The Impact of Kyrgyzstan's Accession to the Eurasian Economic Union (EAEU) on the Structure of Kyrgyz Consumer Demand – A Preliminary Assessment –

Ch. Adiiaeva and M. Grings

IAMO Samarkand Conference
Samarkand
2-4 November 2016

Structure of the presentation

1. Kyrgyzstan's accession to the EAEU
2. Consequences for Kyrgyzstan's foreign and internal economic relations
3. Likely consequences for consumers
4. Method of the analysis
5. Results of the analysis
6. Discussion
7. Directions of future research
8. References

1. Kyrgyzstan's accession to the EAEU

The Eurasian Economic Union (EAEU)

- Established 1 January 2015 as successor to Eurasian Economic Community
- Founding members: Belarus, Kazakhstan, Russian Federation
  (Armenia joined the EAEU on 2 January 2015)
- Objectives: Free movement of goods, services, capital and labour between member states;
  coordination of economic policy

(WTO 2016)

Kyrgyzstan's accession

Date of accession: 12 August 2015

Motivation for accession:

1. Insuring continued access to product markets of EAEU members
2. Insuring continued access to labour markets of EAEU members
3. Energy supply at relatively low prices

(Kubayeva 2015, Sarabekov 2015)

2. Consequences for Kyrgyzstan's foreign and internal economic relations

Impact on foreign trade

Before accession

- Low tariff rates: 5 % on average (WTO 2013)
- Large import volumes from third countries (e.g. China)
- Part of import reexported

After accession

- Tariff rates rise to EAEU level: 10.5 % on average (WTO 2013)
- Shifts in trade relations
- Tendency of rising consumer prices
- in spite of import of energy resources at relatively low prices

Impact on labour market

- Legalization of labour migration to EAEU member states (in particular to Russia)

  Estimated share of remittances from Russia in GDP: almost 30 % (Kubayeva 2015)

- Loss of workplaces in re-export trade and the emerging garment industry

3. Likely consequences for consumers

Estimate of the Kyrgyz Ministry of Economy

Impact of Kyrgyzstan's accession to EAEU on the consumer price index:

In 2015-2016 in the interval of 4.5 and 6.5 percentage points;

difference of 6 percentage points between scenarios after accession and without accession.

(MinEcon 2015)

Scenarios for the empirical analysis

1. Impact ceteris paribus on consumer price index (including subindexes for food, nonfood and services): 6 percentage points

2. No change in subindex for services:
   - Most services are produced locally;
     prices may rise according to share of production costs depending on imports (exception: transport services and cost of housing)
   - Prices for transport services and cost of housing may fall due to energy imports at lower prices

   correspondingly larger price increase for consumer goods (7.5 percentage points)

3. Possible changes in income are neglected.

4. Method of the analysis

Estimation of a model of consumer demand for Kyrgyzstan

Level of aggregation

1. Food products, incl. alcoholic beverages (''Food'')
2. Nonfood products (''Nonfood'')
3. Services

Data

Annual time series data for 1993-2015
on household expenditure and on subindexes of the consumer price index

(NatStatCom 2016a, 2016b)

Estimation of a model of consumer demand for Kyrgyzstan

- Functional form: Linear approximated "Almost Ideal Demand System" (LA/AIDS) (Deaton and Muellbauer, 1980), estimated in first differences imposing regularity conditions including curvature
- Estimation method:[1)] Nonlinear "Seemingly Unrelated Regression Equations" (NLSUR), implemented in econometric program package "R"

1) We thank Dr. J. Gersonde, University of Halle, for performing the estimation.

Simulations on the basis of the demand model

1. Simulation of changes in consumption volumes
   for two scenarios of price changes

2. Simulation of welfare change:
   Calculation of Equivalent Variation (EV)
   for the two scenarios

   (EV: equivalent change in income which would lead to the same change in utility as the price changes)

5. Results of the analysis

Estimated expenditure elasticities for 2015

Expenditure shares and expenditure elasticities for 2015

	Commodity group	Abbreviation	Expenditure shares	Expenditure elasticities
1	Food products	Food	0.534	0.913
2	Nonfood products	Nonfood	0.268	1.518
3	Services	Services	0.198	0.535

Estimated price elasticities for 2015

Ordinary price elasticities for 2015

	Commodity group	Price indices 1	2	3
1	Food	-0.841	0.020	-0.092
2	Nonfood	-0.284	-0.917	-0.317
3	Services	-0.046	-0.164	-0.325

Statistical properties of the model

Estimation of 2 equations with 5 parameters (without constants):

- 2 parameters with p-values lower than 0.01,
- 3 parameters with p-values higher than 0.1,
- very low R^2 (0.06 and 0.19).

Alternative model
Estimation of 3 double-logarithmic single equations:

- good fit (all $R^2 > 0.9$),
- 6 parameters (out of 9, without constants) with p-values lower than 0.01
- but inconsistent, not suitable for simulations,
- own-price elasticities and expenditure elasticity for food similar to those in LA/AIDS model.

Simulations: Scenario 1

All price subindexes increase by 6 percent, income is unchanged:

$$\frac{\Delta p_i}{p_i} = \frac{\Delta p}{p} = 0.06, \quad i = 1, \ldots, 3; \quad \frac{\Delta Y}{Y} = 0$$

Changes in consumption volumes (x) and expenditure shares (s)

	Commodity group	Consumption volumes $\Delta x_i / x_i^0$	Expenditure shares s_i^0	s_i^1
1	Food	-0.0518	0.534	0.536
2	Nonfood	-0.0851	0.268	0.260
3	Services	-0.0310	0.198	0.204

Equivalent variation $EV/Y = -0.0585$

Simulations: Scenario 2

Two price subindexes increase by 7.5 percent, other variables are unchanged:

$$\frac{\Delta p_1}{p_1} = \frac{\Delta p_2}{p_2} = 0.075, \quad \frac{\Delta p_3}{p_3} = \frac{\Delta Y}{Y} = 0$$

Changes in consumption volumes (x) and expenditure shares (s)

Commodity group	Consumption volumes $\Delta x_i/x_i^0$	Expenditure shares s_i^0	s_i^1
1 Food	-0.0577	0.534	0.540
2 Nonfood	-0.0833	0.268	0.264
3 Services	-0.0152	0.198	0.196

Equivalent variation $EV/Y = -0.0577$

6. Discussion

Limitations of the analysis

1. Scope of the analysis

- Rough formulation of simulation scenarios,
- no changes in income considered,
- only changes in price subindexes for broad consumption categories,
- only demand-side effects considered.

Limited scope of the analysis mainly due to limited access to relevant data

2. Characteristics of the simulation model

- Estimation imposing all general theoretical properties (regularity conditions) in order to ensure consistency for simulation,
- weak statistical properties,
- similar to a calibrated model,
- but based on observable data.

7. Directions of future research

Broadening the scope of the analysis

Desirable extensions of the analysis:

- Detailed analysis of food demand in terms of groups of demand categories,
- consideration of price *and* income changes
- impact on vulnerable, i.e., on low-income groups of the population.

Prerequisite: Access to the relevant data.

8. References

Deaton, A., and J. Muellbauer (1980a): "An Almost Ideal Demand System", *American Economic Review*, 70, 312-36.

Kubayeva, G. (2015): *Economic Impact of the Eurasian Economic Union on Central Asia*, Central Asia Security Policy Briefs No. 20, Norwegian Institute of International Affairs, Bishkek.

[MinEcon 2015] Ministry of Economy of the Republic of Kyrgyzstan (2015): *The Republic of Kyrgyzstan in the Eurasian Economic Union* (in Russian), Bishkek.

[NatStatCom 2016a] National Statistical Committee of the Republic of Kyrgyzstan (2016a): *Household Consumer Expenditure*, Document 5.04.00.03, Bishkek.

[NatStatCom 2016b] National Statistical Committee of the Republic of Kyrgyzstan (2016b): *Consumer Price Index by Types of Goods and Services (ECCGS)*, Document 1.08.00.01, Bishkek.

Sarabekov, J. (2015): "Advantages and disadvantages of Kyrgyzstan's accession to the EAEU" (in Russian), InoZpress, available at http://www.inozpress.kg/news/view/id/45008, accessed 2016-06-30.

[WTO 2013] World Trade Organization (2013): *Trade Policy Review - Kyrgyz Republic*, Document WT/TPR/S/288, 1 October 2013.

[WTO 2016] World Trade Organization (2016): *Trade Policy Review - Russian Federation*, Document WT/TPR/S/345, 24 August 2016.

Appendix

The model equations in first differences

$$\Delta s_{it} = \delta_i + \sum_{j=1}^{3} \gamma_{ij} \cdot \Delta \ln p_{jt} + \beta_i \cdot \Delta \ln \left(\frac{Y_t}{P_t} \right), \qquad i = 1, 2;$$

$$t = 1994, \ldots, 2015$$

where

$$\ln P_t = \sum_{i=1}^{3} s_{it} \cdot \ln p_{it}.$$

and

$i = 1$	Food; $i = 2$ Nonfood; $i = 3$ Services
Y	Total expenditure on consumption categories 1, 2 and 3
s_{it}	Share of consumption category i in total consumption expenditure in period t (average budget share)
p_{it}	Price index of consumption category i, period t

Parameter restrictions (1)

. . . for adding-up, symmetry and homogeneity of degree 0 in prices and income:

$$\sum_{i=1}^{3} \delta_i = 0, \quad \sum_{i=1}^{3} \beta_i = 0, \quad \gamma_{ij} = \gamma_{ji}, \quad \sum_{j=1}^{3} \gamma_{ij} = 0.$$

Parameter restrictions (2)

. . . for concavity in prices (curvature restriction) of the corresponding cost function (C):

$$\begin{aligned} S &= \left[\frac{\partial^2 C}{\partial p_i \partial p_j}\right] = \left[\frac{\partial h_i}{\partial p_j}\right] \quad \text{n.s.d.} \\ &= C\hat{p}^{-1}(\Gamma + ss' - \hat{s})\hat{p}^{-1}, \end{aligned}$$

where
S is the Slutsky matrix, which is supposed to be negative semi-definite (n.s.d.),
$h_i(p_1, p_2, p_3, u)$ is the compensated demand function for demand category i given utility level u,
$\hat{p}$ is the diagonal matrix of prices,
s is the vector of average budget shares, $\hat{s}$ the corresponding diagonal matrix,
and Γ has elements γ_{ij}.

Parameter restrictions (3)

Negative semi-definiteness of the Slutsky matrix (S) is imposed via a Cholesky decomposition which also imposes symmetry and homogeneity:

$$S = LDL',$$

where

$$L = \begin{bmatrix} 1 & 0 & 0 \\ L_{21} & 1 & 0 \\ L_{31} & L_{32} & 1 \end{bmatrix}$$

and

$$D = \begin{bmatrix} -d_{11}^2 & 0 & 0 \\ 0 & -d_{22}^2 & 0 \\ 0 & 0 & -d_{33}^2 \end{bmatrix}$$

with $L_{31} = -(1 + L_{21})$, $L_{32} = -1$, and $d_{33} = 0$, incorporating the homogeneity restriction.

The estimated equations

$$
\begin{aligned}
\Delta s_{1t} = \delta_1 \quad & - \quad (d_{11}^2 + s_{1t-1}^2 - s_{1t-1}) \cdot \Delta \ln p_{1t} \\
& - \quad (L_{21} \cdot d_{11}^2 + s_{1t-1} \cdot s_{2t-1}) \cdot \Delta \ln p_{2t} \\
& + \quad ((1 + L_{21}) \cdot d_{11}^2 - s_{1t-1} \cdot s_{3t-1}) \cdot \Delta \ln p_{3t} \\
& + \quad \beta_1 \cdot \Delta (\ln Y_t - \ln P_t), \\
\Delta s_{2t} = \delta_2 \quad & - \quad (L_{21} \cdot d_{11}^2 + s_{2t-1} \cdot s_{1t-1}) \cdot \Delta \ln p_{1t} \\
& - \quad (L_{21}^2 \cdot d_{11}^2 + d_{22}^2 + s_{2t-1}^2 - s_{2t-1}) \cdot \Delta \ln p_{2t} \\
& + \quad (L_{21} \cdot (1 + L_{21}) \cdot d_{11}^2 + d_{22}^2 - s_{2t-1} \cdot s_{3t-1}) \cdot \Delta \ln p_{3t} \\
& + \quad \beta_2 \cdot \Delta (\ln Y_t - \ln P_t),
\end{aligned}
$$

Estimation results

Symbol	Coefficient	Stand. dev.	t value	p value
δ_1	0.001318892	0.006184304	0.2132644	0.8336573
δ_2	-0.002528043	0.008160568	-0.3097877	0.7604876
β_1	-0.046371553	0.065130407	-0.7119801	0.4861340
β_2	0.138698504	0.082029669	1.6908334	0.1091189
d_{11}	0.434186766	0.074493819	5.8284938	0.0000201
d_{22}	0.177298327	0.180814251	0.9805551	0.3405618
L_{21}	-0.747564911	0.239171419	-3.1256448	0.0061566

Equation 1: $R^2 = 0.062074$, $DW = 2.452822$
Equation 2: $R^2 = 0.188029$, $DW = 1.929078$

Equivalent Variation (EV)

EV for simulation 2 (only price subindexes 1 and 2 change):

$$EV = \int_{p_1^0}^{p_1^1} h_1(p_1, p_2^0, p_3^0, u^1)dp_1 + \int_{p_2^0}^{p_2^1} h_2(p_1^1, p_2, p_3^0, u^1)dp_2,$$

where

$$h_i(p_1, p_2, p_3, u) = \frac{Y}{p_i}\left(\alpha_i + \sum_{j=1}^{3}\gamma_{ij}\ln p_j\right) + \beta_i Y \beta_0 u \cdot \Pi_{j=1}^{3} p_j^{\beta_j}/p_i$$

is the compensated demand function for consumption category i.

$\beta_0 u$ can be calculated, using the indirect utility function, as

$$\beta_0 u = (\ln C - \ln P)/\Pi_{j=1}^{3} p_j^{\beta_j}$$

and α_i can be inferred from the original estimation equation as

$$\alpha_i = s_{it} - \sum_{j=1}^{3} \gamma_{ij} \cdot \ln p_{jt} - \beta_i \cdot \ln \left(\frac{Y_t}{P_t} \right),$$

since at the point of approximation ($t = T$) for all price indexes $p_{iT} = 1$, such that

$$\alpha_i = s_{iT} - \beta_i \cdot \ln Y_T.$$