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International School of Economics
at Tbilisi State University

Opening the Russian Market: A CGE Approach

Author: Irma Lapiashvili

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I.   Introduction

In Georgia, the year of 2006 was the year of changes in the economic and political arena: tense political relations with the Russian Federation provoked the northern neighbor to set the sanctions on Georgian products. The loss of the most forceful markets induced Georgia to initiate the range of policy reforms, legislation changes and modifications of various institutions in order to find new trade partners, and to expand collaboration with existing ones. These alterations were expected to recover the economy and generate stable growth. With regards to the 2012 year's parliamentary elections, Georgian relations with Russia are expected to recover. Therefore, it can be rational to wait for the improved collaboration between the countries that could be followed by embargo cancellation. Sanction abolishment can impinge Georgian economy significantly: affect its growth rate, productivity, welfare and unemployment.

In order to analyze the effect of Russian embargo abolishment on Georgian economy, I employee Computable General Equilibrium (CGE) model. The data that is used for the model analysis is arranged in the Social Accounting Matrix (SAM) and the information for SAM is taken from the Georgian National Statistic Department's supply table for the year 2011.

This paper analyzes three potential trade policies that may be employed between two countries after the sanction is abolished. First one accounts for the distortions in the economy if Russia allows trade with agricultural production between Georgia and itself. The second scenario analyzes the agreement, according to which the northern neighbor will abolish the restrictions on all Georgian products and decrease the non-tariff barriers between the two country; while the last counterfactual analysis studies the possible free trade agreement between Georgia and Russia and assumes the omission of all trade barriers. The analyses highlight the preferences that come in line with the trade liberalization policies. The plan of this thesis is as follows: Section II

reviews the Georgian trade policy and its history starting from the 1990s; section III analyzes existing literature on the trade liberalization and shows its preference over restricted trade regimes; section IV analyzes the data and methodology that I employee, while the *results* and limitations are revealed in the sections V and VI, respectively. Finally, conclusions are presented in the section VII.

II.   The case of Georgia

After collapse of the Soviet Union, Georgia declared its independence on April 9, 1991. In the adaptation process (in the beginning of nineties) Georgia was facing political, economic and institutional disturbances. The country was exposed to civil war, financial crisis and blockade of energy supplies from Russian side. After overcoming the threats, Georgian government started evolutionary reforms in order to explore market economy and support economic liberalization, stabilization and structural transformations. Economic liberalization involved price liberalization, eased government control and more open international trade. These reforms were aimed to elicit the hyperinflation, balance the economy and form the institutions. It is intriguing, how formally independent country, which was still under the pressure of Russian influence, managed to open up for trade with the world and liberalize economy to the condition it is now.

The first round of trade liberalization started in the beginning of nineties with gradual decrease of import tariffs in 1992-1996 and abolishment of quotas in 1995. In the same period country eased the restrictions on exports and shortened the list of restricted products to trade. Georgia's main achievement of 1990s was its involvement in structural changes in order to become the member of the World Trade Organization (WTO). The precondition for membership was a large-scale trade liberalization that is why Georgia implemented reforms to harmonize its codex with

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WTO's legislation: the country abated import-export quotas, eased the registration for acquiring licenses and alleviated contract requisites. Under this reform, import tariffs were defined with 5% or 12% amount and export taxes were abandoned at all. These structural changes were successfully implemented and soon, in 2000 year, Georgia became a member of WTO.
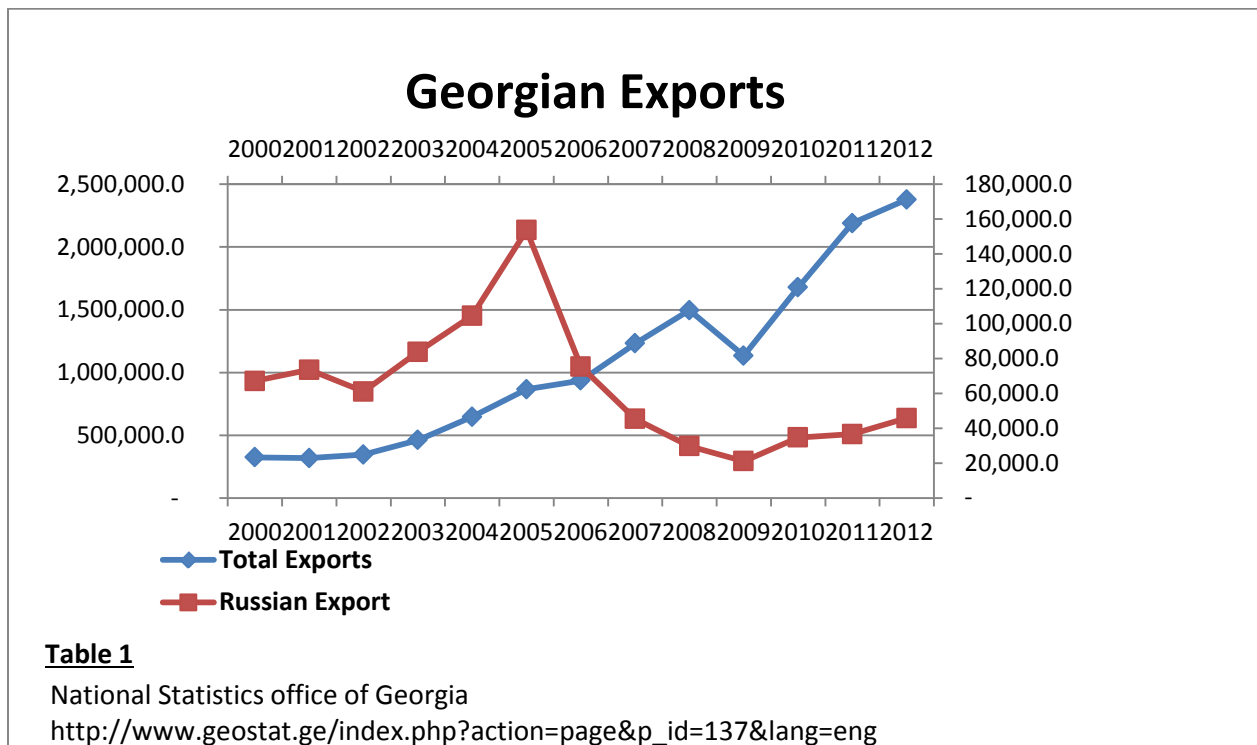
After the involvement in the WTO Georgia was charged to make further modifications and was obliged to get in line with the requirements of the unity. The reforms mainly disturbed the tariffs on the agricultural products. The effect on manufacturing outcome was less meaningful, and absolutely ineffective on other products. The membership of WTO supported Georgia to get the GSP beneficiary status and to have the privileged regime of trade with 148 countries of the world that was a significant step to the trade liberalization of Georgian economy.

The pattern of international trade began to change actively since the Rose Revolution, which took place in November 24, 2003 and was followed by the election of new government. One of the problems, which new administration was endowed with, was an expanding trade deficit. The actively increasing value of imports and much slower expansion in exports stimulated higher current account (CA) deficit. Georgia's main target became to increase the scale of international trade and, at the same time, decrease the trade deficit, in order to avoid potential macroeconomic risks.

In the period of 2003-2005 Russia stayed to be the leading trade partner for Georgia, but the embargo, which was exposed on Georgian products by our northern neighbor, diminished trade with Russia significantly. The reason for this sanction was more political, than economic. Russia was protesting Georgia's pro-western politics and refusing to hold negotiations with the president of government, Mikhail Saakashvili. The pressure started with sanction on agricultural product, wine and water. Russian Chief Inspector, Genadiy Onishchenko, announced that
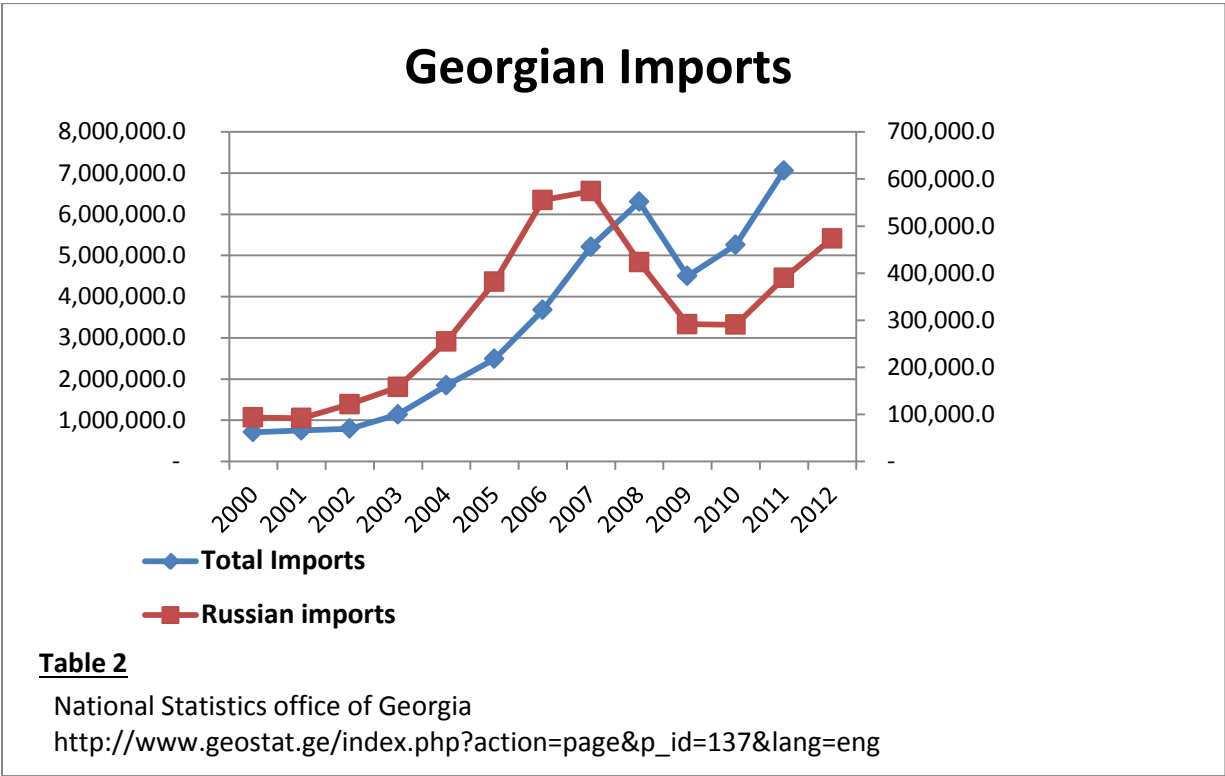
Georgian products were not satisfying sanitary norms and that government was prohibiting these products in Russian market. Later, Russia abolished airlines, railway and marine connections and also, declined the service of Posts between two countries.

Russia was the major importer of Georgian wine, mineral waters and agricultural products. Soon after the sanction, in 2008, Russia was not even mentioned in the list of top 5 exporters of Georgian products (See Table 1). In 2005 Russia exported wine from Georgia with the value of $65 million. That accounted almost 87% of total Georgian wine exports. In the same 2005 year, experts were anticipating a $100 million wine export for 2006. Russia was the primary partner in exporting Georgian mineral waters also. $25 million mineral water was supplied to Russia in 2005. The main exporter of mineral waters was "Borjomi", which traded 65% of its production to Russian market. If in 2005 Georgian Exports to Russia accounted $153 million, this value declined significantly since the sanction establishment and went down to $36 million in 2011 year.

Table 1
National Statistics office of Georgia
http://www.geostat.ge/index.php?action=page&p_id=137&lang=eng

Russia was a significant trade partner in terms of imports also and was the only importer of energy recourses in Georgia (See table 2). After the sanction the rise in prices of energy caused overall price expansion in Georgian economy. Gas prices increased from $65 per thousand cubic meters (tcm) in 2006 to $230 tcm in 2008. Georgia easily found the substitute for expensive gas imports and signed the agreement with Azerbaijan, which set gas price in range of $120-150 tcm for Georgia. Besides Russian pressing, Georgia managed to give credit lines to gas distribution companies also, in order to sustain the stable demand of gas in hard for country times. This policy helped the prices not to increase dramatically.

All in all, increased transportation costs and expanded energy prices encouraged a reduction in import values from Russia. Dramatic decline in imports was accounted in 2008 year. This reduction was promoted mostly by the Russia - Georgian war in the South Ossetia, when the import value from Russia decreased almost twice.

Table 2
National Statistics office of Georgia
http://www.geostat.ge/index.php?action=page&p_id=137&lang=eng

The sanction and consequent expansion of trade with Turkey and European Union brought Georgia to the new agreement GSP+, which was arming our country with more preferential terms of international trade. Georgia signed a Free Trade Agreement with Turkey on November 1, 2008. Due to the adjustments in the period of 2006-2008, the role of Russian market reconciled with Turkish, Ukrainian and Azerbaijan markets. Withal, Georgia increased the volume of trade with the USA. Even though the growth of trade seemed significantly high (about 20% per year in period 2005-2011), the share of trade with the USA (from the total trade) still stayed extremely low (almost 3%). Overall, the total trade in the period of 2003-2010 accounted 5.2 times more than the trade in the period of 1992-2010. Nowadays, Georgia trades with 132 countries and is waiting for signing the Deep and Comprehensive Free Trade Agreement (DCFTA) with the European Union that will make trade with EU countries more liberalized.

This paper concentrates on potential distortion in international trade that may be caused by sanction abolishment on Georgian products by Russian Federation. The elections, which were held in Georgia on October 31, 2012, brought new political party into the government. Despite the fact that Mikhail Saakashvili is still the president, the new parliament managed to renew negotiations with Russian government. This may lead to absolute abolishment of Russian sanction and Georgia may reinstate its products into Russian market.

III.   Literature Review

As this thesis is targeted to discuss the consequences of trade reform on the economy, it would be intriguing to review the experience of other countries that adopted various trade policies in different periods of time. One should mention that starting from the Adam Smith's era, international trade has been perceived as an engine for economic growth and development. Some

economists were sharing this view. They believed that outward-oriented trade expands economy and encourages high production level. However, other economists claimed that in order to promote high growth rate, a country should adopt trade restrictive policies and implement inward-oriented trade.

In the first half of the 20th century, countries started adopting Protectionist policies. The policy was developed in the USA in the 1930 and was perceived as a tool for economic development. Protectionism was a restrictive policy that used import tariffs and quotas in order to prevent economies from international trade and to support the import substitution regime. Authorities believed that, by using this approach, countries would decrease foreign spending and expand demand on domestic production. Moreover, economists claimed that this policy would help countries to accumulate foreign currency; As a result, the governments would become aware to repay the foreign debts and avoid the crisis. The long list of economies perceived protectionism theories as successful phenomenon and believed that developing countries should have targeted inward oriented trade.

The drawbacks of protectionism became obvious since Great depression (1929 - early 1940) and industrial countries started to moderate their trade policies to freer trade regimes. Countries realized that restrictions not only declined imports, but also led the domestic currencies to an appreciation. As a consequence of which, the barriers on exports increased also and deteriorated their value.

Statistical observations showed that open economies performed much better than the countries with Protectionist views. The economists found out, that more outward-oriented economies were more successful: exports were higher, domestic currency was more stable and economic growth was greater. These outcomes motivated the government of the USA to start a tariff cut in 1934.

Soon after the World War II almost all industrial countries followed the decline in trade barriers. This reduction was also supported by the General Agreement on Tariffs and Trade (GATT) - a multilateral and non discriminating agreement, signed in 1947. The debt crisis of 1982 persuaded even more economists, that the best strategy for the developing countries would be to open up borders and target on international trade. The reforms started to spread all over the world and it was even more deeply promoted by World Bank (WB) and international Monetary Fund (IMF) that insisted on trade openness for getting the financial support (Dorbusch, 1992).

In this part of the paper, I will review the literature that analyzes different trade regimes, its history, the opportunities that open up together with trade reforms, the threats and the benefits accompanied with the various policies, and the recommendations for the preferential policies derived by prominent economists.

a. Trade liberalization

As countries decided to shift from protectionism to more liberalized trade, they began adopting different trade regimes. In order to define, how trade liberalization affected the economy, firstly economists decided to examine the level of trade openness implemented by these various policies and to give a clear definition of trade liberalization. Most of the papers defined trade liberalization as the free trade agreements that were resulted from omission or reduction of the tariff and non-tariff barriers. Bhagwati (1978) described trade liberalization as "any policy that reduces the degree of anti-export bias" (Bhagwati, 1978). He employed the effective exchange rate (EER) index for imports and for exports to derive the export bias in different countries as a measure of trade liberalization:

B= E_m (1+t+n+PR) / E_x (1+s+r)

Where, E_m and E_x are exchange rates of imports and exports respectively; t and n stands for average tariffs and other fees imposed on imports; PR accounts for other restrictions on imports. Meantime, s stands for the subsidies on exports and r explains the incentives that promote exports (Bhagwati, 1988).

If the index of bias (B) was less than one, authors treated regime as export oriented; if the value of bias was more than one, they perceived the policy as import substitution policy; and if the ratio was equal to one, they accounted regime as neutral regime.

This definition of trade liberalization was highly criticized by economists. They believed that this ratio was not taking into account the magnitude of custom duties at all and even in case of high tariffs the policy could have been accounted as liberalized regime. Also, the opponents criticized the usage of average values as the components of the index, because these numbers were making the calculations inaccurate. Moreover, they claimed that the analyses were not considering the magnitude of the ratio at all as and that is why, the conclusions of the analysis were wrong. This criticism aside, the economists managed to characterize the trade regimes adopted by different countries and, respectively, discuss the preferences of one policy over another.

The further description of trade liberalization brought economists to distinguish between the free trade agreements (FTA), preferential agreements (PTA) and custom unions (CU). These agreements were purposed to describe trade liberalization between certain groups of countries. Panagariya (2000) described PTA and FTA as agreements that omitted or declined trade barriers between two countries, or groups of countries. Meanwhile, CU agreements were perceived as documents between two states that incentivized the involved countries to the equal custom duties.

Economists fell short to define a unique trade regime that would promote a better economic performance of a country, but they outlined key advantages that could have come in line with freer trade policies: PTA, FTA, CU or any other agreements.

b. Economic performance and productivity

One of the main concerns of government authorities has been to predict how economic growth indices and productivity were affected by trade liberalization. Neoclassical theories dictated that relaxation of trade barriers and abolishments of restrictions encourage expansion of exports and higher production. According to Edwards (1997), these theories predicted no change in economic growth. The modernly developed endogenous growth models also studied the consequence of the policy on growth. The literature revealed that the impact of the freer trade is twofold: it affects general equilibrium of the economy and changes the equilibrium point; on the other hand, it encourages productivity growth that leads country to the long run economic growth.

David Ricardo was one of the leading and sophisticated economists who analyzed the effects of trade openness in his theory on the comparative advantage and who stated that trade creation is a positive phenomenon for the economy. He showed that establishment of trade enables country to consume the package of goods above its Production Possibility Frontier (PPF). This can be achieved if a country will specialize in producing the output, in which it is the least-cost manufacturer, or has comparative advantage. In this case this same country will import from the rest of the world the products, that are in fact more costly to be produced in the domestic country, rather than consumed from the other one (Ricardo, 1817).

As Ricardo, Krugman (1979) also discussed the benefits that come in line with trade openness. He analyzed two economies with homogenous wage rates, prices and households and with zero transportation costs. He showed that these countries will specialize in production and none of the products would be produced in both countries at the same time. The primary effect of the distortion will be higher efficiency and economies of scale. As Krugman (1979) showed, combination of markets and specialization in production, under the same assumptions, will promote higher available variety of goods and higher level of competition between the producers. As the model discussed homogenous firms with same productivity level, the openness of trade does not affect countries' average productivity.

Unlike Krugman (1979), Melitz (2003) introduced heterogeneous firms in his model and assumed fixed entry cost for the firms. In his analyses he observed the behavior of firms under the monopolistic competition. He showed that under these assumptions, the firms with low productivity face negative profit and quit the market; others, with sufficient level of productivity, continue producing. The openness of borders, in Melitz model, stimulates the firms to export their production to the rest of the world. Those producers, who cover transportation costs, start exporting their production and generate higher profit in the equilibrium. The higher liberalization, in Melitz (2003) model was discussed as lower transportation i.e. lower export costs and, therefore, more exporting firms. The consequent increase in demands increases the prices and benefits exporting firms, leaving non-exporting ones with lower gains. All in all, as Melitz depicted, low productivity firms leave market and average productivity level augments in the economy.

In the view of Schumpeter (1912) also, trade liberalization increases total factor productivity (TFP) and tends to productivity gain. Moreover, the continuity of trade liberalization promotes

an access to new markets, bears products and new technologies and as a consequence of this, economic growth expands. Also, country attracts new investments and new ideas that lead economy to higher productivity and broader gains.

Krueger (1978) is one of those authors who believed in the benefits of trade liberalization and stated that more liberal trade leads to the expansion of exports and also to the increase in the aggregate growth rate. She mentioned several factors that could have caused this expansion. According to her results, the opening up firstly, helps to the production sector in reallocating resources and using them more efficiently. Secondly, the international trade promotes investment flows and more efficient project implementations. All in all, fast growth of exports encourage GNP growth.

Similarly to Krueger, Balassa (1982) also deducted, that the effect of trade liberalization on the growth is positive. He created a four way classification of trade regimes across 11 developing countries and showed that the countries with higher export-bias perform much better than the others. This statement again strengthens the assumption that higher liberalization leads to better economic performance. Balassa (1982) in the same analysis deduced that the export growth indices go along with the economic growth dynamics and GNP of the country increases with the same pattern. Balassa was the one, who also believed, that incentives of export play significant role in promoting economic growth.

The import tariff reduction on output and on intermediate inputs and their impact on productivity was discussed on an example of Indonesia in the paper of Amiti and Konings (2007). As reviewed in this literature, a lot of economists tried to define, how the liberalization affected productivity of the country's economy, but someone rarely managed to distinguish from each other the effects of tariff cut on output, custom duty reduction on intermediate inputs and the

change in productivity. The most papers claimed that any reduction in tariffs expands productivity the same way.

According to the Amiti et. al. (2007) the reduction of duties on output encourages import competitiveness and cheap imports. That increases the variety of products, the quality of imported goods and also, encourages a flow of skills and education in the country. On the other hand, tariff reduction on intermediate inputs promotes more competitive industries and this stimulates the flow of advanced technology in the country. All in all, the reduction of tariffs on output or intermediate inputs promotes higher productivity.

The paper discussed trade liberalization and associated changes in productivity using the Indonesian data. The data involved the period starting from 1993 year till 2001 and it delivered detailed information about the imports, firms which use these imports and the competing ones.

Indonesian case was attractive because of the discrepancy between the tariffs on the inputs and outputs imported. The difference was huge in the mid of 20th century and started to decline significantly only after the 1995, when Indonesia entered the WTO. Even though, the reduction in custom duties was big enough, some tariffs still remained high (up to 170 %). In order to study this phenomenon, authors took tariff rates as average rate of existing tariffs. Withal, they assumed constant technology over time of observation. After these assumptions were made, Amiti (2007) checked for the correlation of productivity shocks and imports of production inputs. They separately analyzed the productivity shocks and exports as well.

According to the results of the paper, tariff reduction on inputs affects the economy more, than tariff decline on output. More precisely, a ten percent decrease of custom duties on inputs expands productivity by 12%, while the reduction of tariffs on output with the same rate encourages an augmentation of productivity only by 0-6 %. These results were significant for the

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import oriented firms and insignificant for the others. The intuition behind this pretense was the innovations in technology that the importing firms received together with the goods purchased and this made importing sectors more powerful than non importing ones.

This research, based on Indonesia was one of the rare papers that discussed the issue empirically. The other existing papers were theoretical. Some of them believed that import tariff reduction causes productivity expansion, while others claimed, that tariff cut promotes effective protection and productivity reduction. The paper of Amiti et. Al. (2007) failed to show, which reduction caused the productivity gains, but they managed to declare, that productivity gains are high for import- oriented groups and lower for the rest firms. Thus, this result strengthens the idea, that tariff reduction promotes a growth of productivity.

c. Employment

As already discusses, according to the in the Melitz (2003) and Krugman (1979) models, trade liberalization affects the firms significantly. The reallocation of factor inputs due to the distortion is believed to cause some modifications in the labor market and, therefore, in the unemployment level. The expansion of exports, on the other hand, can hardly affect the distribution of factor inputs in the economy and may have zero consequence on the level of employment. Still, it's intriguing to observe the literature that discusses the relationship between the trade liberalization and unemployment level.

Krueger (1978) surveyed the long run relationship of liberalization and employment. She observed ten developing countries and investigated how the trade expansion affects unemployment. The author found that in these countries exporting sectors were more labor

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intensive and they employed more unskilled labor than import oriented sectors. She revealed that the level of employment increases in outer-oriented economies more than in the inward-oriented economies. She also showed that if there are no distortions in the markets of the factor inputs, trade liberalization will encourage a long-run employment creation.

Unlike Krueger (1978), Michaely et. Al (1977) analyzed the change in unemployment through the gross and net effect of trade liberalization on the unemployment level. Gross effect discussed the employment change when there was a compression of the sectors as a consequence of trade openness. On the other hand, net effect discussed the change of overall unemployment level in the economy. The author concluded that the liberalization affects different sectors variously. In the industries that stay competitive, the employment increases and less competitive sectors are left with higher wage rates.

d. Welfare

The effect of trade liberalization on welfare is ambiguous as trade creation and trade diversion are believed to have different effects on country's welfare and efficiency. Viner (1950) revealed that In case of more efficient allocation of resources and specialization in production, which is believed to be achieved due to the trade creation, country has a potential to abide lower prices that would benefit the demand side of the economy. Supply side would also advantage due to the better recourse allocation and abolishment of protected industries. Overall, having observed the chain of distortions above, it becomes obvious that, in case of trade creation, the economy will affront the welfare gain.

Differently from trade creation, consequences of trade diversion are less optimistic for the countries. Trade diversion, as existing literature perceives it, leads one country to move from the more-efficient trading (in both, exports and imports) to the less efficient one, as it is stimulated by the union establishment or integration (Bhagwati, 1996). This alteration would be beneficial for the customers with lower prices and would hurt the government revenues, stimulating an overall decrease in economic welfare of the member countries.

The authors analyze various reasons that could create the doubt between trade diversion and trade creation. As it finds, establishment of Free Trade Areas (FTA), formation of Custom Unions (CU), signing documents for Common Markets or creation of Economic Unions (EU) - all of them can be discussed to analyze the above mentioned ambiguity. Consequently, these same shocks can be observed to depict the effect of embargo abolishment on welfare, efficiency, economic growth and other macroeconomic variables.

Bhagwati (1996) was one of the authors, who tried to debunk the debating issues about the establishment of trade unions and Free Trade Agreements. He divided the integration development stages into two categories: The first regionalism- starting in 1957 with the Rome Treaty, which was the commencement of European Community; and the Second regionalism- incepting with the Canada-US Free Trade Agreement (CUFTA) and the North American Free Trade Agreement (NAFTA). Bhagwati (1996) depicted that the first regionalization was less successful and it did not prevail on any country but the European ones; meanwhile, the second regionalization was more effective, having collision on the developing countries.

In both regionalisms, Bhagwati (1996), using static model, analysed the alleviation of welfare. The author assented with other economists and stated that, trade creation usually dominates the trade diversion and, thus welfare gain should also be predicted. But, at the same time, the author

doubted, that this is the sure outcome: he stated, that trade establishment aside, the country may still fail to acknowledge the expansion in well-being and the topic still needs further discussions.

Robinson and Thierfelder (2002) reclined on Mexico example to analyze the trade pattern as a result to Regional trade agreement (RTA) model and its impact on economy welfare and trade liberalization. They used economy wide, multi-sector CGE model to depict the results on the macroeconomic variables of the economy. In Mexico integration in RTA model caused both trade creation and trade diversion. Robinson, as well as Bhagwati and other economists, derived that trade creation dominates in most industries and, overall, the welfare in the economy is likely to increase when trade liberalization in maintained.

More sophisticated is Robinson's (2002) analysis of RTA and its impact on welfare with two distinctive models: New trade model and neoclassical models. Both of them forecasted welfare gain in the economy but the former model predicted only a short term and less significant effect on welfare. New trade model conclusions dictated that the integration increases the trade liberalization and expands the economy's well-being in the long run.

Annabi's (2005) analyses were alluring as he, like Robinson did, made distinction between the short run and long run effects of trade barriers abolishment. He derived that in the short run most of the economic variables deteriorate: poverty increases, GDP declines, income distribution worsen and inequality increases. But the reverse is held in the long run, when the service and industrial sectors gain more welfare; Capital accumulation expands and these industries stars growing, that leads to output expansion.

As the results of the PTAs may be various from one country to another, due to the differences in the economic parameters, it is intriguing to observe how developed economies are affected by the cancellation of trade barriers. Dixon (2005) used modified CGE model USAGE ITC

extension in order to analyze the effect of import tariff reduction and abolishment of quotas in the USA. He observed 500 industries and his observations were taken from 25 regions of the country. Differently from previous countries, CGE analysis in the USA predicted no change in real GDP, employment and real or private consumption. Paper predicted only insignificant changes in the output almost in all industries, but sugar, butter and textile industries and also, immaterial consumption welfare gain in the economy.

IV. Data and methodology

In order to analyze the effect of Russian embargo abolishment on Georgian economy, I use Computable General Equilibrium (CGE) model, which has become one of the best tools for recommendations, policy advice and forecast analysis in the developing countries. Calculating general equilibrium is a method for explaining behavior of the economy with several markets. This method strives to derive the set of prices that brings all markets of an economy in the equilibrium. Finding these prices is a tedious process and economists often use different approaches in order to find a solution. One of the models, economists often call for, is the MPSGE model. This model pins down the derivation process to three types of inequalities: zero-profit conditions, income balance equations and market clearing conditions. MPSGE is a distinguished, transparent model that automatically specifies these inequalities, calibrates the parameters and general equilibrium. The data source of this model is represented by the Social Accounting Matrix (SAM). In order to explain the methodology that I employee, I will discuss the structure of SAM and the code that helped me to solve the model and derive results.

The Social Accounting Matrix (SAM) of any country is built in a way in which it reports all economic activities and transactions of the economy. SAM is giving a rundown of the country,

as it encompasses the information from the Supply and Use (SUT) Tables and other macroeconomic data of the economy. In this model, SAM is built according to the SUT tables of 2011 (see appendix A). Using this data it becomes possible to describe the sectors of the economy, the institutions, pattern of trade and investments in the economy.

In order to briefly describe the economy and the intuition behind the assumptions that I imposed, it is worthy to start discussing the country's SAM and observe the components of it. The columns of SAM are describing production sectors and consumptions of the agents (final demand), while the rows of SAM list the markets of the economy and describe the price variables.

All sectors of production are aggregated into four categories: Agriculture, Manufacturing, Service and Government. Domestic production of these industries is described in the first block of columns under the name "Prod". These columns consist of positive numbers that stand for the values of output (Output-Prod) and with the negative numbers (Final-prod) that are transported directly from the USE table, 2011 and signify the intermediate inputs. As in the USE table value added was not divided into two parts: VA labor and VA capital, in order to analyze the effect of embargo abolishment on unemployment, it became essential to make a distinction between the two. For this purpose I assume, that 30% of total Value Added is due to the labor and the rest due to the Capital (in line with the literature Harrison (2002)). Consequently, the drawers across "PL-Prod" and "PK-Prod" are created. The last row in this section, that stands across "Tax-Prod" describes the VAT and Excise taxes, paid by the producers.

In the next section, called "DOM" the country's production is reallocated; the portion of the output that is consumed by the government or households is described in the drawer "Use-DOM" and the other part is directed to the rest of the world (as it is described in the area "Final-Dom").

SAM describes international trade as trade with European Union (EU), Russian federation (RUS) and Rest countries of the world (OTH) separately. As neither the exports nor imports in the Supply and Use tables are derived this way, I employee the Geostat information about Georgian external trade and assign these values respectively. In order to describe the non-tariff barriers that are imposed on Georgian products from Russian side, I impose a 100% tax on the Georgian exports to the northern neighbor. Even though there are tariff and non-tariff trade barriers with EU and other countries also, they are not taken into account in this SAM as they are infinitesimal relative to the barriers set by the Russian Federation.

In this SAM the final domestic production is described in the block of columns under the name "Arm". The sector involves domestic production of goods (for domestic market) and also the imported values of the same products ("Trade- Arm"). Import tariffs are imposed in a way in which the tariffs with Russia are highest. Even though in reality tariff barriers with Russia are not different from the tariffs with other countries, this assumption again highlights the significance of trade burdens with Russia and emphasizes the relative easiness of Trade with the rest of the world. The In this view, 50% of total tariff revenue comes from the trade with Russia, only 25% comes from European Union and the rest 25% is paid when importing from the other countries. In the presence of import tariffs it becomes intriguing, why would one country export the product and at the same time import the same product. Armington explains this phenomena by assuming that the domestic (exported) and foreign (imported) goods are imperfect substitutes and, therefore, dissimilar (Armington 1969). Taking this assumption into account, the intuition behind the behavior of economy becomes clear.

The consumption of government and Households are described in the columns "Cons", while the Investments and welfare of the agents are described in the block of columns under the name "Welf".

To say briefly, we are analyzing the open economy model, which consists of four sectors, homogenous households and the government. The intrigue of formulation this information in SAM is its usage in computer modeling. SAM is used by program GAMS as the data input in order to construct the MPSGE model. This approach is a tool for calibrating the coefficients of preferences and technology; for defining the general equilibrium in the economy and for discussing the scenarios that will be resulted.

As SAM is already derived, the next step is to set up the code for the program. The starting point in the code is to declare the parameters that will characterize the tax system in the economy and the unemployment level. After describing parameters MPSGE starts to formulate the model. The model describes the sectors, which coincide to the columns of the SAM and Commodities, which go along with the rows of SAM. In the section of Consumers, MPSGE describes the agents of the economy and Auxiliary variable block determines parameters for unemployment level.

To describe the production of Georgian economy, the code uses fifteen production functions. First four production functions describe the domestic production activities as CET functions of intermediate inputs and value added with elasticity 3. The next four equations are used to reallocate the output into two parts: domestic use and exports. Still next four functions stand for Armington functions and combine the domestic production and imports altogether with the CET function of elasticity 4. The final three functions describe the formation of welfare of two agents and investments in the economy, where the investment functions are Cobb-Douglas type (elasticity is 1), while the welfare functions are CET functions with elasticity 2.

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The last part of the model is dedicating to describe the constraints. MPSGE sets two types of constraints: Consumers' income constraints (Demand Block) and Constraint on unemployment level (Constraint Block). After defining model the next step is to start calibration of parameters.

In order to analyze the effect of Russian embargo abolishment on the Georgian economy I will set up 3 possible scenarios. As the main reason for restricting Georgian agricultural products, wine and water in Russia was assumed to be political, and in the before-sanction period (2005), Georgia was mainly exporting agricultural products, I will simulate how general equilibrium will change in the economy if trade barriers imposed on agricultural products are relax. In this view, in the first counterfactual I discuss the abolishment of import tariffs on Russian agricultural products and also, cut the export tax on the output of agricultural product by 50%. The next two counterfactuals serve to describe the possible distortions in the economy, if country relaxes the non-tariff and tariff barriers with Russia (counterfactual 3) and if abolishes them at all (counterfactual 4).

V.   Results

In order to analyze the results of the simulations, an economist should compare the output of each counterfactual to the benchmark results. Benchmark results are described in the Table R.1. Here first four lines (AGR, MAN, SER, and GOV) describe the domestic production of four sectors. The next four lines are purposed to show what level of domestic production is consumed domestically, while final use is shown in the following four lines (DAGR, DMAN, DSER and DGOV). The names of the variables are built in a way in which it becomes simple to distinguish the four industries from each other. The emphasis in the following results are going to be on the

level of domestic production, declared in the first rows, as these values are main components describing production sector.

The variables WH and WG show the welfare levels of household and the government, while INV stands for the level of investment in the country. These values will be employed in order to analyze the effect of any trade policy on country's welfare. Changes in prices are described in the next rows and are built in the same way as the industries in the first lines, respectively to the order. The main interest of ours is the variables PFXEU, PFXRUS and PFXOTH. They represent the "Foreign Exchange market" (Markusen, 2004). Decline of these variables indicate, that net exports with the partner country has improved and the exports increased relatively more than the imports with that trade partner.

The rate of return on Capital and labor are described in the PL and PK lines, while the PW describes the consumer price index. As we employee two consumers in this model, the index is defined for both of them separately. The consumption levels of them are derived separately in the lines CONH and CONG and the unemployment level, that is initially assumed to be 15.1% (according to the Geostat data), is described in the last line under the name U. Benchmark is characterized with all variables being 1.000 (other than consumptions). This makes it easier to discuss about the results of scenarios with comparison to the benchmark values.

According to the results, relaxation of trade barriers on agricultural products affected general equilibrium significantly. The outcomes of first counterfactual are described in the Table R.2. The results shown in this table coincide with the theoretical observations discussed in the literature review. As expected, the freer trade encouraged higher production level and expanded output by 0-0.4 %. The highest growth, among the sectors, is accounted in the agriculture (0.4%) and this effect can be viewed as a direct effect of liberalization. Indirect is the effect on

manufacturing and government sectors, which can be seen as intermediate inputs in agricultural industry. In this view, the increased demand on intermediate inputs led to higher output level in manufacturing and government sectors and revealed expansion in the letter sectors stimulated even higher demand on agricultural products. As a consequence to higher output, overall prices in the economy decreased. This decline is depicted across the variables PAI and PAD and accounts 0.2%. The main intrigue of this table is the decrease in PFXRUS. This variable dictates that Georgia expanded exports more than imports and overall, generated positive trade balance in Russian trade. As agricultural output was one of the key products exported in Russia before the embargo establishment, abolishment of trade barriers in this sector expanded exports. Due to the remaining non-tariff barriers changes in import values stayed unremarkable. All in all, the decrease of CA, together with the higher level of consumption and greater output levels dictate, that the economy, as a result to the shock, started to expand.

The results of this scenario coincide with the literature conclusions even in case of unemployment and welfare. As expected, trade liberalization encouraged 0.2% increase in overall welfare and incentivized 0.1% decrease in unemployment.

The next counterfactual stands for analyzing the effect of Russian trade-barriers relaxation on all sectors by 50%. The answers are shown in the Table R.3. If one observes the production sectors, it becomes clear that, as in previous case, getting back to Russian market increased total demand of Georgian products and output in all sectors by 0.1-0.4 percent. According to the results, higher is the final use of the economy also. The variables AAGR, AMAN, ASER, AGO dictate that the domestic use of the economy expanded by 0.4, 0.4, 0.5 and 0.2%, respectively. According to the SAM, each sector uses the production of another as an intermediate input. So the increase in

production caused increase in domestic demand also. This scenario dictates relatively higher consumption level of Government and Households also (CONG and CONH increased).

In order to discuss, how this trade policy affected international trade, one should observe the behavior of variables in PFX. Having all three variables (EU, RUS, and OTH) increased (relative to benchmark), one can conclude that this trade policy encouraged higher growth rate for imports and less expansion in exports. As a result of this the current account deteriorated and resulted higher deficit relative to the benchmark.

As in previous case, this trade policy also, encouraged positive changes in country's welfare and unemployment parameters. More precisely, the results dictate that employment increased by 0.5% and welfare expanded by 0.7%.

The level of unemployment decreased even further in the last scenario, where the trade barriers with Russia are assumed to be abolished at all. The results are shown in the Table R.4. If in the previous counterfactual the employment increased only by 0.6%, in this scenario the expansion counts 2.1%. The highest is the increase in output also, which expanded by 1.3-1.9% relative to the benchmark.

As in previous counter factual analyses, this policy encouraged the increase in consumption, but with the higher level. Prices within the country represented by variables PAD, PMD, PSD and PGD decreased. Under the higher level of output and increased consumption, it is intriguing to take a glance on the parameters of international trade. Being PFXRUS 0.855, it becomes clear that trade balance, due to this trade policy, improved. Relatively lower is the CA deficit that comes with trade to EU and other countries. Being all parameters summed to 2.874 (1.011+0.855+1.008), it becomes clear that the existing balance of payment deficit decreased by 12.6% (3-2.874) under this trade regime.

In all three cases trade liberalization policies incentivized the outputs and encouraged expansion of production. As a result of which overall price level declined in the economy. The welfare in all three cases increased. If in the first scenario the growth accounted only 0.2%, in the last two scenarios it expanded by 0.7 and 4.3% respectively. The trade liberalization expanded employment in all three cases also (with 0.1, 0.5 and 2.1%, respectively). All in all, it became obvious, that trade liberalization affected Georgian economy positively and these distortions are coinciding with the conclusions derived in the literature reviewed.

VI.   Limitations

Computable general equilibrium modeling has become extremely powerful technique that allows quantitative analyses of economic event and finely fits also to those circumstances, where econometric models are impossible to be used. When one uses this methodology, they should observe what drawbacks and limitations come in line with this technique. One of the main privileges of CGE models is that it employs the data from the SUT tables of single year and it does not demand a long time series data. While this pattern is accounted as the advantage of the model, at the same time, it can be analyzed as a drawback. The CGE analysis, conducted for the same country with different reference years may lead economists to dissimilar results. That is why selecting the year for observation becomes crucial and for the same reason, the results of the CGE modeling are not that certain.

Having only one reference year and static model creates another drawback of the modeling. The problem of treating dynamic variables such as investment and savings becomes problematic in the model. Theoretically, these variables have to be estimated in the dynamics, while the CGE model discusses them as static variables. Other than this, CGE models lack to estimate the

financial and monetary conditions of the economy. This is why economists fail to reveal any conclusions relating inflation and foreign exchange rate in the CGE analyses.

In order to make the model more adjusted to reality, researchers may ease the simplifying assumptions employed in this model. One could elaborate more disaggregated Social accounting Matrix (SAM) in order to create more detailed explanation of the scenarios on the industries of the economy. The assumption may be relaxed while dividing the Value Added (VA) from SUT tables in labor and capital factor inputs also. And finally, even though there is no single and perfect measure for the non-tariff barriers between the two countries, still, one could find an improved appraise of the trade barriers for this model.

VII.   Conclusion

The study is based on Computable General Equilibrium (CGE) analysis. It analyzes three possible scenarios that may develop as a result to Russian embargo abolishment on Georgian products. These trade policies are as follows: the tariff relaxation on Agricultural product, the decrease of existing trade barriers in each sector, and finally, abolishment of all custom duties among the countries. The model derived three potential general equilibriums, respectively to the counterfactuals that are used, in order to discuss the effect of new trade policies on the economy.

The scenarios showed that trade liberalization between Russia and Georgia positively affected our country's economy. Under all three scenarios, Georgian output expanded and prices decreased. The improvement was depicted in the overall level of consumption also. The results showed that consumers gained from the reform and their welfare expanded significantly. The

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households benefited because of the lower unemployment level also. Under all three scenarios, the employment was increasing with 0.1%, 0.5% or 2.1%.

To compare the outcomes of these three scenarios to each other, one can easily observe that Georgian economy benefited mostly in the third case. Under the free trade agreement, assumed between Georgia and Russian in this scenario, our country reached 1.3-1.9% expansion in output; the prices in economy declined by 0.5% and the consumption increased by the 1.6-2.2%. This counterfactual accounted the highest (among these scenarios) welfare gains (4.3%); and the unemployment rate decreased by 2.1%, that is intriguing as well.

Overall, the results depicted in the analyses coincide with the observations described in the literature which is reviewed in the third section of this thesis.

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Appendix A: Social Accounting Matrix (SAM) of year 2011, Georgia

Section	Account	PROD Agriculture (Y)	PROD manufacturing	PROD service	PROD government	DOM Agriculture	DOM manufacturing	DOM service	DOM government	ARM Agriculture	ARM manufacturing	ARM service	ARM government	CONS Household (HH)	CONS Government (GOV)	CONS Investment (INV)	WELF Household income (HHI)	Government income (GOVI)	Total
OUTPUT	P agr	2 913				-2 913													0
OUTPUT	Pman		20 594				-20 594												0
OUTPUT	Pserv			8 090				-8 090											0
OUTPUT	Pgov				8 109				-8 109										0
USE	P agr inter					2 267				-2 267									0
USE	Pman inter						15 301				-15 301								0
USE	Pserv inter							5 632				-5 632							0
USE	Pgov inter								7 536				-7 536						0
FINAL	P agr domestic	-542	-1 473	-80	-65					2 836				-153	-22	-501			0
FINAL	Pman Domestic	-400	-6 508	-1 413	-1 248						26 045			-10 618	0	-5 858			0
FINAL	Pserv Domestic	-70	-1 131	-1 534	-628							7 536		-4 005	-120	-48			0
FINAL	Pgov Domestic	-10	-32	-73	-248								7 747	-3 096	-4 288				0
TRADE	PFX (EU)					123	1 009	469	109	-165	-3 102	-551	-61				2 169		0
TRADE	PFX (RUSSIA)					11,0	87,0	40,0	9,0	-31	-589	-107	-10				590		0
TRADE	PFX (OTHER)					501	4 110	1 909	446	-371	-6 972	-1 239	-137				1 753		0
TRADE	PL (Value added Lab)	-557	-2 564	-1 428	-1 745												6 294		0
TRADE	PK (Value added Cap)	-1 298	-5 981	-3 331	-4 072												14 682		0
	TAX	-36	-2 905	-231	-103													3 275	0
	custom taxes					11,0	87,0	40,0	9,0	-2	-81	-7	-3					-54	0
	HH													17 872			-17 872		0
	Gov Services														4 430			-4 430	0
	Investment															6 407	-7 616	1 209	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table R.1

	LOWER	LEVEL	UPPER	MARGINAL
--- VAR AGR	.	1.000	+INF	.
--- VAR MAN	.	1.000	+INF	.
--- VAR SER	.	1.000	+INF	.
--- VAR GOV	.	1.000	+INF	.
--- VAR DAGR	.	1.000	+INF	3.8906E-8
--- VAR DMAN	.	1.000	+INF	1.3049E-7
--- VAR DSER	.	1.000	+INF	9.8113E-8
--- VAR DGOV	.	1.000	+INF	5.5901E-8
--- VAR AAGR	.	1.000	+INF	.
--- VAR AMAN	.	1.000	+INF	.
--- VAR ASER	.	1.000	+INF	.
--- VAR AGOV	.	1.000	+INF	.
--- VAR WH	.	1.000	+INF	.
--- VAR WG	.	1.000	+INF	.
--- VAR INV	.	1.000	+INF	.
--- VAR PA	.	1.000	+INF	.
--- VAR PM	.	1.000	+INF	-1.612E-8
--- VAR PS	.	1.000	+INF	.
--- VAR PG	.	1.000	+INF	.
--- VAR PAI	.	1.000	+INF	.
--- VAR PMI	.	1.000	+INF	.
--- VAR PSI	.	1.000	+INF	.
--- VAR PGI	.	1.000	+INF	.
--- VAR PAD	.	1.000	+INF	.
--- VAR PMD	.	1.000	+INF	.
--- VAR PSD	.	1.000	+INF	.
--- VAR PGD	.	1.000	+INF	.
--- VAR PFXEU	.	1.000	+INF	-2.553E-8
--- VAR PFXRUS	.	1.000	+INF	.
--- VAR PFXOTH	.	1.000	+INF	-1.041E-7
--- VAR PL	.	1.000	+INF	.
--- VAR PK	.	1.000	+INF	.
--- VAR PWH	.	1.000	+INF	.
--- VAR PWG	1.000	1.000	1.000	-1.639E-7
--- VAR PINV	.	1.000	+INF	.
--- VAR CONH	.	17872.000	+INF	.
--- VAR CONG	.	4430.000	+INF	.
--- VAR U	.	0.151	+INF	.

Table R.2

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR AGR	.	1.004	+INF	.
---- VAR MAN	.	1.001	+INF	.
---- VAR SER	.	1.000	+INF	.
---- VAR GOV	.	1.001	+INF	.
---- VAR DAGR	.	1.006	+INF	5.5346E-8
---- VAR DMAN	.	1.000	+INF	3.3708E-7
---- VAR DSER	.	1.000	+INF	1.7936E-7
---- VAR DGOV	.	1.001	+INF	6.4252E-8
---- VAR AAGR	.	1.006	+INF	.
---- VAR AMAN	.	1.000	+INF	.
---- VAR ASER	.	1.000	+INF	.
---- VAR AGOV	.	1.001	+INF	.
---- VAR WH	.	1.001	+INF	.
---- VAR WG	.	1.001	+INF	.
---- VAR INV	.	1.000	+INF	.
---- VAR PA	.	1.000	+INF	-1.936E-8
---- VAR PM	.	1.000	+INF	-1.547E-7
---- VAR PS	.	1.000	+INF	-6.935E-8
---- VAR PG	.	1.000	+INF	-1.992E-8
---- VAR PAI	.	0.998	+INF	.
---- VAR PMI	.	1.000	+INF	.
---- VAR PSI	.	1.000	+INF	.
---- VAR PGI	.	1.000	+INF	.
---- VAR PAD	.	0.998	+INF	.
---- VAR PMD	.	1.000	+INF	.
---- VAR PSD	.	1.000	+INF	.
---- VAR PGD	.	1.000	+INF	.
---- VAR PFXEU	.	1.000	+INF	-1.048E-8
---- VAR PFXRUS	.	0.996	+INF	.
---- VAR PFXOTH	.	1.000	+INF	-4.274E-8
---- VAR PL	.	1.000	+INF	.
---- VAR PK	.	1.000	+INF	.
---- VAR PWH	.	1.000	+INF	.
---- VAR PWG	1.000	1.000	1.000	-3.192E-7
---- VAR PINV	.	1.000	+INF	.
---- VAR CONH	.	17879.975	+INF	.
---- VAR CONG	.	4433.510	+INF	.
---- VAR U	.	0.150	+INF	.

Table R.3

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR AGR	.	1.003	+INF	.
---- VAR MAN	.	1.004	+INF	.
---- VAR SER	.	1.004	+INF	.
---- VAR GOV	.	1.002	+INF	.
---- VAR DAGR	.	1.004	+INF	1.0612E-7
---- VAR DMAN	.	1.005	+INF	6.4349E-7
---- VAR DSER	.	1.006	+INF	3.4276E-7
---- VAR DGOV	.	1.002	+INF	1.2330E-7
---- VAR AAGR	.	1.004	+INF	.
---- VAR AMAN	.	1.004	+INF	.
---- VAR ASER	.	1.005	+INF	.
---- VAR AGOV	.	1.002	+INF	.
---- VAR WH	.	1.005	+INF	.
---- VAR WG	.	1.002	+INF	.
---- VAR INV	.	1.000	+INF	.
---- VAR PA	.	1.000	+INF	-3.675E-8
---- VAR PM	.	1.000	+INF	-2.949E-7
---- VAR PS	.	1.000	+INF	-1.322E-7
---- VAR PG	.	1.000	+INF	-3.791E-8
---- VAR PAI	.	0.999	+INF	.
---- VAR PMI	.	0.998	+INF	.
---- VAR PSI	.	0.998	+INF	.
---- VAR PGI	.	1.000	+INF	.
---- VAR PAD	.	0.999	+INF	.
---- VAR PMD	.	0.999	+INF	.
---- VAR PSD	.	0.999	+INF	.
---- VAR PGD	.	1.000	+INF	.
---- VAR PFXRUS	.	1.004	+INF	.
---- VAR PFXOTH	.	1.003	+INF	-8.451E-8
---- VAR PL	.	0.999	+INF	.
---- VAR PK	.	1.001	+INF	.
---- VAR PWH	.	0.999	+INF	.
---- VAR PWG	1.000	1.000	1.000	-6.121E-7
---- VAR PINV	.	0.999	+INF	.
---- VAR CONH	.	17936.813	+INF	.
---- VAR CONG	.	4438.301	+INF	.
---- VAR U	.	0.146	+INF	.

Table R.4

	LOWER	LEVEL	UPPER	MARGINAL
---- VAR AGR	.	1.013	+INF	.
---- VAR MAN	.	1.013	+INF	.
---- VAR SER	.	1.017	+INF	.
---- VAR GOV	.	1.019	+INF	.
---- VAR DAGR	.	1.017	+INF	1.1298E-7
---- VAR DMAN	.	1.017	+INF	6.8195E-7
---- VAR DSER	.	1.021	+INF	3.6401E-7
---- VAR DGOV	.	1.018	+INF	1.3179E-7
---- VAR AAGR	.	1.017	+INF	.
---- VAR AMAN	.	1.016	+INF	.
---- VAR ASER	.	1.021	+INF	.
---- VAR AGOV	.	1.019	+INF	.
---- VAR WH	.	1.015	+INF	.
---- VAR WG	.	1.028	+INF	.
---- VAR INV	.	1.000	+INF	.
---- VAR PA	.	1.000	+INF	-3.951E-8
---- VAR PM	.	0.998	+INF	-3.166E-7
---- VAR PS	.	0.999	+INF	-1.425E-7
---- VAR PG	.	1.000	+INF	-4.097E-8
---- VAR PAI	.	0.996	+INF	.
---- VAR PMI	.	0.995	+INF	.
---- VAR PSI	.	0.995	+INF	.
---- VAR PGI	.	1.000	+INF	.
---- VAR PAD	.	0.996	+INF	.
---- VAR PMD	.	0.995	+INF	.
---- VAR PSD	.	0.996	+INF	.
---- VAR PGD	.	1.000	+INF	.
---- VAR PFXEU	.	1.011	+INF	-2.227E-8
---- VAR PFXRUS	.	0.855	+INF	.
---- VAR PFXOTH	.	1.008	+INF	-9.110E-8
---- VAR PL	.	0.996	+INF	.
---- VAR PK	.	1.004	+INF	.
---- VAR PWH	.	0.996	+INF	.
---- VAR PWG	1.000	1.000	1.000	-6.576E-7
---- VAR PINV	.	0.995	+INF	.
---- VAR CONH	.	18059.016	+INF	.
---- VAR CONG	.	4554.880	+INF	.
---- VAR U	.	0.130	+INF	.