JTSR (2016) 23: 33-36
DOI 10.14665/1614-4007-23-2-004

PAPER

Tax Policy Impact Analysis. The Armenian Case

Simonyan Vardan M.

Abstract Optimal management of a state budget is one of the cornerstones for every country on their path of prosperity. For most countries the major element of state income are taxes. The taxation allows redistributing income flows between different economic subjects within the country. Taxation models may differ from country to country. It depends on the particular economic structure of the particular state. For instance, some countries apply lower tax rates which allow them to have higher incomes for economics subjects, including firms and households. As a result, the government expenditures in the form of subsidies and direct transfer may decrease. The result may be a higher variance for income distribution between the populations. Another model, more socialistic one, looks totally different – higher taxes applied in the country result in higher social assistance from the government, which may cause equal social-economic structure. Thus, it is an object of analysis for every country what tax policy to apply. In addition, in long term, this policy may face some modifications. Therefore, it is very important to analyze how changes in that policy will affect the economy.

Keywords Taxation - Tax policy - Microeconomics - General equilibrium model - Social Accounting Matrix

JEL Classification D57

When applying a certain policy, governments often not only need to estimate its influence on large aggregated segments of the economy, but also have to disaggregate some of them into smaller groups. Otherwise the results of the analysis cannot be significant and the policy may lead to unpredicted and unwanted effects. When we consider tax reforms, regardless of how they are applied, households will necessarily be affected. In this case, the presence of inequality in social welfare raises the question of behavioral diversity among different groups of households.

The most convenient and effective method to solve this problem is the construction of a general equilibrium model. This approach is based on neoclassical concepts of rationality, market clearing and rational expectations.[1] Economists such as Ysidro Edgeworth, Leon Walras and Vilfredo Pareto had decisive impact on defining the concept of general equilibrium. Later, Kenneth Arrow and Gerard Debreu appeared to be the first who formalized the theory of general equilibrium into economic-mathematical model called Computable General Equilibrium (CGE) model.[2]

1 Andreu Mas-Colell- "Microeconomic Theory"
2 John Geanakoplos - "Arrow-Debreu Model of General Equilibrium"

Simonyan Vardan M. (✉)
Russian-Armenian (Slavonic) University, Yerevan, Armenia
Email: varsim@gmail.com

The model comprehensively analyzes the influence of economic changes on the economic segments that are included (e.g. households, industries). Each subject in the model is rational and is aimed to solve its own optimization problem. For firms it will be profit maximization, for households – utility maximization. This brings the whole economy to the equilibrium point – no excess demand for a good. When an economic reform is carried out, it will naturally affect the optimization process of all segments of the economy. Consequently, this will change solutions of their optimization problems and a new equilibrium point will be established. Thus, making a simulation and analyzing the shift of the equilibrium point will allow to conclude how the reforms affect the economy.

CGE is widely used by such organizations as International Monetary Fund (IMF), World Bank (WB), OECD and others. In this paper, we will apply the model to the Armenian case. The Republic of Armenia (RA), being a member of the Eurasian Tax Union (ETU), must increase its import tariff ratios in a defined way for the third party countries that are not included in the Union.[3] Now let us try to estimate how this change will affect the inner social-economic situation of Armenia.

Because the official tariff change data is given in the Harmonized System (HS) classification, and the CGE model uses NACE classification of goods, we first classify all the imported goods of Armenia by NACE1. There are 5 major sectors of NACE which include all the imported flows: Sector A - agriculture and fishing, Sector C – Mining, Sector D – manufacturing, Sector E – Utilities (incl. natural gas, water supply, electrical energy) and Sector "Others". Thus, having the tariff change data in HS classification and the values of imports of Armenia in HS[4], we can calculate the increase of imported goods prices in NACE 1 classification. For that, we calculate the weighted average increase in price of each of the given five major NACE sectors (A, C, D, E and "Other").

Table 1

Name	Description	Import Price Index
SectorA	Agriculture and fishing	5,7%
Sector C	Mining	10%
Sector D	Manufacturing	6,3%
Sector E	Utilities (incl. natural gas, water supply, electrical energy)	2,6%
Other		0,06%

Now, when we have the actual import price changes of NACE 1 sectors, we are able to run the proper simulation in the CGE model. The model uses the algorithm of so-called Mixed Complementarity Problem (MCP), which considers the standard economy of Arrow-Debrew with **n** goods, **m** sectors and **h** institutions with its equilibrium conditions. [1]

As a result, the problem of MCP looks as the following:
Given: $f: Rn \rightarrow Rn$
Get: $z \epsilon Rn$
Such that: $f(z) \geq 0, z \geq 0, zT * f(z) = 0.$

3 http://www.eurasiancommission.org/ru/act/trade/catr/ett/Pages/default.aspx
4 http://www.intracen.org/itc/market-info- tools/trade-statistics/

The solution of the problem $z = [y, p, M]$ and $f(z) = [\Pi_j(p),\xi_i,(\Sigma_h p_i b_{ih}-\Sigma_h p_i d_{ih})]$ is the equilibrium point we are looking for. [4]

Our CGE model is based on Social Accounting Matrix (SAM), constructed from the input-output table of RA of 2006 year (the latest possible year). Therefore, the output of this model may most probably be deviated from an output of a model with an updated SAM. Below the results of the simulation, featuring the increase of the import goods tariffs (as shown in the table 1), are presented. In each row, we can see sectors listed in terms of NACE 1[5] and their representative outputs of the model.

Table 2

NACE 1 Sectors	Perc, used as production (%)	Changein prod (%)	Change in prod (abs. v.)
SectorA	14.9	-0.9	-8940.33
SectorB	14.9	-1.3	-372.46
Sector C	45.2	-2.3	-4443.15
Sector D	48.2	-2.8	-23648.6
Sector E	50.5	-0.3	-751.146
Sector F	15.8	-0.1	-433.209
Sector G	4	0.9	21625.39
Sector H	48.5	-10	-8172.17
Sector I	11.5	-1.9	-7689.42
Sector J	4	-0.8	-2101.57
Sector K	2.2	-0.8	-1233.2
Sector L	0.3	22.5	38696.23
Sector M	17.4	4.4	1975.974
Sector N	0	1.8	794.4534
Sector O	0	1	198.583
Sector P	0	-0.9	-18

As we can see from the Table 2, the impact is heavily negative. This happens because a certain amount of the imported goods that are more costly for the Armenian domestic market, are used not only by households as a final consumption, but also by producers as intermediate consumption. As a result in the sectors with the highest amount of usage of the imported goods, the decrease in production has the highest values. This is caused by the highly increased producer's cost and, consequently, the final prices for the goods.

To conclude, we can state that Armenia is highly sensitive to an increase in import tariffs. It is explained by the fact, that Armenian import is 30.6% of the country's GDP. Therefore, such a strict reform of the tariff regime may cause a shock therapy to the Republic's social-economic situation. Surely, the results are not the perfect representation of what will happen; because the model has its assumption, restrictions, and the data itself is not perfect (input-output table has not

5 http://ec.europa.eu/eurostat/documents/1965800/1978839/NACEREV.2INTRODUCTORYGUIDELINESEN.pdf/f48c8a50-feb1-4227-8fe0-935b58a0a332

been updated since 2006 and in the model the outdated structure is used). However, the results of the simulation clearly worn us of the incoming risks, and additional treaties, such as bilateral agreements and temporal exceptionsfor some goods' tariff rates, may become helpful.

References

Lofgren H, Harris R, Robinson S (2002) A Standard Computable General Equilibrium (CGE) Models. Model in GAMS.

Breisinger C, Thomas M, Thurlow J (2010) Social Accounting Matrices and Multiplier Analysis. An Introduction with Exercises // Food Security in Practice.

Brooke T, Kendrick D, Meeraus A (1984) GAMS: A User's Guide // Scientific Press, South San Francisco.

Rutherford T (1995) Extensions of GAMS for complementarity problems arising in applied economic analysis // Journal of Economic Dynamics and Control 19: pp. 1299-1374.

Lau M, Pahlke A, Rutherford T (1997) Modeling Economic Adjustment: A Primer in Dynamic General Equilibrium Analysis.