(a) A CGE Model and policy making for Uzbekistan: notes and examples

The research is based on using Computable General Equilibium (CGE) model for the Republic of Uzbekistan. The model was made in collaboration with Sergey Paltsev, Ph.D., Joint Program on Science & Policy of Global Change Massachusetts Institute of Technology Cambridge, Massachusetts and Miles K. Light, Ph.D.,Business Research Division University of Colorado Boulder, Colorado

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Abstract

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(c) CGE Model, Economic Impacts from Tax Reform, small open economy model, Uzbekistan-SOE model

The model represents Uzbekistan as a small open economy with 13 production sectors, 13 goods, and two factors of production. There is a single, representative agent that is endowed with the country's labor and capital, and that consumes the domestic output from producers in an optimal way.

Paper also analyses modeling examples such as: Economic Impacts from Tax Reform. Here the author demonstrated how the Uzbekistan-SOE model is used to determine the economic consequences of tax policy. It began with a scenario where VAT rates are set uniformly. Then it’s considered a scenario with a labor tax.

A CGE Model and policy making for Uzbekistan: notes and examples

A Simple CGE Model for Uzbekistan

The economic model presented here provides a foundation for future modeling efforts. It is a simple, yet complete, example of how the National Accounts can be converted into a CGE model. The model represents Uzbekistan as a small open economy with 13 production sectors, 13 goods, and two factors of production. There is a single representative agent that is endowed with the country's labor and capital, and that consumes the domestic output from producers in an optimal way. When prices rise for a particular good or service, the consumer shifts consumption towards less expensive substitutes. The model also includes a state government agent. The government agent imposes and collects taxes using 10 distinct tax instruments. Tax revenues are then used to produce a *government good*, represented by public administration, public education, public health care and other social services financed through taxation and public income. Finally, there is an *investment activity*, where materials are combined to produce an investment good. Investments typically use durable goods in combination with construction or building-type activities. The investment activity represents *Gross Fixed Capital Formation* from both private and public sources.

The model is consistent with the traditional Arrow-Debreu economy. It exhibits constant returns-to-scale technology and perfect competition across all modes of production. As a small open economy, Uzbekistan faces fixed prices for imports and exports. Producers in the model maximize profits and take prices as given, and consumers maximize utility subject to a budget constraint that is defined by: the value of their endowments, transfers from the government, and remittances from abroad.

These assumptions imply that no producer earns above-normal profits and that consumers cannot increase consumption of all goods. These are the basic concepts of economic scarcity and competition.

Following Mathiesen (1985) and Rutherford (1995) the model is formulated and solved as a complementarity problem with three types of equilibrium conditions: market clearance, zero profits, and income balance.[1] Production technology and consumer preferences are characterized by using the nested, constant-elasticity of substitution (CES) functional form.

The numerical equations are based upon the data derived from the 2005 Uzbek national accounts of the Ministry of Economy (UNDP, 2006). Detailed tax accounts are have been procured from various publications, such as the *Uzbekistan Statistical and Analytical Review* (CSER, 2006).

The Uzbek Economy and the Current CGE Dataset

This section presents the Uzbek economy, as seen through the lens of a CGE model. The data forensics come from the balanced Social Accounting Matrix (SAM) developed at the Ministry of Economy (MoE) and published in *shares form* by UNDP (2006). This SAM is itself based upon another dataset: the Input-Output Tables provided by the National Statistical Committee (NSC). Unfortunately, MoE and UNDP have not provided a description of sectoral composition in their SAM, therefore, in many cases we have to guess what industries compose 13 sectors of the MoE dataset.

While we review the economic indicators for Uzbekistan, some obvious and expected characteristics arise, but also some suprising and possibly incorrect statistics are highlighted to point out where there is room for improvement.

Output, Value-Added, and International Trade

Table 1 presents the numbers for total output (including production of intermediate goods used for production of other goods), percent of sectoral output in the total output, labor inputs, capital inputs, and final demand. All values are presented in billions of UZS. According to the provided SAM, two major sectors of the Uzbek economy in terms of total output are Oil, Gas, and Coal (OIL) and Agriculture (AGR). However, agriculture (AGR) and Apparel Textile and Food (LMN) have the largest shares in terms of final demand.

The data shows that 70 percent of Uzbekistan's economy is driven by the following sectors: resource based activity (OIL, MET: 29 percent of output, 5 percent of employment), agriculture (AGR: 14 percent of output, 40 percent of employment), light manufactures (LMN: 12 percent of output, 5 percent of employment), and public services (ministries, education, health, OTR: 12 percent of output, 24 percent of employment).

Table 1 also shows relative capital or labor intensities of the sectors, where OIL, LMN, MET, ELE, MAN, OMN, CMT, and PPR are capital-intensive industries, while AGR, TRN, and CON are labor-intensive industries. This information can be potentially important for sectoral responses when one considers changes in capital and labor taxes.

Table 2 provides the numbers for international trade activities in 2005, where MET and LMN sectors account for 65 percent of total exports, while the MAN sector accounts for 47 percent of total Uzbek imports. Another way to look at the international trade is to consider a share of sectoral exports and imports in the total sectoral supply. As one can see from Table 2, MET, LMN, and TRN sectors export more than 20 percent of their production. On the import side, MAN, PPR, CHM, and OMN sectors import more than 20 percent of Uzbek supply. These numbers are important for the scenarios on

international trade, as they hint what sectors can be gaining or losing substantially after a change in international trade regime. At the same time, sectors with large volumes of production but small shares of exports-imports can be affected by an increase in exports or imports due to a different tariff policy towards these sectors.

Tax and Tariff Revenues

In this section, we present the tax data available from UNDP (2006) and CSER (2006). Table 3 summarizes tax revenues from different instruments. UNDP refers to the data from the Ministry of Economy, while CSER refers to the data from the Ministry of Finance. Both reports the data as a share of GDP, so we have converted the numbers into billions of soums (bln. UZS) considering that GDP in 2005 is 15,210.6 bln. UZS. The tax TY includes the following taxes: Road tax, Payments to School Fund, Tax on gross income of trade and public catering enterprises, Unified Tax on micro-firms and small businesses, Fixed tax on income of legal entities and individuals engaged in enterpreneurial activity. The tax RS includes the following taxes: Property tax, Land tax, Natural resource tax, Water tax, Ecology tax.

UNDP and CSER data differ in several categories. First, total tax revenue in the UNDP publication is 31.0 percent of GDP, while CSER reports the tax revenue as 22.6 percent of GDP. Based on the shares provided by CSER, adding up revenues from all tax instruments gives 22.7 percent of GDP, a small difference likely due to a rounding error. However, there is a difference of 8.3-8.4 percent of GDP between total tax revenues in two publications.

Second, UNDP does not report any import tariffs and tax on individuals for consumption of gasoline, which are reported by CSER. On the other hand, CSER does not report Social Security contributions, Road tax, and Payments to the School Fund.

According to UNDP publication, Social Security contributions are 6.4 percent of GDP, Road Tax is 1.4 percent of GDP, and and Payments to the School Fund are 0.9 percent of GDP. Adding up these three categories results in 8.7 percent of GDP, which is a number close for to the difference in the total revenues reported in two publications.

Third, there is no information on some categories of taxes. Therefore, we have assumed that import tariffs and tax on individuals for consumption of gasoline are reported in Other Taxes on Goods (TO) category by UNDP. We have also included "Other revenues" reported by CSER into the TO category. All these assumptions are purely a speculation by the authors, we hope that local Uzbek experts will improve these assumptions for their policy analysis.

As a result of our assumptions and interactions with local experts, we constructed tax data, reported in the "Experts" column of Table 3. As the goal of our exersice was purely illustrative, we have conducted our analysis with the "Expert" tax data. The Tax on social infrastructure development (SIT) was eliminated in 2006, therefore, we did not consider it in our analysis. We also have some doubts about the data on Social Security contributions (SS). Social Security contributions are set at 25 percent of payments for labor. UNDP report that net salaries in Uzbekistan were 2,987 billions UZS, 25 percent of that number equals to 747 billions UZS. Even though the Social Security contributions make distortions in the Uzbek economy, we have not considered a chane in SS tax, because these payments are related to current pensions. Reforming pension system and changing social security contributions is an interesting project for a quantitative analysis. It deserves an attention, but it lies beyond the scope of the current paper. In section 5.4 we conduct a sensitivity analysis and report the results where we make alternative assumptions about the initial tax data.

There is a difference between *statutory* and *collected* tax rates. Table 4 provides an example of sectoral collections of a tax instrument - VAT, where a statutory rate is 20 percent for most of the sectors. One can see that the *collected* rates are not uniform across sectors with the highest rate in *TRN* sector, and the lowest rate in *MET* and *AGR*.

Table 5 presents sectoral tax collections by direct taxes (TL, SS, TK, TY, RS) and indirect taxes (VAT, TXS, TM), net output by sector (i.e., sectoral gross output reported in Table 1 minus sectoral tax payments), and implicit tax rate (i.e., tax payments divided by net output). The data show that 70 percent of the total tax revenue is collected from the following four sectors: TRN, OIL, MET, LMN. The implicit tax rates vary substantially among sectors, with the rates more than 20 percent in TRN, OMN, MET sectors, and less than 2 percent in AGR, PPR sectors. Table 5 also show the sectors that rely mostly on direct taxes (MET, OTR, AGR), and sectors that rely mostly on indirect taxes (TRN, LMN, MAN).

Model Examples: Tax Reform

This section demonstrates how the Uzbekistan-SOE model is used to determine the economic consequences of tax policy. We begin with a scenario where VAT rates are set uniformly. Then we consider a scenario with a labor tax.

Experiment #1: Uniform VAT Exercise

In this scenario, VAT rates are set uniformly, and the average rate is scaled until a pre-determined tax-revenue target is met. In the model, any combination of the ten tax streams can be adjusted to meet the revenue target. General results are presented in Table 6.

The main effect here is that a lower, uniform VAT significantly lowers the price of consumption. The lower CPI translates into higher consumption and welfare. As a

result of the lower CPI, *real* GDP increases (1.3% from the lower price, and 0.8% from higher nominal earnings). The end result translates into a 2.1% increase in real GDP. This effect is dramatic particularly because the VAT collection rates are highly-disparate. VAT is collected in the formal sector, but not in the informal sector. Next, we look at tax collections presented in Table 7.

The main thing to notice here is the VAT – where revenues fall by 111.8 billion UZS. This is to be expected, as tax-rates for some consumption goods fall significantly (remember that the VAT has uniform rates in this scenario). The surprising effect is the increase in TXS revenues. Excise (TXS) taxes are applied in the same place as VAT (final consumption), and the demand response is recovering a lot of the lost VAT revenues. Other tax streams also compensate for lower VAT revenues, until total revenues are almost the same.

The secondary effect upon other, unrelated taxes, is called the TAX-INTERACTION effect. Finally, we consider sectoral production changes presented in Tables 8-9. The results are indicative of the underlying data.

Experiment #2: Labor Taxation

Due to high labor tax (*TL*) and social security tax (*SS*), many private employers prefer to pay using cash, rather than official payments. These cash transactions are not reported in official GDP statistics. The under-reporting of labor earnings creates a "downwardly-biased" estimate of true GDP.

In this scenario we consider a reduction in formal labor tax rates from the existing (average) collected rate of 20% to a much lower average rate of 13%. These lower taxes encourage workers and businesses to shift away from cash payments and informal labor, toward registered employment. If labor and social taxes are low enough

for employers they will find it advantageous to employ workers formally in order to deduct their labor expenses from total net income. On the margin, workers will choose employment in the formal sector if their after-tax wage rises compared to wages in the informal sector. The following two tables describe the net effect of this experiment.

Table 10 shows the macroeconomic changes elicited by lower labor taxes. Although the total change in GDP is not enormous, it masks the fact that there has been a shift between formal and informal employment – this shift in employment should, in fact, appear as a more dramatic increase in the official statistics.

Table 11 shows the formal and informal employment choice for each sector. The figures in this experiment are not precise because the original *formal/informal* employment levels were not available to the authors. In general, agriculture and subsistence activities tend to hire more informal labor, whereas telecommunications, government and education hire formal employees almost exclusively. In these scenarios, the formal/informal split was assumed to be 50% for all sectors. However, it is still useful to identify those sectors where formal employment increases most.

Those sectors where labor taxation is enforced benefit from this tax reform, whereas more informal sectors (AGR) suffer from higher net wages, but don't benefit from lower labor taxes because they didn't pay these taxes in the first place. Therefore, we see gains in formalized sectors such as transportation and communications, metals mining, and electricity production, and we see net losses in agriculture.

Table 11 can be decomposed in an interesting way. The net change in formal labor demand can be distinguished between those households who have transferred from the informal sector and those households who are entering the labor market altogether. The column labeled SUBSTITUTION EFFECT lists the wages that have shifted

away from the informal sector, into the formal sector. This value is positive for all sectors except agriculture. It is even positive for sectors that decline as a result of the tax-reform. This means that although overall activity is falling, employment in the formal sector is increasing. This is the case for the Transportation and Communication sector, where 83 billion in informal wages are shifted into formal wages, but where 38.8 billion Soums worth of employment is released. There is a net positive effect upon formal sector employment of 44.5 billion Soums.

Experiment #3: A Change in Tax Rates

In this section we report the results from a simple exercise of changing existing tax rates. This scenario is developed to illustrate that the model can be used for an exercise, where tax rates can be changed one by one, or several tax rates together. We describe the adjustments necessary for such experiments in Appendix C.

Table 12 presents the results for a scenario, where we have eliminated output taxes *TY* in *ELE* sector (*TY("ELE") = 0;*). As an alternative scenario, we have reduced capital tax rate *TK* in every sector by 20 percent (*TK(i) = 0.8*TK(i)*).

Sensitivity: Different assumptions regarding initial tax data

As mentioned in Section 4, there is some uncertainty about tax data. Therefore, in this section we show how sensitive the results are to the alternative assumptions about the initial tax data. Table 13 presents an alternative assumption about the data. In the column "Alternative" we have based our guess on UNDP (2006) tax data provided in Table 3, with exception of the omitted *TO* and *SIT* taxes. Table 14 shows the results of Experiment #1 performed with "Alternative" tax data.

[1]All CGE models formulated using MPSGE use the Mathiesen-Rutherford approach, where economic duality theory is incorporated into the market conditions.

Tables and figures

Table 1. Economic activity (Billions of Soum)

		TOTAL OUTPUT	OUTPUT (%)	LABOR INPUTS	CAPITAL INPUTS	FINAL DEMAND
OIL	Oil Gas and Coal	6,531	18.7	97	1,940	244
AGR	Agriculture	4,927	14.1	2,606	656	2,215
LMN	Apparel Textile and Food	4,313	12.4	211	844	2,389
OTR	Other industries	4,289	12.3	1,531	1,265	898
MET	Ferrous & Non-Ferrous Metallurgy	3,569	10.2	209	583	1
TRN	Transport & Communications	2,295	6.6	970	207	550
ELE	Electricity	2,193	6.3	124	382	102
MAN	Manufactures & Metal Processing	1,849	5.3	120	312	278
CON	Construction	1,833	5.3	469	192	25
OMN	Other manufacturing	1,024	2.9	77	130	708
CMT	Construction Materials	1,016	2.9	51	314	3
CHM	Chemicals	812	2.3	75	97	116
PPR	Forestry & Paper Products	260	0.7	8	89	31
	TOTAL	34,911	100.0	6,550	7,011	7,559
	TOTAL (MLN. US DOLLAR)	29,092		5,458	5,841	6,299

Table 2. Basic International Trade Statistics (Billions of Soum)

		VOLUMES		SHARES (%)*	
		EXPORT	*IMPORT*	*EXPORT*	*IMPORT*
MET	Ferrous & Non-Ferrous Metallurgy	2,254.6	441.1	38.7	11.0
LMN	Apparel Textile and Food	1,685.8	430.5	28.1	9.1
TRN	Transport & Communications	781.0	333.3	25.4	12.7
OIL	Oil Gas and Coal	571.8	97.6	8.1	1.5
MAN	Manufactures & Metal Processing	374.6	2134.4	16.8	53.6
CHM	Chemicals	111.2	422.3	12.0	34.2
AGR	Agriculture	82.0	60.7	1.6	1.2
OTR	Other industries	74.3	113.4	1.7	2.6
OMN	Other manufacturing	36.6	259.2	3.5	20.2
CMT	Construction Materials	33.3	64.6	3.2	6.0
ELE	Electricity	20.0	21.4	0.9	1.0
PPR	Forestry & Paper Products	5.8	162.0	2.2	38.4
CON	Construction	4.3	15.6	0.2	0.8
	TOTAL	6,035.3	4,556.0	14.7	11.5

Notes:

* EXPORT share equals the ratio of exports to total Uzbek production (exports + domestic). Calculated as: $\frac{X^0}{(X^0+D^0)}$.

* IMPORT share equals the ratio of imports to total Uzbek supply (imports + domestic). Calculated as: $\frac{M^0}{(M^0+D^0)}$.

Table 3. Tax Revenue Data

		UNDP		CSER		EXPERTS	
		%-GDP	*BLN.UZS*	*%-GDP*	*BLN.UZS*	*%-GDP*	*BLN.UZS*
TL	Labor Tax	2.9	434.4	2.9	435.2	2.9	435.2
SS	Social Security Tax	6.4	980.6	n.a	n.a.	1.1	167.3
TK	Corporate Income Tax	1.8	281.3	1.9	282.1	1.9	282.1
TY	Output (Production) Taxes	3.7	561.1	1.4	210.6	1.1	165.2
RS	Resource and Property Taxes	4.6	692.8	4.6	699.7	4.6	699.7
SIT	Infrastructure Tax	0.4	61.2	0.4	60.8	0.0	0.0
VAT	Value Added Tax	5.4	814.8	5.4	816.1	5.4	816.1
TXS	Excise Tax	3.9	600.2	4.0	602.1	4.4	672.4
TO	Other Taxes on Goods	1.9	284.7	1.6	237.6	0.0	0.0
TM	Import Tariffs	n.a	n.a	0.7	108.6	0.7	108.6
TOTAL	Total Tax Revenue	31.0	4,711.2	22.7	3,452.8	22.0	3,346.5

Table 4. VAT Collections, Tax Base, and Collected Tax Rate – Distinguished by Sector

		VAT		
		BASE	*REVENUE*	*RATE*
ELE	Electricity	2,173.0	55.8	2.6
OIL	Oil Gas and Coal	5,958.9	213.6	3.6
MET	Ferrous & Non-Ferrous Metallurgy	1,314.8	2.6	0.2
CHM	Chemicals	700.6	10.6	1.5
MAN	Manufactures & Metal Processing	1,474.3	20.3	1.4
PPR	Forestry & Paper Products	254.4	1.3	0.5
CMT	Construction Materials	982.3	19.2	2.0
LMN	Apparel Textile and Food	2,627.5	96.8	3.7
OMN	Other manufacturing	987.1	75.5	7.6
AGR	Agriculture	4,845.3	3.4	0.2
TRN	Transport & Communications	1,513.9	220.2	14.5
CON	Construction	1,828.7	48.6	2.7
OTR	Other industries	4,214.7	48.4	1.1
TOTAL	Total	28,875.6	816.1	2.8

Table 5. Tax Revenue by Sector (UZS Billions)

		Total Taxes	Direct Taxes	Indirect Taxes	Net Output	Implicit Rate (%)
TRN	Transport & Communications	729.9	170.1	559.7	1,565	46.6
OIL	Oil Gas and Coal	691.7	312.7	379.0	5,839	11.8
MET	Ferrous & Non-Ferrous Metallurgy	598.2	588.3	9.8	2,971	20.1
LMN	Apparel Textile and Food	318.7	74.6	244.1	3,995	8.0
OTR	Other industries	240.4	183.7	56.7	4,049	5.9
OMN	Other manufacturing	188.9	92.4	96.5	835	22.6
ELE	Electricity	135.1	75.3	59.8	2,058	6.6
MAN	Manufactures & Metal Processing	130.7	37.7	92.9	1,718	7.6
CON	Construction	128.4	76.7	51.7	1,705	7.5
AGR	Agriculture	85.1	76.8	8.4	4,842	1.8
CMT	Construction Materials	52.6	30.6	22.0	963	5.5
CHM	Chemicals	43.1	28.8	14.3	769	5.6
PPR	Forestry & Paper Products	3.8	1.6	2.1	256	1.5
	TOTAL	3,346.5	1,749.4	1,597.1	31,564	10.6

Table 6. Macroeconomic Impacts of Uniform VAT Experiment

	ORIGINAL	SCENARIO	(% CHANGE)
VAT Rate	20%	13.1%	
Real GDP	15,111.1	15,428.4	2.1
Household Welfare	100.0	101.3	1.3
Gross Output	34,910.9	35,636.9	2.1
Consumer Price Index	100.0	98.7	-1.3
Tax Revenues	3,346.5	3,362.8	0.5

Table 7. Nominal Tax Revenue Impacts (Billions of Soums)

		UNIFORM	ORIGINAL	CHANGE
TY	Output (production) taxes	165.8	165.2	0.7
RS	Resource and Property Taxes	709.2	699.7	9.5
TL	Labor Tax	442.7	435.2	7.5
SS	Social Security Tax	168.5	167.3	1.2
TK	Corporate Income Taxes	288.6	282.1	6.6
TM	Import Tariffs	108.8	108.6	0.2
VAT	VAT	704.3	816.1	-111.8
TXS	Excise Tax	774.9	672.4	102.6
TOTAL	Total	3,362.8	3,346.5	16.3

Table 8. Change in production in *real* terms

		BASE	SCEN	DIFF	%
TRN	Transport & Communications	2,294.9	2,420.7	125.8	5.5
CMT	Construction Materials	1,015.6	1,040.2	24.6	2.4
OIL	Oil Gas and Coal	6,530.7	6,729.4	198.7	3.0
ELE	Electricity	2,193.0	2,236.4	43.6	2.0
CON	Construction	1,833.1	1,859.9	26.8	1.5
MET	Ferrous & Non-Ferrous Metallurgy	3,569.4	3,575.6	6.2	0.2
CHM	Chemicals	811.8	804.7	-7.1	-0.9
MAN	Manufactures & Metal Processing	1,848.9	1,846.5	-2.4	-0.1
PPR	Forestry & Paper Products	260.2	255.5	-4.7	-1.8
OMN	Other manufacturing	1,023.7	1,005.2	-18.5	-1.8
OTR	Other industries	4,289.0	4,244.9	-44.2	-1.0
AGR	Agriculture	4,927.3	4,853.4	-73.9	-1.5
LMN	Apparel Textile and Food	4,313.3	4,096.0	-217.3	-5.0

Table 9. Change in production in *nominal* terms

		BASE	SCEN	DIFF	%
TRN	Transport & Communications	2,294.9	2,464.5	169.6	7.4
CMT	Construction Materials	1,015.6	1,061.0	45.4	4.5
OIL	Oil Gas and Coal	6,530.7	6,864.7	334.0	5.1
ELE	Electricity	2,193.0	2,281.1	88.1	4.0
CON	Construction	1,833.1	1,894.8	61.8	3.4
MET	Ferrous & Non-Ferrous Metallurgy	3,569.4	3,646.4	77.0	2.2
CHM	Chemicals	811.8	820.5	8.6	1.1
MAN	Manufactures & Metal Processing	1,848.9	1,882.6	33.7	1.8
PPR	Forestry & Paper Products	260.2	260.5	0.4	0.1
OMN	Other manufacturing	1,023.7	1,024.3	0.6	0.1
OTR	Other industries	4,289.0	4,323.5	34.5	0.8
AGR	Agriculture	4,927.3	4,939.8	12.6	0.3
LMN	Apparel Textile and Food	4,313.3	4,173.1	-140.2	-3.3

Table 10. Macroeconomic Impacts of Uniform Labor Tax Experiment (Billion Soums)

	ORIGINAL	SCENARIO	CHANGE (%)
Average Labor Tax Rate	20%	13.1%	
Real GDP	15,111.1	15,173.2	0.4
Household Welfare	100.0	101.2	1.2
Gross Output	34,910.9	35,025.3	0.3
Consumer Price Index	100.0	98.9	-1.1
Tax Revenues	3,346.5	3,287.9	-1.8

Table 11. Formal Labor Demand with Lower Labor Taxes (Billion Soums)

	Description	Initial Demand	Scenario Demand	Net Change	Substitution Effect	New Entrants
TRN	Transport & Communications	970.4	1,014.9	44.5	83.3	-38.8
OIL	Oil Gas & Coal	96.8	146.3	49.4	34.0	15.4
MET	Ferrous & Non-Ferrous Metals	209.2	383.3	174.1	81.0	93.1
LMN	Apparel Textile & Food	211.5	217.8	6.4	28.9	-22.5
OTR	Other industries	1,531.1	1,540.6	9.4	2.5	7.0
OMN	Other manufacturing	77.4	96.2	18.8	17.4	1.4
ELE	Electricity	124.4	171.8	47.4	34.4	13.0
MAN	Manufacturing	119.5	153.0	33.5	27.5	6.0
CON	Construction	469.4	509.3	39.9	42.0	-2.1
AGR	Agriculture	2,606.5	2,471.7	-134.8	-67.9	-66.9
CMT	Construction Materials	50.6	70.5	19.9	15.9	4.0
CHM	Chemicals	75.3	98.8	23.6	20.6	3.0
PPR	Forestry & Paper Products	7.7	8.1	0.4	0.8	-0.4
	TOTAL	6,549.7	6,882.2	332.5	320.3	12.2

Notes:

1. *Substitution Effect*: Workers who switch away from informal labor supply to formal labor supply.

2. *New Entrants:* New workers who decide to enter the labor force as a result of higher net-of-tax wages.

Table 12. Change in production in *real* terms from Experiment #3

		BASE	TY CHANGE		TK CHANGE	
		OUTPUT	OUTPUT	% DIFF	OUTPUT	% DIFF
TRN	Transport & Communications	2,294.9	2,293.2	-1.7	2,348.6	2.3
OIL	Oil Gas and Coal	6,530.7	6,533.4	0.0	6,539.8	0.1
MET	Ferrous & Non-Ferrous Metallurgy	3,569.4	3,577.3	0.2	3,537.2	-0.9
LMN	Apparel Textile and Food	4,313.3	4,310.8	-0.1	4,304.0	-0.2
OTR	Other industries	4,289.0	4,286.5	-0.1	4,251.8	-0.9
OMN	Other manufacturing	1,023.7	1,023.8	0.0	1,032.7	0.9
ELE	Electricity	2,193.0	2,195.1	0.1	2,194.1	0.0
CON	Construction	1,833.1	1,833.1	0.0	1,833.3	0.0
MAN	Manufactures & Metal Processing	1,848.9	1,848.4	-0.6	1,839.4	-0.5
AGR	Agriculture	4,927.3	4,927.0	0.0	4,932.3	0.1
CMT	Construction Materials	1,015.6	1,015.6	0.0	1,017.9	0.2
CHM	Chemicals	811.8	813.8	2.0	814.0	0.3
PPR	Forestry & Paper Products	260.2	260.1	-0.1	259.5	-0.3

Table 13. Tax Revenue Data

		ALTERNATIVE		EXPERTS	
		% GDP	*BLN.UZS*	*% GDP*	*BLN.UZS*
TL	Labor Tax	2.9	434.4	2.9	435.2
SS	Social Security Tax	6.4	980.6	1.1	167.3
TK	Corporate Income Tax	1.8	281.3	1.9	282.1
TY	Output (Production) Taxes	3.7	561.1	1.1	165.2
RS	Resource and Property Taxes	4.6	692.8	4.6	699.7
SIT	Infrastructure Tax	0.0	0.0	0.0	0.0
VAT	Value Added Tax	5.4	814.8	5.4	816.1
TXS	Excise Tax	3.9	600.2	4.4	672.4
TO	Other Taxes on Goods	0.0	0.0	0.0	0.0
TM	Import Tariffs	0.0	0.2	0.7	108.6
TOTAL	Total Tax Revenue	28.7	4,365.6	22.0	3,346.5

Table 14. Macroeconomic Impacts (% Change) with Alternative Assumptions about Initial Tax Data

	EXPERIMENT#1	
	ALTERNATIVE	*EXPERT*
Real GDP	2.1	2.1
Household Welfare	1.4	1.3
Gross Output	2.1	2.1
Consumer Price Index	-1.4	-1.3
Tax Revenues	0.5	0.5

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