

SECTORAL IMPACT OF INDIRECT TAX REDUCTION ON THE KYRGYZ ECONOMY BASED ON INPUT-OUTPUT ANALYSIS

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ABSTRACT

After the Soviet Union collapsed all ex-Soviet countries faced the problem of establishing their own systems in all spheres of life, including new economic and fiscal systems. These systems of the Kyrgyz Republic, at the present stage of development, are still unstable; many changes occur very often and, as a result, doing business in Kyrgyzstan is difficult. This leads to inhibition of development of the whole country. Nowadays Kyrgyzstan desperately needs to stabilize its economic and fiscal systems.

This study provides a sectoral analysis of the Kyrgyz economy in order to determine the key sectors in the economy and the impact of VAT rate reduction on the whole economy on the basis of the Input-Output Table of the Kyrgyz Republic for 2009.

Calculations of forward and backward linkages were made by the traditional method of the Rasmussen/Hirschman approach. Sectoral impact of indirect tax reduction was made by simulation of two scenarios.

According to the results of the analysis, the top eight main sectors in Kyrgyzstan in 2009 were Agriculture, hunting and forestry; Metallurgical industry; Construction; Manufacture of food products, beverages and tobacco; Financial activities; Hotels and

restaurants; Other non-metallic mineral products; and Textiles and textile products, leather, leather products and footwear.

To test the effect of reduction of the VAT by half (from 12% to 6%) on the economy, two models were simulated, one in which the extra money was allocated to investment and the other in which the extra money was allocated towards consumption. Among the two main simulated scenarios of VAT reduction, the model with allocation of the money to consumption had a reasonably strong, positive effect.

The results of this study can help Kyrgyz economic policymakers to decide which sectors need to be supported more or less and how decrease the tax burden of taxpayers in order to improve the efficiency of the whole economy. The government of the Kyrgyz Republic might reduce the VAT tax rate since consumers will consume more in response, which has a positive impact on the economy. On the other hand it should monitor the sectoral structure of the budget expenditures in order to increase the effectiveness of governmental spending and compensate for lost revenue from the reduced VAT tax rate.

Key words: Input-Output Analysis, Sectoral Structure of Economy, Value Added Tax

Introduction

For about 70 years (from 1919 to 1991) Kyrgyz Republic was a member of the Union of Soviet Socialist Republics (USSR or Soviet Union). On August 31, 1991 the Kyrgyz Supreme Soviet voted to declare the independence of the Kyrgyz Republic from the Soviet Union.

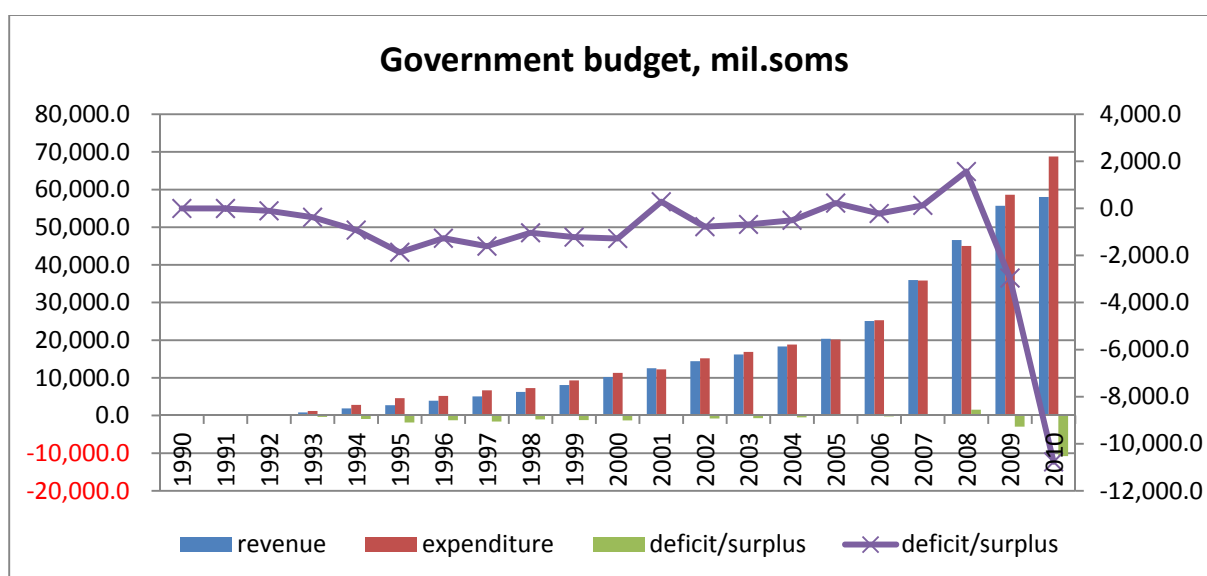
According to the data of the National Statistical Committee of Kyrgyz Republic (NSCKR) Kyrgyzstan's population was estimated at 5.478 million in 2011. Of those, 32.3% are under the age of 15 and 6.6% are over 63. The country is rural: only about one-third of population lives in urban areas. The average population density is 27.4 people per km² (65 per square mile). Territory of the Kyrgyz Republic is 198 km².

In 2010 the GDP of Kyrgyz Republic was KGS 220,369.3 mil. (about USD 4,864.6 mil.). The GDP per capita was KGS 40,235 (about USD 888) (National Statistical Committee of Kyrgyz Republic (NSCKR), 2011).

Overview of current Kyrgyz fiscal system

After gaining independence in 1991 the economy of the Kyrgyz Republic lost all previous ties with ex-Soviet countries and faced the problem of survival in a new economic and political reality. The USSR stopped financing the Kyrgyz government budget, so it had to establish its own revenues to finance its expenditures.

Figure 1.6. Kyrgyz budget revenue and expenditure for 1990-2010



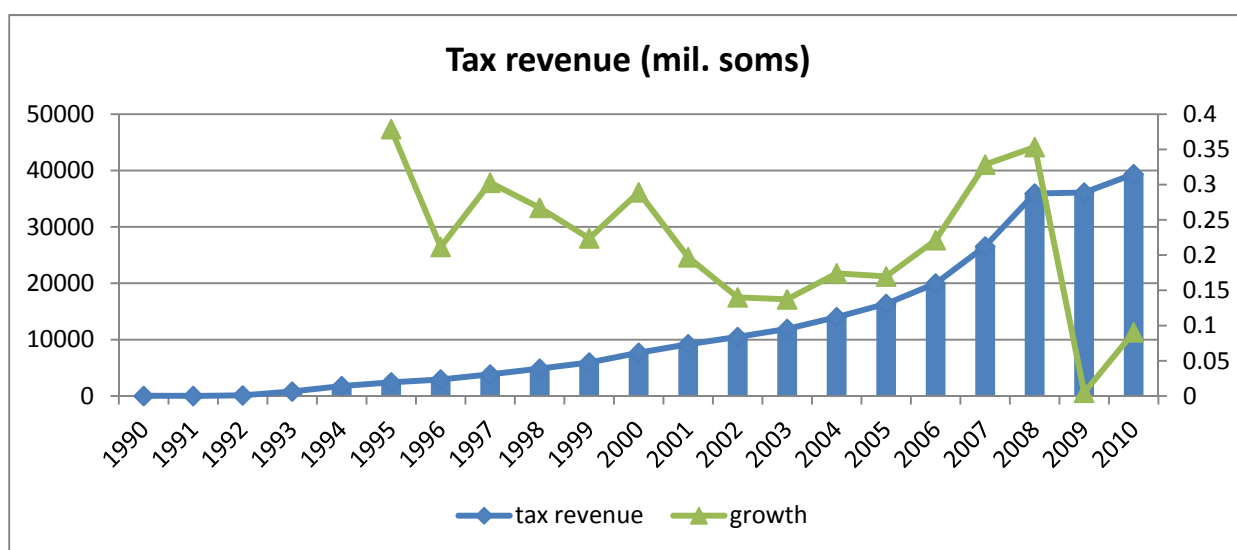
Source: National Statistical Committee of Kyrgyz Republic.

Starting from 1993 we can observe the stable increase of both government revenue and expenditure. The velocity of increase is constant (on average) until 2005. Starting from 2005 there is an acceleration in the velocity of increase of the Kyrgyz budget's revenue and expenditure. This is due to a political changing in 2005. Starting from the USSR collapse until 2005 Kyrgyzstan was led by President A. Akaev. In 2005 after the revolution, and Akaev's escape from the country, there were presidential elections and Kyrgyzstan's second president became K. Bakiev. Under Bakiev's leadership the fiscal policy changed. In 2008 he introduced the new Tax Code which was implemented in 2009.

Also, Figure 1.7 shows that Bakiev's cabinet tried to reduce the budget deficit beginning in 2005. However, by 2009 and 2010 this policy had failed and the budget deficit reached its peak for the entire period of review.

Before 1993, Kyrgyzstan had a united currency with the USSR, Soviet rubles and the economic system was very dependent on other ex-Soviet countries. In May 1993, the Kyrgyz government has introduced its own currency, the som (KGS). Nevertheless, after gaining independence the principles of the soviet tax system remained in use in the Kyrgyz tax system until July 1996 when the Tax Code of the Kyrgyz Republic was implemented. Taxes in the Code were divided to national and local levels. There were 5 national and 16 local taxes. The Tax Code of 1996 was in effect until 2009 when the new Tax Code was introduced. Nowadays, in the Kyrgyz Republic there are in effect 6 national and 2 local taxes (Tax Code of Kyrgyz Republic, 2009). Tax revenues of governmental budget are presented in Figure 1.7.

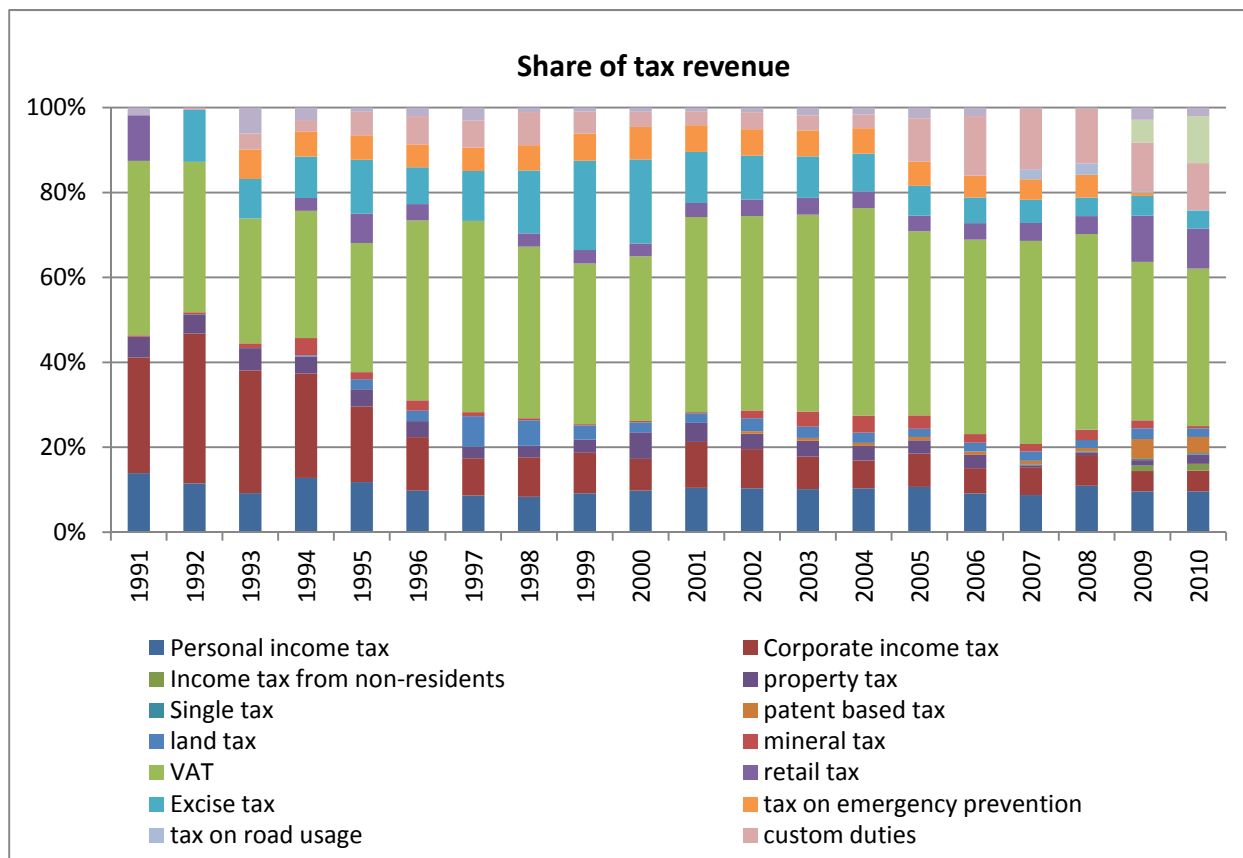
Figure 1.7. Kyrgyz tax revenue for 1990-2010



Source: National Statistical Committee of Kyrgyz Republic.

The growth rate of taxes in 1990–2010 was positive in the range 10–38% except 2009 when the growth rate fell down to 0.5%. The reason for this decrease was a change in the taxation system through implementing a new Tax Code reducing the number of taxes and changing the tax rates.

Figure 1.8. Share of total revenue of various taxes for 1991-2010



Source: National Statistical Committee of Kyrgyz Republic.

The share of total revenue of the various types of taxes is presented in Figure 1.8. According to figure above, the greatest share of tax revenues belongs to the Value Added Tax (30 – 49%). That is the reason why the VAT was chosen as the focus of economic impact simulation in the present research study. Further information about the scope and structure of the VAT, extracted from the current Tax Code of the Kyrgyz Republic, is presented in Table 1.1.

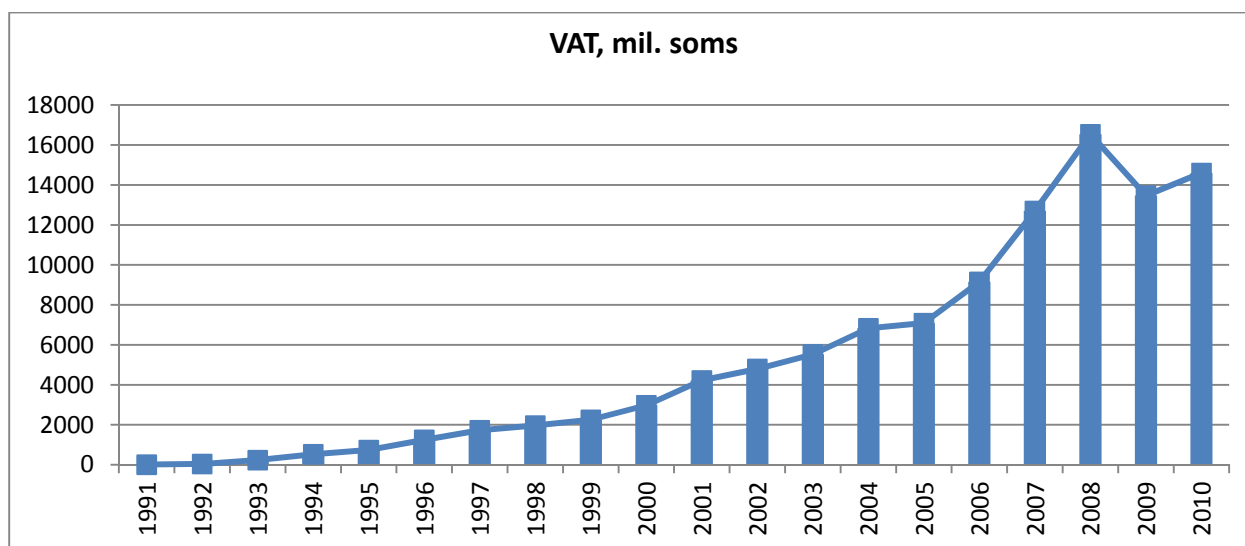
Table 1.1. Information about the Kyrgyz VAT

Subject of taxation (taxpayers):	Legal entities and private entrepreneurs with annual sales more than 4 mil.soms (about 86 000 USD)
Object of taxation:	Total sales of goods and services
Tax rate:	12%
Economic sectors exempted from VAT taxation:	Real estate, agriculture, hot water, waste, gas, health, finance, transport, communication, education
Economic sector with VAT rate 0%:	International transportation (except rail)

Source: Tax Code of the Kyrgyz Republic.

The share of VAT revenue in the total budget is presented in Figure 1.9. As it is shown in the graph, the growth rate of VAT was positive in all years except 2009. In 2009 the government implemented a new Kyrgyz Tax Code under which the tax rate of VAT was reduced from 20% down to 12%. That is the reason of the negative growth rate of the VAT only in 2009.

Figure 1.9. VAT revenue's share of budget for 1991-2010



Source: National Statistical Committee of Kyrgyz Republic.

Data description

The Kyrgyz Input-Output Table was published by the National Statistic Committee of Kyrgyz Republic in 2011 as a book with the title *Input-Output table of goods and services for 2009*. The Kyrgyz Input-Output Table for 2009 consists of 34 sectors. A full list of Kyrgyz sectors is presented in Table 3.1.

Table 3.1. List of Kyrgyz sectors

1	Agriculture, hunting and forestry	
2	Fishing, fish farming, the provision of services in these areas	
3	Mining of coal, lignite and peat, crude oil and natural gas	
4	Mining of metal ores	
5	Other mining and quarrying	
6	Manufacture of food products, beverages and tobacco	
7	Textiles and textile products, leather, leather products and footwear	
8	Wood processing and production of wood products	
9	Pulp and paper production, publishing	
10	Manufacture of coke, refined petroleum products and nuclear fuel, chemicals, rubber and plastic products	
11	Other non-metallic mineral products	
12	Metallurgical industry	
13	Manufacture of fabricated metal products	
14	Machinery and equipment	
15	Other industries	
16	Production and distribution of electricity	
17	Production and distribution of gaseous fuels	
18	Steam and hot water supply	
19	Collection, purification and distribution of water	
20	Construction	
21	Wholesale trade and business through agents, except of motor vehicles and motorcycles	
22	Retail trade, except of motor vehicles and motorcycles	
23	Trade in cars and motorcycles, their maintenance and repair, repair of household goods and personal items	
24	Hotels and restaurants	
25	Transport, supporting and auxiliary transport activities	
26	Communications	
27	Financial activities	
28	Real estate, renting and services to consumers	
29	Governmental management	
30	Education	
31	Health and social services	
32	Sewage, waste, and similar activities	
33	Activities of public associations, recreation and entertainment, culture and sports	
34	Individual services	

In order to calculate the Leontief's Inverse Matrix the ratio

$$\text{Import} / \text{Domestic Demand}$$

was applied for all sectors except two, No. 10 (Manufacture of coke, refined petroleum products and nuclear fuel, chemicals, rubber and plastic products) and No 27 (Transport, supporting and auxiliary transport activities), to which was applied the ratio

$$\text{Import} / \text{Total Demand}$$

due to the inconsistency of the data in the initial Input-Output Table.

General economic structure by sector

According to Temirshoev (2004) “the total significance of any sector in the economy can be estimated by examining the inter-industry linkage effects, i.e. the effect of a one unit increase in exogenous final demand or exogenous total value added components on the level of production of each industry. The sector uses inputs from other industries in its production process. This reflects the sector's backward linkage. Again, a sector may supply inputs to other industries. This indicates the forward linkage of the sector with other industries to which it supplies inputs. Thus, industries with large backward and forward linkages are termed *key sectors*, and play an important role in the development strategy of a country” (Temirshoev, 2004).

Forward linkage defined by IMPLAN as the interconnection of an industry to other industries to which it sells its outputs. It is measured as the row sum of the direct requirements table (direct forward linkage) or as the row sum of the total requirements table (total forward linkage). An industry has significant forward linkages when a substantial amount of its output is used by other industries as intermediate inputs to their production. (IMPLAN, n.d.)

Backward linkage defined by IMPLAN as the interconnection of an industry to other industries from which it purchases its inputs in order to produce its output. It is measured as the proportion of intermediate consumption to the total output of the sector (direct backward linkage) or to the total output multiplier (total backward linkage). An industry has significant backward linkages when its production of output requires substantial intermediate inputs from many other industries (IMPLAN, n.d.).

Augustinovic (1970) suggests that product flows may be approached from two opposite directions, which are best characterized by the following questions: “Where do they come from?” and “Where do they go?” The first question is directed backwards and inquires

after the composition of the inputs (per unit of output). The second is directed forwards and asks for the allocation of the production (per unit of output). The examination of backward and forward linkages enables one to identify leading sectors in the economy and investigate the structure of production of the economy.

One of the more traditional methods for calculation of forward and backward linkages is the Rasmussen/Hirschman approach. The work of Rasmussen and Hirschman led to the development of indices of linkage that have now become part of the generally accepted procedures for identifying key sectors in an economy (Sonis, 1995). The formulas for calculation of backward and forward linkages are next.

$$BL_j = \sum_{i=1}^n b_{ij} / \left(\sum_{i=1}^n \sum_{j=1}^n b_{ij} / n \right) \quad (\text{eq. 3.2.1})$$

$$FL_i = \sum_{j=1}^n b_{ij} / \left(\sum_{i=1}^n \sum_{j=1}^n b_{ij} / n \right) \quad (\text{eq. 3.2.2})$$

where b_{ij} as a typical element of the Leontief inverse matrix B ; n is number of sectors.

Estimated according the above formulas forward and backward coefficients on the basis of the Kyrgyz IO-Table are presented in Tables 3.2 and 3.3.

Table 3.2. Forward coefficients

<i>Rank</i>	<i>Sector</i>	<i>Effect</i>	<i>Rank</i>	<i>sector</i>	<i>Effect</i>
		>1			<1
1	Agriculture, hunting, and forestry	4.22	1	Food products, beverages, and tobacco	0.95
2	Fuel, chemicals, rubber, plastic	3.10	2	Gas production and distribution	0.94
3	Financial activities	2.31	3	Fabricated metal products	0.87
4	Metallurgical industry	1.98	4	Real estate, renting and services	0.84
5	Retail trade	1.77	5	Coal mining, crude oil and natural gas	0.82
6	Construction	1.42	6	Wholesale trade and business through agents	0.79
7	Transport	1.26	7	Machinery and equipment	0.79
8	Textiles and leather	1.24	8	Pulp and paper production, publishing	0.75
9	Wood processing and wood products	1.13	9	Fishing and fish farming	0.68
			10	Communication	0.66
			11	Other non-metal mineral products	0.65
			12	Vehicle trade, maintenance, and repair	0.64
			13	Electricity production and	0.62

				distribution	
			14	Hotels and restaurants	0.60
			15	Mining of metal ores	0.51
			16	Other industries	0.48
			17	Steam and hot water supply	0.46
			18	Collection, purification and distribution of water	0.45
			19	Recreation, entertainment, culture, and sport	0.44
			20	Individual services	0.44
			21	Other mining and quarrying	0.42
			22	Health and social services	0.41
			23	Education	0.41
			24	Sewage, waste, and similar	0.40
			25	Government management	0.40

Table 3.3. Backward coefficients

<i>Rank</i>	<i>Sector</i>	<i>Effect</i>	<i>Rank</i>	<i>sector</i>	<i>Effect</i>
		≥ 1			< 1
1	Financial activities	2.36	1	Machinery and equipment	0.99
2	Steam and hot water supply	1.34	2	Transport	0.96
3	Vehicle trade, maintenance, and repair	1.27	3	Pulp and paper production, publishing	0.95
4	Food products, beverages, and tobacco	1.20	4	Electricity production and distribution	0.92
5	Fuel, chemicals, rubber, plastic	1.17	5	Other industries	0.89
6	Wood processing and wood products	1.14	6	Communication	0.86
7	Metallurgical industry	1.12	7	Individual services	0.86
8	Gas production and distribution	1.12	8	Wholesale trade and business through agents	0.84
9	Agriculture, hunting, and forestry	1.11	9	Recreation, entertainment, culture, and sport	0.83
10	Construction	1.09	10	Collection, purification and distribution of water	0.82
11	Fabricated metal products	1.08	11	Real estate, renting and services	0.81
12	Other mining and quarrying	1.07	12	Government management	0.79
13	Hotels and restaurants	1.06	13	Coal mining, crude oil and natural gas	0.78
14	Other non-metal mineral products	1.00	14	Retail trade	0.78
15	Textiles and leather	1.00	15	Fishing and fish farming	0.76
			16	Sewage, waste, and similar	0.75
			17	Mining of metal ores	0.71
			18	Health and social services	0.71
			19	Education	0.69

On the basis of the initial I-O table the output of Kyrgyz sectors was ranked from largest to smallest and presented in Table 3.4.

Table 3.4. Ranked output of Kyrgyz economic sectors

<i>Rank</i>	<i>Sector No.</i>	<i>Sector name</i>	<i>Output</i>	<i>% of total</i>
1	1	Agriculture, hunting and forestry	2,592.6	25.9
2	12	Metallurgical industry	1,095.9	11.0
3	22	Retail trade	1,055.4	10.6
4	20	Construction	942.7	9.4
5	6	Food products, beverages, and tobacco	545.3	5.5
6	25	Transport	469.4	4.7
7	29	Government management	418.3	4.2
8	26	Communication	371.4	3.7
9	28	Real estate, renting and services	368.8	3.7
10	30	Education	286.9	2.9
11	27	Financial activities	259.8	2.6
12	16	Electricity production and distribution	185.1	1.9
13	21	Wholesale trade and business through agents	182.8	1.8
14	24	Hotels and restaurants	176.9	1.8
15	31	Health and social services	170.9	1.7
16	11	Other non-metal mineral products	130.3	1.3
17	33	Recreation, entertainment, culture, and sport	120.8	1.2
18	7	Textiles and leather	119.6	1.2
19	10	Fuel, chemicals, rubber, plastic	97.7	1.0
20	23	Wholesale trade and business through agents	78.5	0.8
21	14	Machinery and equipment	65.7	0.7
22	34	Individual services	48.9	0.5
23	18	Steam and hot water supply	43.8	0.4
24	3	Coal mining, crude oil and natural gas	31.2	0.3
25	9	Pulp and paper production, publishing activity	29.1	0.3
26	13	Fabricated metal products	27.4	0.3
27	17	Gas production and distribution	23.1	0.2
28	15	Other industries	16.5	0.2
29	19	Collection, purification and distribution of water	13.8	0.1
30	5	Other mining and quarrying	10.0	0.1
31	8	Wood processing and wood products	8.0	0.1
32	4	Mining of metal ores	3.8	0.04
33	32	Sewage, waste, and similar	3.7	0.04
34	2	Fishing and fish farming	0.3	0.003
		Total		100%

According to the results of the analysis, the top 8 main sectors in the Kyrgyzstan in 2009 were:

1. Agriculture, hunting and forestry
2. Fuel, chemicals, rubber, plastic
3. Financial activities
4. Metallurgical industry
5. Retail trade
6. Construction
7. Transport
8. Textiles and leather

A sector was judged to be main if its forward effect coefficient was more than 1 (Table 3.2), backward coefficient less than 1.2 (Table 3.3), and total output more than 1% of GDP (Table 3.4).

In comparison with the results of the Termishoev's (2004) previous study on the basis of the 1998 Kyrgyz I-O Table (see Table 3.5), three sectors are still key sectors in the 2009 Kyrgyz economy:

1. Agriculture, hunting and forestry
2. Financial activities
3. Textiles and leather

Table 3.5. Comparative table

<i>Study written by Umed Temirshoev (2004) "Key sectors in the Kyrgyzstan economy" on the basis of 1998 IO-Table</i>	<i>This study on the basis of 2009 IO-Table</i>
Agriculture, hunting and forestry	Agriculture, hunting and forestry
Fishing and pisciculture	Fuel, chemicals, rubber, plastic
Ore extraction	Financial activities
Foodstuffs and tobacco goods production	Metallurgical industry
Textile and clothing industry, leather manufacture	Retail trade
Water generation, purification and distribution	Construction
Wholesale trade	Transport
Finance	Textiles and leather

As for the backward effect coefficients (Table 3.3) most of them are quite moderate, have coefficients around 1 (in the range 0.69–1.34) except the Financial activities sector which has the highest backward coefficient (2.36). Data in the initial IO-table provide the input volume into the Financial activities sector from other sectors. However, the largest input into the Financial activities sector is the Financial activities sector itself. It seems that the characteristics of the Kyrgyz Financial activities sector are very unique.

Impact of VAT reduction

In order to model the economic impact of indirect tax reduction to the economy, this study created a simulation of reducing the VAT rate from 12% down to 6%. In other words, VAT was reduced by half. The economic impact analysis was processed under the assumption that there were no savings in the economy.

First, we established the value of the reduced VAT for the simulation. Since it simulated the reduction of the VAT by 50%, then for the sector j the tax reduction is represented as

$$\Delta T_j = 0.5 * \Delta T_j \quad (\text{eq.3.3.1})$$

For the whole economy the tax reduction is

$$\Delta T = \sum_{j=1}^n \Delta T_j \quad (\text{eq.3.3.2})$$

Then, the induced output of the simulation for 2 scenarios was calculated:

$$X_j^1 = B * (G_j' + C_j') \quad (\text{eq.3.3.3})$$

$$X_j^2 = B * (G_j' + I_j') \quad (\text{eq.3.3.4})$$

Where B is Leontief's Inverse Table as described in Chapter 2;

$$G_j' = G_j - \Delta T * \frac{G_j}{\sum_{i=1}^n G_j} \quad (\text{eq.3.3.5})$$

$$C_j' = C_j - \Delta T * \frac{C_j}{\sum_{i=1}^n C_j} \quad (\text{eq.3.3.6})$$

$$I_j' = I_j - \Delta T * \frac{I_j}{\sum_{i=1}^n I_j} \quad (\text{eq.3.3.7})$$

G_j is Government Expenditure of sector j,

C_j is Consumption of sector j.

I_j is Investment of sector j,

In order to find the efficiency of the induced output of the simulations, the obtained induced outputs were compared with the data in the initial table.

Current data:

For scenario 1:

$$X_j^{01} = B * (G_j + C_j) \quad (\text{eq.3.3.8})$$

For scenario 2:

$$X_j^{02} = B * (G_j + I_j) \quad (\text{eq.3.3.9})$$

Then, the difference between the simulated output and the current output was calculated:

Scenario 1:

$$X_j^{d1} = X_j^1 - X_j^{01} \quad (\text{eq.3.3.10})$$

Scenario 2:

$$X_j^{d2} = X_j^2 - X_j^{02} \quad (\text{eq.3.3.11})$$

For more simplicity here is a step-by-step explanation of the model calculations:

1) Tax reduction of sector j

$$\Delta T_j = 0.5 * \Delta T_j \quad (\text{eq.3.3.12})$$

2) For the whole economy:

$$\Delta T = \sum_{j=1}^n \Delta T_j \quad (\text{eq.3.3.13})$$

3) Reduction of Government Expenditure of sector j:

$$G_j' = G_j - \Delta T * \frac{G_j}{\sum_{i=1}^n G_i} \quad (\text{eq.3.3.14})$$

4) Increase of Investment to sector j:

$$I_j' = I_j - \Delta T * \frac{I_j}{\sum_{i=1}^n I_i} \quad (\text{eq.3.3.15})$$

5) Increasing of Consumption in sector j:

$$C_j' = C_j - \Delta T * \frac{C_j}{\sum_{i=1}^n C_i} \quad (\text{eq.3.3.16})$$

6) Induced output for scenario 1:

$$X_j^1 = B * (G_j' + C_j') \quad (\text{eq.3.3.17})$$

7) Induced output for scenario 2:

$$X_j^2 = B * (G_j' + I_j') \quad (\text{eq.3.3.18})$$

8) Current data for scenario 1:

$$X_j^{01} = B * (G_j + C_j) \quad (\text{eq.3.3.19})$$

9) Current data for scenario 2:

$$X_j^{02} = B * (G_j + I_j) \quad (\text{eq.3.3.20})$$

10) Difference for scenario 1:

$$X_j^{d1} = X_j^1 - X_j^{01} \quad (\text{eq.3.3.21})$$

11) Difference for scenario 2:

$$X_j^{d2} = X_j^2 - X_j^{02} \quad (\text{eq.3.3.22})$$

The share of indirect tax in the output of each sector was estimated based on the Kyrgyz 2009 IO-Table. Results are presented in Table 3.6.

Table 3.6. Share of indirect tax in the total output

<i>Group</i>	<i>Rank</i>	<i>Sector</i>	<i>Tax share,%</i>
0%<X<1%	1	Financial activities	0.35
	2	Agriculture, hunting, and forestry	0.70
	3	Textiles and leather	0.81
	4	Fishing and fish farming	0.86
	5	Health and social services	0.93
1%<X<2%	1	Wholesale trade and business through agents	1.01
	2	Retail trade	1.05
	3	Education	1.22
	4	Sewage, waste, and similar	1.42
	5	Government management	1.42
	6	Other industries	1.45
	7	Coal mining, crude oil and natural gas	1.48
	8	Transport	1.64
	9	Communication	1.64
	10	Individual services	1.65
	11	Food products, beverages, and tobacco	1.66
	12	Real estate, renting and services	1.67
	13	Other mining and quarrying	1.78
2%<X<3%	1	Wood processing and wood products	2.03
	2	Hotels and restaurants	2.06
	3	Fabricated metal products	2.13
	4	Electricity production and distribution	2.19
	5	Metallurgical industry	2.26
	6	Construction	2.27
	7	Recreation, entertainment, culture, and sport	2.30
	8	Fuel, chemicals, rubber, plastic	2.35
	9	Other non-metal mineral products	2.37
	10	Collection, purification and distribution of water	2.37
	11	Vehicle trade, maintenance, and repair	2.45
	12	Machinery and equipment	2.48
	13	Mining of metal ores	2.97
3%<X<4%	1	Pulp and paper production, publishing	3.70
4%<X<5%	1	Gas production and distribution	4.86
	2	Steam and hot water supply	4.98

Also the indirect tax structure by sector was determined by sorting them from the largest to smallest and presented in the table 3.7.

Table 3.7. Structure of indirect tax by sector

<i>Rank</i>	<i>Sector</i>	<i>Tax, USD mil.</i>	<i>% of total</i>	<i>Output USD mil.</i>	<i>% of total</i>
1	Metallurgical industry	24.8	17.0	1095.9	11.0
2	Construction	21.4	14.7	942.7	9.4
3	Agriculture, hunting, and forestry	18.1	12.4	2592.6	25.9
4	Retail trade	11.1	7.6	1055.4	10.6
5	Food products, beverages, and tobacco	9.0	6.2	545.3	5.5
6	Transport	7.7	5.3	469.4	4.7
7	Real estate, renting and services	6.2	4.2	368.8	3.7
8	Communication	6.1	4.2	371.4	3.7
9	Government management	6.0	4.1	418.3	4.2
10	Electricity production and distribution	4.1	2.8	185.1	1.9
11	Hotels and restaurants	3.6	2.5	176.9	1.8
12	Education	3.5	2.4	286.9	2.9
13	Other non-metal mineral products	3.1	2.1	130.3	1.3
14	Recreation, entertainment, culture, and sport	2.8	1.9	120.8	1.2
15	Fuel, chemicals, rubber, plastic	2.3	1.6	97.7	1.0
16	Steam and hot water supply	2.2	1.5	43.8	0.4
17	Vehicle trade, maintenance, and repair	1.9	1.3	78.5	0.8
18	Wholesale trade and business through agents	1.9	1.3	182.8	1.8
19	Machinery and equipment	1.6	1.1	65.7	0.7
20	Health and social services	1.6	1.1	170.9	1.7
21	Gas production and distribution	1.1	0.8	23.1	0.2
22	Pulp and paper production, publishing	1.1	0.7	29.1	0.3
23	Textiles and leather	1.0	0.7	119.6	1.2
24	Financial activities	0.9	0.6	259.8	2.6
25	Individual services	0.8	0.6	48.9	0.5
26	Fabricated metal products	0.6	0.4	27.4	0.3
27	Coal mining, crude oil and natural gas	0.5	0.3	31.2	0.3
28	Collection, purification and distribution of water	0.3	0.2	13.8	0.1
29	Other industries	0.2	0.2	16.5	0.2
30	Other mining and quarrying	0.2	0.1	10.0	0.1
31	Wood processing and wood products	0.2	0.1	8.0	0.1
32	Mining of metal ores	0.1	0.1	3.8	0.04
33	Sewage, waste, and similar	0.1	0.04	3.7	0.04
34	Fishing and fish farming	0.003	0.002	0.3	0.003
	Total	145.8	100		100

Results of the analysis shown in Table 3.6 indicate that five sectors have the least share of VAT in their output (less than 1%), and three sectors have the most share (more than 3%). Four sectors among five with the least VAT share are exempted from the VAT: Financial activities; Agriculture, hunting, and forestry; Fishing and fish farming; Health and social services. That is the reason for their low VAT share in their total output. As for Textiles and leather sector there is no any obvious reason. However, one cause might be the inconsistency of the data in the initial IO-Table or the existence of a significant shadow economy in the Kyrgyz Republic. As for the three sectors with the highest VAT share we can conclude that they have very high levels of value added in their output.

Economic impact results for Scenario 1 and Scenario 2 are presented in the Tables 3.8 and 3.9, respectively. Discussion of the results follows the table of results.

Table 3.8. Economic impact analysis results for the Scenario 1

<i>Rank</i>	<i>Sector</i>	<i>effect</i>	<i>Rank</i>	<i>sector</i>	<i>effect</i>
		<i>>0</i>			<i><0</i>
1	Agriculture, hunting, and forestry	35.80	1	Fishing and fish farming	-0.01
2	Retail trade	12.79	2	Collection, purification and distribution of water	-0.02
3	Food products, beverages, and tobacco	9.27	3	Electricity production and distribution	-0.10
4	Transport	5.05	4	Pulp and paper production, publishing activity	-0.11
5	Textiles and leather	3.68	5	Steam and hot water supply	-0.55
6	Fuel, chemicals, rubber, plastic	3.58	6	Real estate, renting and services	-0.85
7	Communication	3.46	7	Recreation, entertainment, culture, and sport	-3.91
8	Construction	2.93	8	Health and social services	-12.28
9	Financial activities	2.54	9	Education	-17.42
10	Wholesale trade and business through agents	1.76	10	Government management	-33.07
11	Hotels and restaurants	1.54			
12	Metallurgical industry	1.09			
13	Machinery and equipment	0.95			
14	Vehicle trade, maintenance, and repair	0.71			
15	Gas production and distribution	0.68			
16	Other non-metal mineral products	0.63			
17	Fabricated metal products	0.50			
18	Individual services	0.47			
19	Coal mining, crude oil and natural gas	0.32			
20	Other industries	0.31			

21	Other mining and quarrying	0.20			
22	Wood processing and wood products	0.06			
23	Sewage, waste, and similar	0.01			
24	Mining of metal ores	0.003			
	Subtotal (positive)	88.35		Subtotal (negative)	-68.33
	Total			+20.02	

Table 3.9. Economic impact analysis results for the Scenario 2

<i>Rank</i>	<i>Sector</i>	<i>impact</i>	<i>Rank</i>	<i>sector</i>	<i>impact</i>
		>0			<0
1	Construction	26.35	1	Fishing and fish farming	-0.001
2	Machinery and equipment	14.79	2	Textiles and leather	-0.06
3	Communication	9.22	3	Steam and hot water supply	-0.19
4	Transport	7.84	4	Hotels and restaurants	-0.81
5	Other non-metal mineral products	7.50	5	Agriculture, hunting, and forestry	-1.49
6	Electricity production and distribution	5.43	6	Real estate, renting and services	-3.26
7	Financial activity	2.50	7	Recreation, entertainment, culture, and sport	-4.76
8	Retail trade	1.94	8	Health and social services	-12.48
9	Food products, beverages, and tobacco	1.34	9	Education	-18.25
10	Fuel, chemicals, rubber, plastic	0.97	10	Government management	-31.51
11	Wholesale trade and business through agents	0.79			
12	Coal mining, crude oil and natural gas	0.75			
13	Fabricated metal products	0.62			
14	Metallurgical industry	0.53			
15	Individual services	0.44			
16	Gas production and distribution	0.19			
17	Pulp and paper production, publishing activity	0.17			
18	Vehicle trade, maintenance, and repair	0.16			
19	Other industries	0.13			
20	Wood processing and wood products	0.08			
21	Other mining and quarrying	0.07			
22	Mining of metal ores	0.03			
23	Sewage, waste, and similar	0.03			
24	Collection, purification and distribution of water	0.002			
	Subtotal (positive)	81.88		Subtotal (negative)	-72.81
	Total			+9.07	

The results of the two simulations of the economic effects of reducing the VAT rate by half give indicate that the scenario with the model 3.3.3 can improve the Kyrgyz economy most because this model has the most positive effect adding USD 20.02 million to the total economy. The second scenario with the model 3.3.4 has less effect, with only USD 9.07 million added to the economy.

The results of simulations raise the question: why does consumption have a larger impact on the Kyrgyz economy than investment? The answer might be in the industrial structure of Kyrgyz economy, since the agriculture and food products sectors comprise nearly one- third (31.4%) of total output.

Conclusion

This study, on the basis of 2009 Kyrgyz Input-Output Table, accomplished the following:

- found the forward and backward linkages of Kyrgyz economic sectors
- found the economic sectors with the most and least output in 2009
- found the share of VAT in the total output of every sector
- made a simulation of the two scenarios with the twice VAT tax reduction

The Kyrgyz Input-Output Table for 2009 was published in 2011 and consists of 34 sectors. According to the results of the current analysis, the top 8 main sectors in the Kyrgyzstan in 2009 were Agriculture, hunting and forestry; Metallurgical industry; Construction; Manufacture of food products, beverages and tobacco; Financial activities; Hotels and restaurants; Other non-metallic mineral products; Textiles and textile products, leather, leather products and footwear.

The backward effect of Financial activities sector had the highest coefficient. The Kyrgyz finance sector has very specific and unique characteristics, but the monetary policy framework appears appropriate to the present stage of development of the Kyrgyz banking system.

VAT revenue of the Kyrgyz budget constitutes more than 30% of total tax revenues and the impact of the VAT is very important for the whole economy. Four sectors among five with the least VAT share are exempted from the VAT which is the reason for their low VAT share in their total output. Three sectors with the highest VAT share have very high levels of value added in their output.

The simulated scenario which allocated the extra money from the VAT reduction towards consumption indicated that this approach could improve the Kyrgyz economy most because this model has the most positive effect on the total economy. The reason why consumption has a larger impact on the Kyrgyz economy than investment might be found in the industrial structure of Kyrgyz economy, since the agriculture and food products sectors comprise nearly one-third of total output.

The results of this study can help Kyrgyz economic policymakers to decide which sectors need to be supported more or less and how decrease the tax burden of taxpayers in order to improve the efficiency of the whole economy. The government of the Kyrgyz Republic might consider reducing the VAT tax rate since consumers obviously will consume more which has positive impact on the economy. On the other hand it should monitor the sectoral structure of the budget expenditures in order to increase the effectiveness of governmental spending and compensate for lost revenues from the reduced VAT tax rate.

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