not face any additional restrictions. Thirdly, there are large trade flows from China to Russia that transit through Kyrgyzstan (see Kaminski and Mitra 2010). Most of this re-export trade goes unrecorded in order to avoid paying the EEU's higher tariffs, and so joining the EEU will affect the profits earned on transit trade. Finally, Russia has offered to assist Kyrgyzstan in complying with EEU regulations and procedures. A Russian-Kyrgyz Development Fund (RKDF) will mitigate some of the adjustment costs incurred by Kyrgyzstan due to accession.

There is extensive literature on the integration of post-Soviet economies.¹ Relatively few studies, however, consider Russia's integration with Central Asia, and those that do tend to focus on the larger regional economies or the original EEU member states (see, for example, de Sousa 2011). Moreover, studies that are relevant to Kyrgyzstan's EEU accession tend to focus on specific impact channels, such as import tariffs and revenues (Wentworth et al. 2015), migration and remittances (Beishenaly et al. 2013), or unrecorded re-exports (Mogilevskii 2012). These studies sometimes provide contradictory indications about the potential economic impacts, making the net effect of joining the EEU unclear.

This paper estimates the economy-wide impact of EEU accession on Kyrgyzstan. A single-country computable general equilibrium (CGE) model is used to separately and jointly evaluate three of the major impact channels, i.e., changes in import tariffs, migrant remittances, and unrecorded re-exports. By estimating their net economic impact, the analysis also informs the required level of compensation from the RKDF, which is the fourth impact channel mentioned above. Given the high degree of uncertainty surrounding the magnitude of each channel's impacts, we adopt a stochastic simulation procedure that randomly draws combinations of impacts from empirically-informed distributions. This approach to addressing uncertainty leads to weighted distributions of potential economy-wide impacts. It should be noted that the model provides a medium-term assessment of impacts and uncertainty – it does not capture cyclical phenomena, such as the Russian economic crisis.

¹ See Libman (2012) for a comprehensive review of this literature.

The paper is structured as follows: Section 2 describes Kyrgyzstan's economy, and Section 3 discusses the four impact channels and areas of uncertainty. Section 4 describes the CGE model and its data sources, and Section 5 presents the simulation results. The final section concludes by summarizing our findings and their implications for Kyrgyzstan and other Central Asian economies who may consider joining the EEU.

2. Structure of the Kyrgyz Economy

Kyrgyzstan is a small landlocked economy, with Kazakhstan and Russia to the north and China to the east. Kyrgyzstan is one of the poorer Central Asian countries: GDP per capita is about \$3000 (at purchasing power parity) and one-fifth of the population lives on less than \$3.10 per day (World Bank 2016). Most households, particularly the poor, are farmers living in rural areas. As shown in Table 1, agriculture made up almost a fifth of total GDP and *official* export earnings in 2011, which is the pre-accession baseline year for our modeling analysis. About a third of the workforce is engaged in agriculture, where labor productivity is lowest among sectors of the economy. Although livestock and wheat are the country's two main farming activities, it is horticulture that is the main agricultural export. In fact, the country is a net importer of food products, mainly from Kazakhstan.

Table 1. Structure of Kyrgyzstan's Economy, 2011

	Share of total (%)			Exports/ Output (%)	Imports/ Demand (%)
	GDP	Exports	Imports		
All sectors	100.0	100.0	100.0	22.7	32.4
Agriculture	18.7	18.3	13.8	16.2	19.0
Mining	0.9	0.6	1.0	21.9	41.0
Manufacturing	20.6	35.3	57.2	30.0	52.6
Processed foods	2.9	2.1	9.3	6.0	38.2
Textiles, clothing, footwear	1.0	4.3	6.0	45.2	69.4
Wood, paper products	0.3	0.3	2.1	16.4	69.8
Petroleum, chemicals	0.4	0.0	25.2	0.0	90.8
Non-metal minerals	0.9	0.5	1.7	6.8	28.9
Metals, metal products	14.4	27.9	4.2	43.0	15.1
Machinery, equipment	0.6	0.3	8.2	10.1	83.7
Other manufactures	0.1	0.0	0.6	0.0	63.9
Other industry	9.3	3.5	1.7	8.1	6.3
Services	50.5	34.0	21.0	21.8	20.8
Recorded re-export trade	0.1	8.2	5.3	100.0	100.0

Source: Own calculations using the 2011 Kyrgyzstan SAM (Mogilevskii et al. 2016).

Manufacturing in 2011 accounted for less than a fifth of total GDP and employment and more than a third of official earnings from exports of goods and services. Gold is Kyrgyzstan's main (official) export item, almost all of which is destined for Europe and the Middle East. More than half of the manufactured goods used in Kyrgyzstan are imported, and half of these imports con-

sist of petroleum and chemicals, mainly from Russia. Most machinery and equipment, including vehicles, are imported from East Asia and Europe.

Table 1 indicates that textiles, clothing and footwear (TCF) make up only 4% of exports and 6% of imports. However, these official statistics underestimate the actual scale of TCF trade. In the next section we impute the economic value of *unrecorded* TCF re-exports. For now, it should be noted that some re-exports are captured in official statistics, and these accounted for 8.2% and 5.3% of gross exports and imports in 2011, respectively (see final row in the table). In our analysis we will separate *recorded* re-exports from other trade flows because we assume that the decision to re-export these goods is independent of Kyrgyzstan's accession.² Even if recorded re-exports are affected by accession, they generate very little value added beyond some trade and transport services. This is not the case for *unrecorded* re-exports, which is a major impact channel.

3. Impact Channels

3.1. Channel 1: Import tariffs and tax revenues

The first set of impacts comes from changes to Kyrgyzstan's import tariffs and its tax collection procedures. Table 2 reports the weighted average *ad valorem* tariff rates for broad groups of imported products. This is a summary of statutory tariff rates derived from detailed six-digit Harmonized System product categories weighted by bilateral import values (as reported by Kyrgyzstan). The third column shows Kyrgyz tariff rates prior to joining the EEU and the fourth column shows the CETs (for the same basket of Kyrgyz imports) applied to goods from non-EEU countries.

Table 2. Pre-Accession Trade Flows and Import Tariffs

Product categories	Share of trade with non-EEU countries (%)		Weighted average import tariff (%)		Net tariff rate change (%-point)
	Exports	Imports	Pre-EEU	CET	
All goods	71.7	54.2	3.2	9.4	1.9
Agriculture	36.1	52.3	2.4	22.4	9.3
Mining	49.2	7.8	5.2	5.4	-4.7
Processed foods	40.8	30.6	5.0	14.0	-0.7
Textiles, clothing, footwear	12.2	95.1	1.6	23.9	21.1
Wood, paper products	9.0	43.9	0.0	11.6	5.1
Petroleum, chemicals	34.4	64.6	1.1	3.4	1.1
Non-metal minerals	6.1	65.1	9.3	13.9	-0.2
Metals, metal products	98.7	54.6	6.2	14.4	1.6
Machinery, equipment	44.1	89.7	1.5	3.3	1.5
Other manufactures	63.1	76.4	1.5	8.5	5.0

Source: Own calculations using trade and tariff data from UNSD (2015) and UNCTAD (2015).

Notes: Bilateral trade shares are for 2011; and average ad-valorem tariff rates are weighted by 2011 Kyrgyz import values. Net tariff rate changes are the immediate effect of imposing CETs on non-EEU imports (i.e., before trade diversion).

² COMTRADE data (UNSD 2015) was used to estimate the share of recorded re-exports in total exports and imports. This share was subtracted from trade flows in the official supply-use table (NSCKR 2012). Trade margins for each product were used to derive the value-added generated by re-exporting, and this was extracted from wholesale and retail trade GDP in order to create a new "recorded re-export trade" sector in the model.

The largest absolute percentage point difference between pre- and post-EEU tariff rates is for agricultural and TCF products – by 20 and 22 percentage points, respectively. However, these tariff increases only apply to imports from countries under the Most Favored Nation regime.^{3,4} As such, the *net* change in tariff rates depends on the share of imports coming from outside of the EEU, which is reported in the second column of Table 2. About half of agricultural imports are from non-EEU countries, meaning that the *net* increase in tariff rates on *total* agricultural imports is 9 rather than 20 percentage points (i.e., $52.3\% \times 22.4 - 2.4$). Conversely, 95% of recorded TCF imports come from non-EEU countries, mainly China, meaning that the net tariff increase on total TCF imports is 21 rather than 22 percentage points (i.e., $95.1\% \times 23.9 - 1.6$). It is clear from the table that, for most product categories, tariff increases on non-EEU imports imply a net increase in Kyrgyzstan's weighted average tariff rates after accession. Although the average tariff increase on all imported goods is fairly small, at only 1.9 percentage points this average masks large increases for agricultural and TCF products.

A recent study by Wentworth et al. (2015) measured the effects of EEU tariff changes on Kyrgyz trade and production. Using partial and general equilibrium models, the authors found that accession reduces total import volumes, diverts trade towards EEU countries, and causes national GDP to fall. However, these impacts are small: imports fall by 1.4% and annual GDP growth slows by 0.2 percentage points. The authors conclude that the losses are more than offset by tariff revenues, which increase despite a drop in import volumes. Under the EEU arrangement, all tariffs collected by member states are pooled and allocated according to a revenue-sharing formula that favors Kyrgyzstan.⁵ The authors estimate that the Kyrgyz government should receive an additional \$63 million in the year immediately following accession (i.e., tariff revenues of \$175 million with the formula versus \$112 million without it).⁶ This is essentially a transfer from other EEU member states to Kyrgyzstan. In our modeling analysis we will separate the effects of Kyrgyz tariff changes from the windfall gains from the revenue-sharing formula.

Finally, changes to customs procedures along the Kazakh border will affect the collection of excise and value-added taxes (VAT) on imported goods from the EEU. These indirect taxes amount to about 7% of total tax revenues (Wentworth et al. 2015). These should, in principle, be unaffected by Kyrgyzstan's EEU accession. In practice, however, Kyrgyz tax authorities can no longer collect taxes at the Kazakh border, and must instead collect VAT from domestic businesses. Some revenues may be lost as a result. Small traders and informal businesses, for example, are not registered VAT taxpayers and so they do not pay taxes on inputs imported from the EEU. Wentworth et al. (2015) estimate that, as a result of accession, the Kyrgyz government may lose 7.4% of the VAT previously collected on imports. Evidence suggests that VAT revenues did fall significantly immediately after accession. However, the uncertainty surrounding the extent of these losses will be reflected in our modeling analysis.

³ Essentially, all countries except EEU members and other post-Soviet economies continue with a free-trade regime regardless of Kyrgyzstan's membership in the EEU.

⁴ To ease adjustment costs, Kyrgyzstan has negotiated a gradual transition to the CETs over a 5 year period.

⁵ Under EEU rules, Kyrgyzstan receives 1.9% of total import tariff revenues collected by the EEU, which is higher than its share of total tariff revenues collected by individual states prior to the EEU.

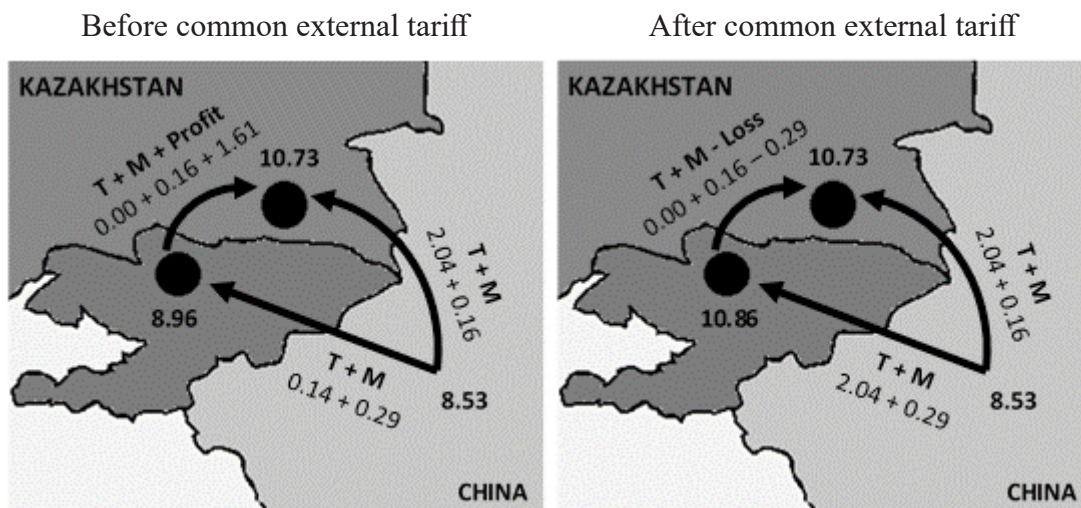
⁶ Kyrgyz Som converted to dollars using the 2014 exchange rate (World Bank 2015).

3.2. Channel 2: Unrecorded re-export trade

Kyrgyzstan is a major transit route for exports moving from China to Russia. Table 2 separated *recorded* re-exports from exports produced within Kyrgyzstan, because, under rules of origin, re-exported Chinese goods are already subject to the EEU's CET, and so should be unaffected by Kyrgyzstan's accession. However, in the past, almost all Chinese TCF destined for the EEU were undervalued and not labelled as "re-exports" at the Kyrgyz-China border. Incorrect labeling of goods allowed traders to pay lower Kyrgyz tariffs (see TCF row in Table 2). Traders could still export these goods to the EEU without paying the CET, because of a porous Kyrgyz-Kazakh border. Undervaluing Chinese imports meant that re-exports were not accurately reflected in official statistics. This was made possible by Kyrgyzstan's simplified customs procedures for TCF imports, which applied duties based on weight rather than value.⁷ In 2011, for example, China reported exporting 428,000 tons of TCF to Kyrgyzstan valued at \$3.6 billion (\$8.53 per kilogram), whereas Kyrgyzstan reported importing 313,000 tons from China valued at only \$0.3 billion (\$0.93 per kilogram). This \$3.3 billion difference clearly indicates the massive scale of unrecorded trade.

Joining the EEU means that Kyrgyzstan must impose the CET on Chinese imports, thus removing a key incentive underpinning the unrecorded re-export business. In order to assess the effects of this change on Kyrgyzstan, we must first estimate the profits generated by unrecorded trade. This is done by triangulating data from different sources. Mogilevskii (2012), for example, multiplied trade margins by the difference between Chinese imports and domestic consumption of light industrial products. This approach estimated value-added in the unrecorded re-export sector at \$0.6 billion in 2010 (or 13.2% of GDP). We use an alternative approach that compares the weighted unit price of a representative basket of Chinese TCF imports entering the EEU via either the Kyrgyz or Kazakh borders. This bottom-up price decomposition is illustrated in Figure 1 and its underlying data is provided in Table A1 in the appendix.

Figure 1. Price Decomposition and Profit Margin of Unrecorded Re-exports, 2011 (\$ per kilogram)



Source: Own calculations using Kyrgyz and Kazakh input-output tables (CSRK 2012; NSCKR 2012) and trade and tariff data from UNSD (2015) and UNCTAD (2015).

Notes: The composite good is the weighted combination of unrecorded Chinese textiles, clothing and footwear entering Kazakhstan via Kyrgyzstan. *T* is the import tariff and *M* is the trade and transport margin.

⁷ Mogilevskii (2012) comprehensively reviews the regulations and conditions that gave rise to Kyrgyzstan's unrecorded re-export trade.

Earlier we said that the weighted unit price of Chinese-reported TCF exports at the Kyrgyz-China border was \$8.53 per kilogram in 2011.⁸ We assume that this basket of imported goods costs the same at the Kazakh-China border. We then build up the price of this composite good as it transits to Almaty in Kazakhstan, either directly over the Kazakh-China border or indirectly via Bishkek in Kyrgyzstan (henceforth referred to as “northern” and “southern” routes, respectively). We first impose the tariff rates from Table 2, which adds \$0.14 to the southern route’s price (i.e., $1.6\% \times \$8.53$) and \$2.04 to the northern route’s price (i.e., $23.9\% \times \$8.53$). We then apply transaction cost margins derived from input-output tables (NSCKR 2012; CSRK 2012). Higher margins are incurred by goods moving from the Kyrgyz-China border to Bishkek (3.3%) than from the Kazakh-China border to Almaty (1.5%). Transaction costs add \$0.29 and \$0.16 to the southern and northern routes’ prices, respectively (i.e., $3.3\% \times \$8.67$ and $1.5\% \times \$10.57$, respectively). At this point, goods on the northern route reach Almaty at a final market price of \$10.73 per kilogram, whereas goods on the southern route reach Bishkek at a price of \$8.96 per kilogram. We assume that goods moving from Bishkek to Almaty incur no additional tariffs, but incur the same \$0.16 transaction costs that were incurred by goods on the northern route, giving a total price of \$9.11 per kilogram. The \$1.61 price gap between northern and southern routes represents an 18.9% profit margin on Kyrgyz unrecorded re-exports (i.e., $\$1.61 / \$8.53 \times 100\%$). Applying this margin to the aforementioned \$3.3 billion gap between Chinese- and Kyrgyz-reported imports, implies unrecorded profits of \$0.6 billion in 2011 (or 10.2% of national GDP), which is similar to the 2010 estimate from Mogilevskii (2012).

Joining the EEU reduces the profits earned by unrecorded re-exports. This is shown in the right-hand panel of Figure 1. Goods on the southern route must now pay the CET at the Kyrgyz-China border, equal to \$2.04 per kilogram in 2011. Transaction costs along the southern route add a further \$0.44 to the price, which is \$0.29 higher than the transaction costs along the direct northern route (i.e., $\$0.29 + \$0.16 - \$0.16$). Now that tariffs are the same on both routes, the higher transaction costs of the southern route lead to negative profits on re-exports via Kyrgyzstan.

The above analysis suggests that unrecorded profits, equal to a tenth of Kyrgyz GDP, are expected to decline if Chinese trade diverts to the Kazakhstan route or transits through neighboring Tajikistan. It is unlikely, however, that EEU accession will cause Kyrgyzstan’s transit trade to cease entirely. Our composite price analysis hides the possibility that the re-export of certain goods might remain profitable even after the CET is introduced. The magnitude of the decline in unrecorded profits is another source of uncertainty for our modeling analysis.

3.3. Channel 3: Regional migration and remittances

The total number of Kyrgyz migrants working in the EEU is unknown, but the overwhelming majority are in Russia (Mogilevskii and Atamanov 2008). Russia reports that half a million Kyrgyz citizens (about 9% of the Kyrgyz population) were in Russian territory as of early 2015, and that about half of these people had applied for work permits (FMSRF 2015). However, many migrants are undocumented or work without permits and so the actual numbers are probably higher. The Kyrgyz government estimates that there were 457,000 migrants working abroad in 2011, while others put the number at over a million (World Bank 2015).

⁸ The representative basket of Chinese-reported TCF exports to Kyrgyzstan in 2011 consisted of yarn (7.4%), textiles (57.9%), clothing (20.2%), and footwear (14.5%) (UNSD 2016).

More is known about migrants' individual characteristics. The annual Kyrgyz Integrated Household Survey (KIHS) captures information from a sample representing 200,000 migrant workers. These surveys suggest that migrants are more likely to be younger unmarried males with general secondary education, who leave Kyrgyzstan in search of job opportunities and higher wages (see World Bank 2015). Migrants with established social networks tend to earn better wages and incur lower job search costs (Patel and Vella 2013). Three quarters of migrants are employed in the trade and construction sectors, and many return to Kyrgyzstan in winter when there is less demand for casual labor in Russia and Kazakhstan. Migrants earn about twice the wage of workers in Kyrgyzstan, and most migrants send remittances home (World Bank 2015). According to the KIHS, about 13% of households in Kyrgyzstan receive remittances, which comprise almost half of these households' incomes (World Bank 2015). Higher-income Kyrgyz households are more likely to have members who are (permanent) migrants and, on average, remittances make up a larger share of these households' total incomes (see Atamanov and van den Berg 2010; World Bank 2015).

Kyrgyzstan's central bank uses information from money transfer operators and commercial banks to measure the total value of foreign transfers. In 2011, net inflows were \$1.8 billion or 28.4% of GDP. However, this includes non-remittance transfers, such as repatriated profits and earnings from foreign assets. The KIHS estimated that remittances in 2011 were \$0.8 billion or 13.1% of total household incomes (World Bank 2015). In our analysis, we subtract the profits from unrecorded trade (\$0.6 billion, see above) from the total value of transfers (\$1.8 billion) and what remains is treated as remittance payments to households. This puts the total value of remittances at \$1.2 billion or 16.6% of total household incomes, which is more consistent with what is reported in the KIHS. Our approach assumes that official statistics do capture unrecorded profits, but that these are bundled with foreign transfers rather than added to GDP at factor cost (see Mogilevsky and Atamanov 2008). If Kyrgyz statistics are correct and there are 457,000 migrants working abroad, then our approach suggests that, on average, migrants remit \$211 per month, which is similar to what migrants themselves report sending (Beishenaly et al. 2013; Quillin et al. 2007).

Kyrgyzstan's accession to the EEU could affect the level of migration and remittances. About one in five Kyrgyz migrants returning from Russia identified harassment by immigration police and difficulties in finding formal work as major challenges (Beishenaly et al. 2013). It is expected that joining the EEU's integrated market should alleviate some of these concerns and increase migration. While the magnitude of this increase is unknown, it can perhaps be inferred from Russia's introduction, in 2012, of more stringent requirements for migrants seeking work permits (e.g., Russian language and culture tests). According to the NSCKR data, after that there was a sharp decline in Kyrgyz permanent net-migration to Russia – from an average 38,000 per year during 2007-2011 to 5,000 per year during 2012-2013. This decline, equal to 1.25% of Kyrgyzstan's workforce in 2011, gives some indication of the magnitude of possible migration impacts after EEU accession. Our analysis will, however, reflect the considerable uncertainty surrounding this impact channel.

3.4. Channel 4: Development fund

As our discussion so far suggests, accession to the EEU could have profound implications for large parts of Kyrgyzstan's economy. Recognizing the possible adjustment costs, Russia has proposed establishing a \$1 billion RKDF to finance public investment projects in Kyrgyzstan, and help adversely-affected Kyrgyz businesses adapt to, and take advantage of, the EEU's single mar-

ket (Wentworth et al. 2015). The RKDF has been capitalized by Russia, with half of the initially discussed capital. An additional \$0.2 billion grant financed the upgrading of customs infrastructure and meeting EEU regulations. The latter includes, for example, food safety standards on agricultural products, which are tantamount to non-tariff barriers if not adequately met. In our modeling analysis, we will not simulate RKDF investments, since it is not yet clear what kinds of investments will be made or which sectors are the most-likely recipients. Moreover, given the recent economic crisis in Russia, it is possible that the RKDF may be smaller than intended, at least initially. Nevertheless, by estimating the economy-wide impacts from the first three channels, our analysis provides some indication of the level of resources required from the RKDF.

4. Economy-Wide Model

We use a static single-country CGE model of Kyrgyzstan to estimate the economy-wide impacts resulting from each impact channel (see Lofgren et al. 2002). This class of model is well-suited to evaluating trade and labor policies and external shocks. The model tracks the interactions between different producers (sectors) and consumers (households) in markets for different products and factors of production (i.e., land, labor and capital). Demand and supply imbalances are mediated via changes in relative product prices and factor returns (e.g., wages or rental rates). By adhering to national accounting rules, the model ensures that all macroeconomic balances are maintained, which is essential for large-scale policy changes like EEU accession. Finally, the model's equations and parameters are calibrated to observed data, and the model provides a simulation laboratory for experimenting with different policies and assumptions.

4.1. Model specification and data

The model separates Kyrgyzstan's economy into 35 sectors. Representative producers in each sector combine labor and capital using a constant elasticity of substitution (CES) function and under constant returns to scale. The labor force is divided into three categories (i.e., primary and basic secondary; higher secondary; and tertiary educated workers) and capital is separated into agricultural and nonagricultural capital. Labor and nonagricultural capital are mobile across sectors, and skilled labor and capital are fully-employed, implying that increases in demand lead to higher wages and rental rates. In contrast, primary and secondary educated workers are under-employed at a fixed real wage. This model therefore captures how producers substitute between factors in response to changes in relative factor costs, and how changes in factor demand at the sector level influence economy-wide factor returns and employment. Finally, aggregate factor inputs are combined with intermediate inputs using a fixed-share Leontief specification, which means that the quantity of intermediate inputs per unit of output is determined independently of prices. The combination of inputs (technologies) in each sector is drawn from Kyrgyzstan's 2011 input-output table.

The model captures international trade, with imperfect substitution between domestic and foreign goods based on relative prices (inclusive of any tariffs and taxes). The decision to use imported or domestic goods is governed by a CES function. Foreign goods are distinguished by region of origin – EEU, China, or Rest of World – using Kyrgyz-reported trade data from UNSD (2015). Our trade specification means that if EEU accession leads to higher prices for non-EEU imports, as is expected, then consumer demand for EEU or domestic goods increases. Similarly, producers' decision to supply domestic or foreign markets is governed by a constant elasticity of

transformation function, with export markets also separated into three trading regions. The ease with which producers and consumers shift between domestic and foreign goods depends on product-specific elasticities of substitution taken from Dimaranan (2006). At the macroeconomic level, we assume that the real exchange rate adjusts to maintain a fixed current account balance. Our single-country model assumes that external prices are fixed in foreign currency. This is an unusual assumption for a regional integration study but, as mentioned earlier, Kyrgyzstan is a small economy relative to its trading partners and is thus unlikely to influence foreign prices.

The model separates Kyrgyz households into ten representative groups, i.e., per capita consumption quintiles in rural and urban areas. This disaggregation of households is done using the 2011 KIHS data, which provides detailed information on households' income and expenditure patterns. Representative households receive incomes based on their reported factor endowments, including remittances from migrant family members working abroad. Households use their incomes to pay taxes, save and consume goods. Consumption spending on different products is governed by a linear expenditure system of demand.

Finally, the Kyrgyz government receives direct and indirect taxes and foreign transfers, and uses these revenues to pay for recurrent spending and investment. Tariff revenues are earned on imports based on product-specific tariff rates for each trading region. We assume that the recurrent fiscal balance adjusts to equate total government revenues and expenditures. This means that an increase in tariff revenues or intra-EEU transfers leads to a larger recurrent surplus (or smaller deficit), which in turn determines the government's contribution to national savings. Household and government savings are pooled together with foreign capital inflows (i.e., the current account balance) and these loanable funds are used to finance investment spending. We assume that total private and public consumption and investment spending are constant shares of nominal total absorption. This means any change in total absorption, which is a measure of all goods and services used within the country, are proportionally distributed across households, government and investors and so are not biased against any particular agent in the economy.

4.2. Simulating impact channels under uncertainty

The model is calibrated to a 2011 Social Accounting Matrix (SAM) constructed using official statistics.⁹ The KIHS data were used to disaggregate total private consumption and income in national accounts, and trade data were used to disaggregate the TCF sector and separate imports and exports across trading regions. Data sources were reconciled using cross-entropy techniques (see Robinson et al. 2011). The final 2011 SAM provides an initial equilibrium state for the model prior to EEU accession. The model is then shocked by changing the values of its exogenous parameters, such as tariff rates, unrecorded profits, or foreign remittances. The model is resolved and changes in the equilibrium values of endogenous variables before and after the shock are reported.

Table 3 describes our five model simulations. The first two simulations capture changes in import tariffs (Channel 1) for the model's 35 products and 3 trading regions (see Table 2). There is no change in export prices because there is no change in the tax and tariff regime for Kyrgyz exports. Drawing on Wentworth et al. (2015), the second simulation includes the \$63 million windfall gain from the EEU's revenue-sharing formula, which is treated as an increase in foreign trans-

⁹ The SAM is described in Mogilevskii et al. (2016) and is available upon request.

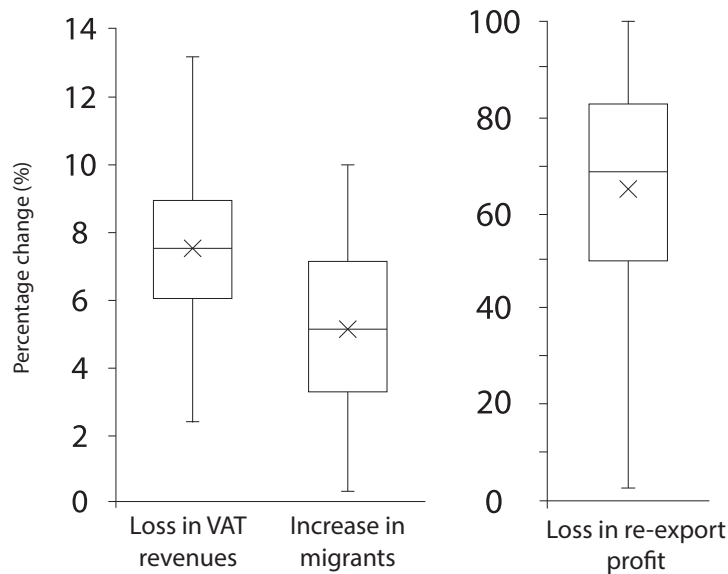
fers paid to the government.¹⁰ Both simulations include declines in VAT revenues (see Section 3). VAT losses are modeled with uncertainty. Figure 2 contains box-and-whisker plots showing the assumed distribution of potential losses (as a share of total initial VAT collections on EEU imports).¹¹ The mean of the distribution is the 7.4% decline estimated by Wentworth et al. (2015). A standard deviation around the mean is assigned to reflect uncertainty about the exact magnitude of losses. Given that Wentworth et al. conducted detailed tax analysis, we assume a low normalized standard deviation of 0.27 (i.e., 2.0/7.4), such that half of the distribution falls between 6.1% and 8.9% losses. The extreme scenarios, with 2.4% and 13.2% losses, have a low probability of occurring. In our analysis, we randomly draw 200 values from the distribution and impose the VAT losses on the model, thereby generating a distribution of impacts with an associated mean or expected impact.

Table 3. Model Simulations

Simulation name		Shocks
1	Tariff changes without formula	Changes in product and region-specific tariff rates (see Table 2); and a 7.4% decline in VAT collected on EEU imports (modeled with uncertainty, see Figure 2).
2	Tariff changes with formula	As above, with an additional \$74 million foreign inflow resulting from the EEU's favorable revenue sharing formula (see Section 3).
3	Reduced re-export profits	75% decline in foreign transfer inflows resulting from lower unrecorded re-export profits (modeled with uncertainty, see Figure 2).
4	Increased migration	5% increase in secondary-educated migrants working abroad, with a commensurate increase in remittances and a decline in domestic supply of secondary-educated labor (see Section 3).
5	Combined	All of the above shocks imposed together.

¹⁰ Kyrgyzstan's actual windfall gains were smaller than expected because accession coincided with an economic crisis in Russia and other EEU countries, which led to a devaluation of their currencies, a sharp fall in imports and ultimately a reduction in import tariff revenue.

¹¹ Upper and lower grey boxes indicate the middle two quartiles of the distribution of VAT loss scenarios. The solid horizontal line between boxes is the median and the cross is the mean. The upper and lower tails (whiskers) indicate the range of the first and fourth quartiles, respectively.

Figure 2. Uncertainty Distributions for Major Impact Channels

Source: Own calculations using truncated normal distributions with assumed means and standard deviations.

Notes: VAT loss on EEU imports; increase in migrant workers to EEU countries; and loss in profits earned from unrecorded re-export trade.

The third simulation captures a decline in profits earned from unrecorded TCF re-export trade (Channel 2). Given our limited information about the size and possible contraction of the sector, we model this channel under considerable uncertainty. Most studies anticipate substantial losses and so, as shown in Figure 2, we assume a mean loss equal to 65% of the estimated \$0.6 billion profits earned in 2011 (see Section 3). We also assign a high standard deviation, such that half of the scenarios involve contractions between 50.2% and 82.7%. There are also extreme scenarios in which profits are either largely unaffected or entirely eliminated.

The fourth simulation captures the anticipated increase in labor migration (Channel 3). Increased migration leads to larger foreign remittance inflows, as well as a decline in labor availability within Kyrgyzstan. The increase in migration is modeled under uncertainty, with the assumed distribution of this increase shown in Figure 2. Section 3 discussed how the decline in migration to Russia following the introduction of tighter labor market restrictions was equivalent to 1.25% of the Kyrgyz workforce, a decline that persisted after 2012. The mean of the distribution in Figure 2 assumes that an additional 5% of Kyrgyz workers migrate to the EEU after regional labor markets become fully-integrated. This is equivalent to recouping four years of unmet “migration demand” accumulated during 2012-2015. Again, we allow for considerable uncertainty: half of the scenarios involve an increase in migration between 3.3% and 7.1%, but the extreme scenarios include either 0% or 10% increases. We assume that each new migrant remits \$211 per month to their households in Kyrgyzstan (see Section 3) and these new remittances are allocated to household groups in the model in proportion to existing remittance receipts, as captured in the KIHS and the SAM.

The final simulation combines all of the above shocks, including the different sources of uncertainty. This scenario evaluates the joint effects of three major impact channels: import taxes, unrecorded re-export profits, and migration and remittances. The next section presents the results of each simulation.

5. Simulation Results

5.1. Changes to import tariffs and VAT collections

The first simulation includes import tariff changes and VAT losses, but *not* the windfall gains from EEU revenue sharing. As discussed earlier, joining the EEU leads to higher Kyrgyz import tariffs (see Table 2). As shown in column 1 of Table 4, the resulting increase in import prices causes total imports to fall, prompting an appreciation of the real exchange rate. The appreciation reduces demand for Kyrgyz exports, while also reducing the value in local currency of foreign remittances and unrecorded profits, which are important income sources for Kyrgyz households. Government revenue rises because the VAT on EEU imports is smaller than the additional tariffs collected on non-EEU imports. Overall, however, the increase in import prices dominates, causing total absorption to fall in real terms. Absorption is a measure of national welfare because it is the sum of all private consumption, public consumption and investment spending within the country.¹² The model's results indicate that joining the EEU reduces total GDP and absorption in Kyrgyzstan by 0.2%.

Table 4. Outcomes from the CGE Model Simulations

	Mean deviation from baseline (%)				
	Import tariff changes		Reduced re-export profits	Increased migration	Combined scenario
	No formula	With formula			
	(1)	(2)	(3)	(4)	(2+3+4)
Real GDP factor cost	-0.23	-0.15	-0.52	-0.96	-1.67
Agriculture	-0.41	-0.13	-1.99	0.66	-1.39
Industry	0.10	-0.29	2.55	-1.50	1.06
of which TCF	-0.78	-0.61	0.38	0.76	-0.52
Services	-0.36	-0.07	-1.85	-1.23	-3.45
Real GDP market prices	-0.24	-0.09	-1.02	-0.62	-1.74
Absorption	-0.19	0.78	-6.81	3.61	-2.43
Exports	-0.85	-1.81	6.89	-5.98	-1.10
Imports	-0.56	0.17	-5.10	2.63	-2.43
Real exchange rate	-0.22	-0.35	0.83	-0.68	-0.09
Tax revenues/GDP	0.37	1.47	-0.22	0.13	1.40
Remittances/GDP	-0.05	-0.09	0.27	5.27	5.52
Unrecorded profit/GDP	-0.03	-0.05	-7.61	0.03	-7.61
Employment	-0.54	-0.36	-1.23	-2.25	-3.95
Primary-educated	-1.04	-0.53	-3.59	1.54	-2.71
Secondary-educated	-1.12	-0.78	-2.31	0.49	-2.88
Tertiary-educated	0.00	0.00	0.00	-5.00	-5.00
Real labor income	-0.85	-0.58	-1.82	-0.86	-3.60
Primary-educated	-1.04	-0.53	-3.59	1.54	-2.71
Secondary-educated	-1.12	-0.78	-2.31	0.49	-2.88
Tertiary-educated	-0.62	-0.44	-1.16	-2.31	-4.31
Real capital income	-0.62	-0.61	-0.04	-0.25	-0.90
Private consumption	-0.34	0.63	-6.88	3.81	-2.49
Quintiles 1-3	-0.48	0.32	0.07	3.54	3.78
Quintiles 4-5	-0.26	0.84	-11.40	3.98	-6.57

Source: Results from the Kyrgyz CGE model.

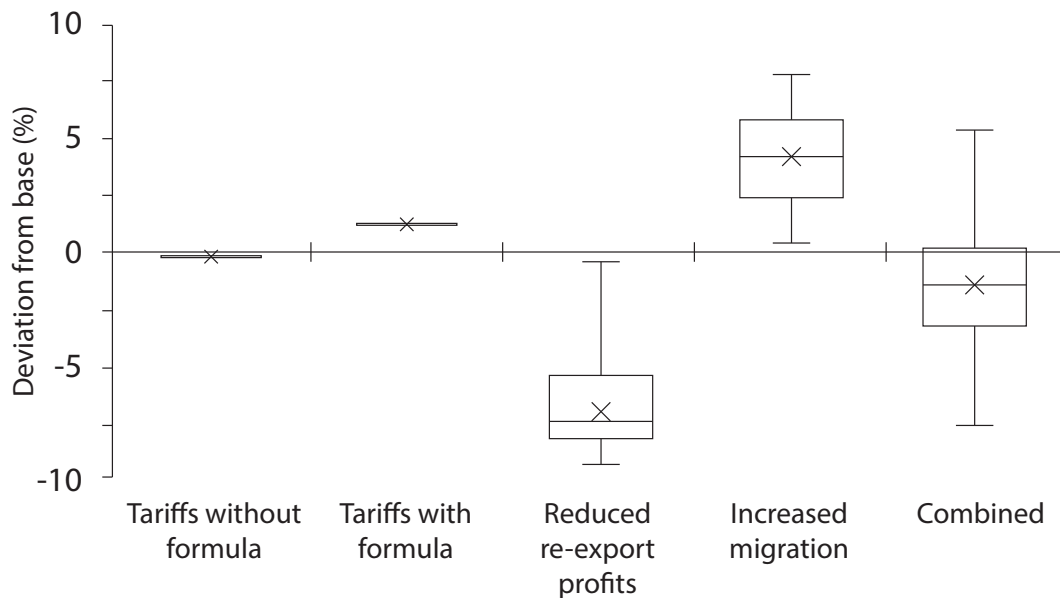
¹² $GDP = Absorption + Trade\ Balance = (C+I+G) + (X-M)$. Where I is investment demand; X is exports; M is imports; and C and G are private and public consumption, respectively.

Notes: Changes in ratios to GDP are in percentage points. Household quintiles are based on per capita expenditures.

The decline in national GDP in the first simulation is driven by a contraction of agriculture and services. Within industry, there is a sharp decline in TCF production (note this is not a decline in unrecorded TCF re-export trade, which remains fixed in foreign currency). The decline is most pronounced for the domestic textile industries, which are more reliant on export markets and so are more adversely affected by the appreciated real exchange rate. Falling TCF production is more than offset by an expansion of other industrial sectors, particularly metal products, which substitute for higher-priced manufactured imports. The slight expansion in industrial production is not enough, however, to reverse the decline in other sectors, leading to falling total factor demand, and lower employment and factor incomes. Primary and secondary educated labor is more likely to work in sectors that contract, such as agriculture and services, and so these workers face the largest declines in employment and wages. Private consumption declines due to falling factor incomes, with larger losses for households at the lower end of the expenditure distribution (i.e., quintiles 1-3).

The second simulation includes the additional transfers received by the Kyrgyz government from the EEU's favorable revenue-sharing formula. As shown in column 2 of Table 4, tax revenues as a share of GDP now increase by 1.5 percentage points, compared to 0.4 percentage points in the first simulation. This additional inflow of foreign exchange causes a larger appreciation of the real exchange rate, which reduces total exports by more than in the first simulation. The real appreciation now also outweighs the dampening effect of higher tariffs on import demand, causing total imports to rise slightly. More imports and fewer exports mean that more goods and services are available for domestic use, so total absorption now increases rather than declines. Household consumption rises, which is partly the result of cheaper imports driving down consumer prices. However, it also reflects our assumption that a portion of the additional government revenues from the revenue-sharing formula are passed on to households in the form of lower taxes and higher disposable incomes.

Our findings from the first two simulations are consistent with Wentworth et al. (2015), who found that adopting the EEU's tariff system leads to a modest decline in Kyrgyz GDP, despite higher tariff revenues. We find that, even though GDP declines after accession, the windfall gains from the revenue-sharing formula result in higher national and household welfare. Our conclusion is robust across the full range of potential VAT losses. This is shown in Figure 3, which reports the distribution of total absorption changes after imposing 200 randomly-drawn impact magnitudes from the distribution of VAT losses in Figure 2. There is almost no variation in outcomes for the first and second simulations. This is because VAT collections on EEU imports formed only a small part of total revenues, and because the expected VAT losses on these imports are quite small. Uncertainty over VAT losses is therefore not a major factor influencing the benefits of adopting the EEU's tariff structure and unified customs procedures.

Figure 3. Distribution of Total Absorption Impacts

Source: Results from the Kyrgyz CGE model.

Notes: Each impact channel involves 200 randomly-drawn impact magnitudes (see Figure 2).

5.2. Contraction of unrecorded re-export trade

The third simulation reduces the profits from unrecorded TCF re-export trade, the results of which are shown in the third column of Table 4. The mean reduction in unrecorded profits is equal to 7.6% of official GDP, which represents a substantial shock to national income. It causes a sharp decline in the supply of foreign exchange, leading to a sizable depreciation of the real exchange rate in order to maintain the current account balance, i.e., by encouraging exports and discouraging imports. The resulting increase in total exports and reduction in total imports implies that fewer goods and services are available for domestic use, resulting in a large 6.8% decline in total real absorption. Total GDP losses are much smaller than absorption losses mainly because, like official statistics, we treat unrecorded profits as a foreign transfer paid to households, and so these appear in gross national income but not GDP. Moreover, exports, which are increasing, are part of GDP but not absorption. Model results indicate that a contraction of unrecorded TCF re-reports has serious negative implications for the Kyrgyz economy.

The large exchange rate depreciation favors industrial exports, particularly the metals sector that accounted for over a quarter of export earnings prior to accession (see Table 1). Kyrgyzstan's own TCF sector also benefits, albeit only slightly, from a contraction of the Chinese TCF re-export business. However, while industry expands, it makes up less than a third of the Kyrgyz economy, and is more than offset by large declines in agriculture and services. These contracting sectors are also major employers of less-educated workers, who experience the largest declines in incomes and employment. However, lower-income households' per capita consumption levels remain virtually unchanged, even though these households are more reliant on incomes from less-educated workers. Rather, it is higher-income households that experience large declines in real consumption levels. There are three explanations for this result. First, we assume that high-

er-income households were the main recipients of the profits from the unrecorded TCF re-export trade. Secondly, lower-income households benefit from the depreciation increasing the value of foreign remittances in local currency. Finally, lower-income households are less import-intensive consumers and so are less-affected by higher import prices.

We find that a sharp contraction of the unrecorded TCF re-export trade causes a major economic contraction and decline in national welfare. There is much uncertainty surrounding this impact channel. Figure 3 reports the distribution of absorption losses from reduced re-export trade. Although potential total absorption losses range from 0.2% to 9.0%, the values close to the range limits are fairly unlikely – half of the absorption losses fall between 4.7% and 7.5%. Concerns over how EEU accession will affect unrecorded TCF re-exports are clearly warranted.

5.3. Increased migration and remittances

The fourth simulation focuses on migration. As with profits on unrecorded trade, remittances are a foreign transfer paid to households, and so the macroeconomic effects of increasing remittances are generally opposite to the effects of decreasing unrecorded profits (see column 4 in Table 4). Joining the EEU increases out-migration from Kyrgyzstan and reduces domestic labor supply. The additional remittance inflows are equivalent to 5.3% of GDP. When these new remittances are converted into local currency, they generate a sizable appreciation of the real exchange rate, which raises import competition and reduces export competitiveness. Rising imports and falling exports lead to lower GDP, but higher total absorption. Simply put, new Kyrgyz migrants contribute to raising GDP in other countries, but their remittances allow more goods and services to be consumed within Kyrgyzstan.

Household consumption is the major source of demand for agricultural products, processed foods, clothing and footwear. Higher household incomes therefore increase the domestic production of these kinds of consumer-oriented products. In contrast, sectors that produce for foreign markets, like textiles and metals, are adversely affected by the appreciation of the real exchange rate. Increased production within labor-intensive sectors, like agriculture and TCF, leads to increased labor demand. This translates into higher incomes for underemployed primary and secondary-educated workers, and for households towards the bottom of the income distribution. Although tertiary workers' incomes fall, this is due to out-migration, with real wages rising for those workers who remain. Even though the income for tertiary workers fall, higher-income households are the largest beneficiaries of increased migration, since remittances form a larger share of these households' incomes (see Section 3).

Increased migration to Russia and other EEU countries benefits Kyrgyz households, even though it leads to lower GDP and employment in Kyrgyzstan. Workers earn higher wages outside the country and so their remittances help raise domestic consumption levels.¹³ However, it is uncertain by how much migration will increase after Kyrgyzstan joins the EEU. Figure 3 shows the distribution of absorption gains from simulated increases in migration flows. In half of the randomly-drawn scenarios we estimate absorption gains of between 2.4% and 5.2%, with an upper-bound gain of 7.1%.

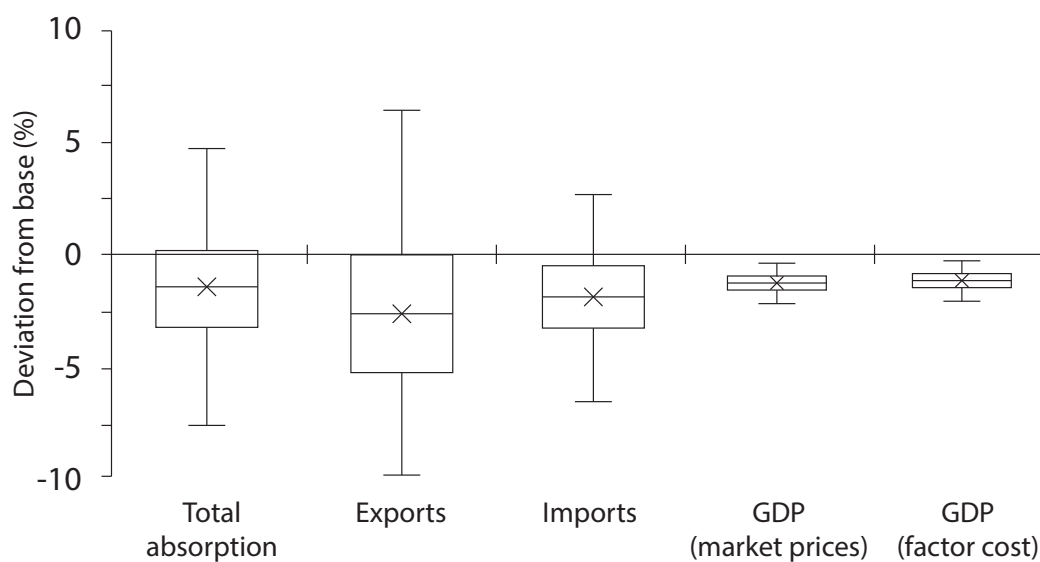
¹³ Our results are consistent with Atamanov et al. (2009), who used a 2003 CGE model to estimate the contribution of migration to the Kyrgyz economy.

6. Combined impacts under uncertainty

In the final simulation we combine all of the impact channels. As shown in the final column in Table 4, the results from the combined simulation are generally a sum of the results from the individual impact channels. For example, total GDP declined in all of the simulations and so these effects compound each other in the combined simulation, with GDP falling by 1.7%. In cases where impact channels generated conflicting results, it is the reduction in unrecorded profits that dominates. For example, total absorption falls by 2.4% in the combined simulation, even though it rose in the migration and tariff revenue simulations. Overall, our results indicate that EEU accession has a negative effect on the Kyrgyz economy, including declines in total GDP, employment, and national welfare.

Table 4 reports the expected or mean results from our 200 scenarios, and so hides the uncertainty surrounding our final assessment. Figure 4 reports the distribution of macroeconomic impacts in the combined simulation. While the change in GDP is negative in all scenarios, the decline in total absorption is more ambiguous, with just over a quarter of the scenarios (54 out of 200) resulting in absorption gains. This uncertainty is caused by wide variation in international trade outcomes. As shown in the figure, both exports and imports are expected to decline, but the impacts of the latter are generally smaller. Total absorption is likely to rise in scenarios where the decline in exports exceeds the decline in imports. Overall, our analysis suggests that there is only a one-in-four chance that absorption increases as a result of EEU accession.

Figure 4. Distribution of Macro Impacts in the Combined Simulation



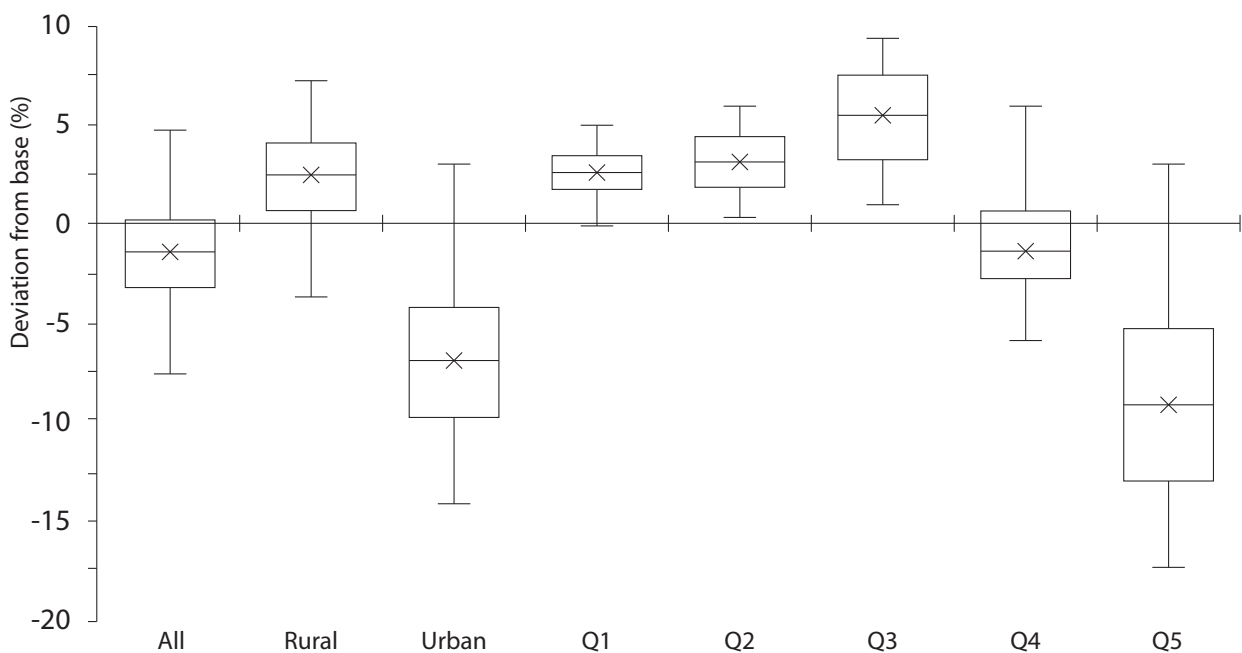
Source: Results from the Kyrgyz CGE model.

Notes: The Combined Simulation includes all impact channels with 200 randomly-drawn impact magnitudes (see Figure 2).

We also consider the impacts of EEU accession on household welfare. Figure 5 reports the distribution of real per capita consumption outcomes for different household groups. We assumed that changes in total absorption are divided proportionally between investment demand and private and public consumption. As such, the distribution of private consumption changes for all

households in Figure 5 is virtually identical to the distribution of total absorption changes in Figure 4. However, there is wide variation in outcomes across household groups. Households in the first three expenditure quintiles almost always benefit from EEU accession, whereas households in the top two quintiles do not. This is because higher-income households are severely affected by reduced unrecorded re-export profits, and these losses almost always exceed any gains from increased migration and remittances (see Table 4). In contrast, households around the middle of the expenditure distribution benefit from increased migration and remittances and are largely unaffected by reduced unrecorded re-export trade. While households are expected to be worse off following EEU accession, this is not true for poorer households, most of which are located in rural areas.

Figure 5. Distribution of Household Impacts in the Combined Simulation



Source: Results from the Kyrgyz CGE model.

Notes: The Combined Simulation includes all impact channels with 200 randomly-drawn impact magnitudes (see Figure 2). Q1-Q5 are national per capita expenditure quintiles.

Finally, we consider the implications of our results for the size of the RKDF. As mentioned, the expected decline in total absorption is 1.5%, but this rises to 7.2% in the worst case scenario. Using 2015 national accounts data, these percentage declines in absorption amount to \$0.2 billion and \$0.9 billion, respectively. The proposed RKDF of between \$0.5 billion and \$1.0 billion is therefore broadly consistent with our estimated national welfare losses.

7. Conclusions

We have used an economy-wide model to estimate the effects of EEU accession on the Kyrgyz economy, taking into account three impact channels: tariff changes; re-export trade; and migration and remittances. Our results indicate that joining the EEU is likely to have an adverse effect on the Kyrgyz economy, with declines in national production and welfare. This is mainly due to

reductions in the unrecorded profits earned from re-exporting Chinese goods into Russia and Kazakhstan. These profits, which were more than 10% of GDP prior to accession, are expected to decline once Kyrgyzstan adopts the EEU's tariff rates and customs procedures. The effects of falling re-export profits outweigh the expected gains from increased migration and remittances as well as the windfall gains from the EEU's favorable revenue-sharing formula. Finally, as with previous studies, we find that the economic losses from adopting the EEU's higher tariffs are small, except insofar as these contribute to the decline in the unrecorded re-export business.

We acknowledged the uncertainties surrounding our *ex ante* analysis. After characterizing each channel's main areas of uncertainty, we used a stochastic simulation approach to generate distributions of impacts. Results from 200 randomly-generated scenarios indicate that there is only a one-in-four chance that EEU accession leads to higher national welfare. However, the results also indicate that it is almost certain that, as a group, households in the lower three expenditure quintiles benefit from EEU accession, at least over the medium-term (i.e., after adjustment costs have diminished). So even if EEU accession reduces the size of the Kyrgyz economy, lower-income households should still benefit from expanded migration opportunities and remittances. Ensuring that regional labor market integration keeps pace with product market integration is therefore a high priority for Kyrgyzstan. So too is the establishment of the RKDF which should be sufficient to offset potential losses in national welfare.

We anticipate similar issues for other Central Asian countries that are considering joining the EEU. Some of these countries also receive remittances from Russia, and so labor market integration is also likely to be a major benefit channel. In fact, other Central Asian countries are more likely to benefit from accession, since none of these countries engage in Chinese re-exporting to the same extent as Kyrgyzstan. This raises two important caveats for our analysis. First, we have assumed that there is sufficient demand in Russia to absorb new Kyrgyz migrants. This may not be the case, however, especially if there is a *persistent* economic downturn in Russia. Secondly, Kyrgyzstan's unrecorded re-export trade may have started declining prior to EEU accession (Mogilevskii 2012). We may therefore overstate the extent of the contraction of this particular business attributable to Kyrgyzstan joining the EEU. Similarly, past profits in the re-export business have depended on the EEU waiving VAT and import tariffs on Kyrgyz exports. However, it is possible that had Kyrgyzstan not joined the EEU, it would have faced more stringent customs procedures on the Kazakh border. From this perspective, the contraction of the re-export business was inevitable, and should therefore not be considered an outcome of Kyrgyzstan's decision to join the EEU. If this impact channel is excluded, then our analysis concludes that joining the EEU should improve the long-term welfare of Kyrgyzstan and the majority of its citizens.

8. References

Atamanov, A., M. Luecke, T.O. Mahmoud, R. Mogilevsky, K. Tereshchenko, N.A. Tourdyeva, A. Uzagalieva, and V. Vavryshchuk. 2009. Income and Distribution Effects of Migration and Remittances: An Analysis Based on CGE Models for Selected CIS Countries. Network Report 86/2009. Warsaw, Poland: Center for Social and Economic Research.

Atamanov, A. and M. Van den Berg. 2010. Determinants of Remittances in Central Asia: Evidence Based on the Household Budget Survey in the Kyrgyz Republic. Working Paper 2010/007. Maastricht, Netherlands: Maastricht Graduate School of Governance, Maastricht University.

- Beishenaly, N., H. Levent, L. Ormonbekova, and C. Shamshiev. 2013. Labor Migration and Human Capital of Kyrgyzstan: Impact of the Customs Union. Report 13. Saint Petersburg, Russia: Centre for Integration Studies, Eurasian Development Bank.
- CSRK. 2012. 2011 Input-Output Table of the Republic of Kazakhstan. Astana, Kazakhstan: Committee on Statistics, Republic of Kazakhstan.
- De Sousa, L.V. 2011. An Initial Estimation of the Economic Effects of the Creation of the EurAsEC Customs Union on Its Members. Economic Premise No. 47. Washington DC, USA: Poverty Reduction and Economic Management Network, World Bank.
- Kaminski, B. and S. Mitra. 2010. Skeins of Silk: Borderless Bazaars and Border Trade in Central Asia. Washington DC, USA: World Bank.
- Libman, A. 2012. Studies of Regional Integration in the CIS and in Central Asia: A Literature Survey. Report 2. Saint Petersburg, Russia: Centre for Integration Studies, Eurasian Development Bank.
- Lofgren, H., R.L. Harris and S. Robinson. 2002. A Standard Computable General Equilibrium (CGE) Model in GAMS. Washington DC, USA: International Food Policy Research Institute.
- Mogilevskii, R. 2012. Re-export Activities in Kyrgyzstan: Issues and Prospects. Working Paper No. 9. Bishkek, Kyrgyzstan: Institute of Public Policy and Administration, University of Central Asia.
- Mogilevskii, R. and A. Atamanov. 2008. Remittances of International Migrants and the Financial Sector in the Kyrgyz Republic. Country Report (Project No. 40038). Asian Development Bank.
- Mogilevskii, R., J. Thurlow, and A. Yeh. 2016. 2011 Social Accounting Matrix for Kyrgyzstan. Washington DC, USA: International Food Policy Research Institute.
- NSCKR. 2012. 2011 Input-Output Table of the Kyrgyz Republic. Bishkek, Kyrgyzstan: National Statistical Committee, Kyrgyz Republic.
- NSCKR. Web-site www.stat.kg.
- Quillin, B., C. Segni, S. Sirtaine, and I. Skamnelos. 2007. Remittances in the CIS Countries: A Study of Selected Corridors. Europe and Central Asia Chief Economist's Regional Working Paper Series Vol. 2 No. 2. Washington DC., USA: Finance and Private Sector Development Department, World Bank.
- Robinson, S., A. Cattaneo, and M. El-Said. 2001. Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods. *Economic Systems Research* 13(1): 47-64.
- UNCTAD. 2015. Trade Analysis Information System (TRAINS). Geneva, Switzerland: United Nations Conference on Trade and Development.
- UNSD. 2015. Commodity Trade Statistics Database. New York NY, USA: United Nations Statistics Division.
- Wentworth, D., S. Caner, and H. van Bodegraven. 2015. Kyrgyz Republic: Impact of Accession to the Eurasian Economic Union. Washington DC, USA: Fiscal Affairs Department, International Monetary Fund.
- World Bank. 2015. World Development Indicators. Washington DC, USA.

9. Appendix

Table A1. Estimated Profit Margin per Kilogram of Unrecorded TCF Re-exports, 2011

		Price decomposition per kilogram (KGS)	
		Pre-EEU	Post-EEU
Direct northern route (China-Kazakhstan)			
1	Chinese export price at Kazakh border	8.53	8.53
2	Tariff on Chinese imports	2.04	2.04
3	Trade/transport margin within Kazakhstan	0.16	0.16
4	Delivery price in Almaty (1+2+3)	10.73	10.73
Indirect southern route (China-Kyrgyzstan-Kazakhstan)			
5	Chinese export price at Kyrgyz border (=1)	8.53	8.53
6	Tariff on Chinese imports	0.14	2.04
7	Trade/transport margin within Kyrgyzstan	0.29	0.29
8	Market price in Bishkek (5+6+7)	8.96	10.86
9	Trade/transport margin within Kazakhstan (=3)	0.16	0.16
10	Delivery price in Almaty	9.11	11.02
Profit on unrecorded re-exports (4-10)		1.61	-0.29

Source: Own calculations using input-output tables (NSCKR 2012; CSRK 2012) and trade and tariff data from UNSD (2015) and UNCTAD (2015).

Notes: Chinese price is for a composite of textile, clothing and footwear exports to Kyrgyzstan.