Nuru Giritli¹, Sevin Ugural² IMPLICATIONS OF EXOGENOUS INCOME SHOCK ON ECONOMIC WELL-BEING IN NORTH CYPRUS: CGE MODEL APPROACH

The objective of this paper is to analyze the influence consequences of unskilled labor outmigration and resulted external income on economic well-being. The first general equilibrium model describing the economic activities in North Cyprus is constructed to be used for implementing the effect of particular shocks on economic well-being. The empirical analysis reveals that despite positive effects on demand side, supply side of the economy is worsened and output decreased by 3.78% in real terms in 2011.

Keywords: general equilibrium model, external income shock, remittances, North Cyprus, migration.

JEL Classification: C63, C68, D57.

Нуру Гірітлі, Севін Угурал ВПЛИВ ШОКУ ВІД ЗОВНІШНІХ ДОХОДІВ НА ЕКОНОМІЧНИЙ ДОБРОБУТ ПІВНІЧНОГО КІПРУ: ОБЧИСЛЮВАНА МОДЕЛЬ ЗАГАЛЬНОЇ РІВНОВАГИ

У статті проаналізовано вплив міграції некваліфікованої робочої сили і одержуваних у результаті зовнішніх доходів з-за кордону на економічний добробут Північного Кіпру. Побудовано модель загальної рівноваги, що описує економічну діяльність на Північному Кіпрі, що може бути використано для аналізу впливу конкретних економічних шоків на добробут країни. Емпіричний аналіз показує, що, незважаючи на позитивні ефекти попиту, у плані пропозиції в економіці спостерігається спад, що в 2011 р. склав 3,78% у реальному вираженні.

Ключові слова: модель загальної рівноваги, шок від зовнішніх доходів, грошові перекази, Північний Кіпр, міграція.

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Нуру Гиритли, Севин Угурал ВЛИЯНИЕ ШОКА ОТ ВНЕШНИХ ДОХОДОВ НА ЭКОНОМИЧЕСКОЕ БЛАГОСОСТОЯНИЕ СЕВЕРНОГО КИПРА: ВЫЧИСЛИМАЯ МОДЕЛЬ ОБЩЕГО РАВНОВЕСИЯ

В статье проанализировано влияние миграции неквалифицированной рабочей силы и получаемых в результате внешних доходов из-за границы на экономическое благополучие Северного Кипра. Построена модель общего равновесия, описывающая экономическую деятельность на Северном Кипре, которая может быть использована для анализа влияния конкретных экономических шоков на благосостояние страны. Эмпирический анализ показывает, что, несмотря на положительные эффекты для спроса, в плане предложения в экономике наблюдается спад, составивший в 2011 г. 3,78% в реальном выражении.

Ключевые слова: модель общего равновесия, шок от внешних доходов, денежные переводы, Северный Кипр, миграция.

1.Introduction. Economic isolation from the world economy due to the current political situation has led to limited production capability in North Cyprus. Due to market inefficiency in goods and factors market, North Cyprus economy fails to uti-

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lize its resources and thus it has been extremely difficult to achieve its economic goals. Besides the inefficiency in goods and factors markets, the economy is highly dependent on Turkish economy. North Cyprus uses Turkish Lira (TL), supplied by the Central Bank of Republic of Turkey and dependence on TL causes macroeconomic instability; a sudden change in interest rates and inflation directly affects the growth and stability of Turkish Cypriot economy. The Central Bank of North Cyprus has a critical role to play in regulation of the country's financial institutions although it is dependent on Turkey's economy. However, the economy exhibits characteristics of small-island economies; those economies are diverse in economic situations, they experience very high transportation costs, on the other hand, market competition is frequently lacking in international transport to remote island communities so that monopoly charges may apply to such transport (Tisdell, 2006).

Since 1974, north part of the island is isolated from the world economy. There have been many attempts to re-unite Cyprus within the last decade but attempts to re-unite the island failed because of political dispute between Turkish and Greek Cypriot leaders, and the isolation from the world economy and the unrecognized status of North Cyprus as a state still continues. In April 2003 borders between North and South Cyprus have been eased and since then crossing the borders (Green Line) between South and North Cyprus became possible. Tourists of both communities started travelling daily through check points and movement across the borders benefited the economies of both communities. Since April 2003, the participation of unskilled Turkish Cypriot workers in the Greek Cypriot labor market has increased substantially (Economic Interdependence Report, 2011). In Cyprus, there is an exceptional case that Turkish Cypriot workers move daily across the borders to take opportunities in Greek Cypriot labor market. In 2004, Turkish Cypriot workers' participation in the South Cyprus increased by 51% according to Social Insurance Service in South Cyprus. Amount of Turkish Cypriot workers who work in the south constituted a 10% of Turkish Cypriot unskilled labor market in the benchmark year 1998. However, those workers who work in the South transfer earnings of 12.5 mln. TL in the form of remittances to the northern part of the island.

Effectiveness of migrant remittances has received great attention in the literature and many researchers analyzed the implications of migrant remittances on development of economy, labor market outcomes and competitiveness (Airola, 2007; Bajaras at al., 2011; Jansen, 2011). It is suggested that consequences of migrant remittances vary with the characteristics of migrant workers and there are many studies in the literature analyzing the migration impact on productivity. It is empirically proved that in the long run, immigration benefits the host countries if the skills are complement with other production factors in economies, even though immigration lowers the wage earnings of the nationals. However, migration may negatively affect a host country's productivity. When immigrants lack the skills that employers demand and find it difficult to adapt, immigration may significantly increase the costs associated with income maintenance programs as well as exacerbate the ethnic wage differentials already existing in a host country (Borjas, 1994). Productivity differential can be attributed through differences in labor force composition already existing in countries. Okkers (2005), taking labor heterogeneity and all the channels into account, built a CGE model to stimulate the effect of immigration in Belgium. His results show that although immigration is macroeconomically beneficial, there is a significant adverse effect of immigration at the distributional stage.

In this paper we built a model and used it to analyze the influence of remittances and daily outmigration on income, factor prices, savings, investment and output in North Cyprus. The structure of this paper is as follows. The following part consists of background notes and motivation of the study, followed by the methodology. The third part briefly explains the data, sources and simulations. The final part is the conclusion and recommendations.

2. Background Notes of the North Cyprus Economy and Motivation of Study. Although many attempts failed to re-unify the island, easing of restrictions on movement along the Green Line that has been enjoyed since April 2003 affected both economies in the island. Expenditures accelerated stimulating the demand-driven factors, and due to improvements in the investment climate in North Cyprus, economy experienced an enormous growth trend in the period from 2004 to 2007 by almost 10%. However, easing of restrictions on movement along the Green Line has a significant impact on savings and investments. The theoretical models predict that savings in a country of origin is positively related to both migrant's current income and origin-household income (Osili, 2007). In North Cyprus, there has been a large flow of external income, coming from the South Cyprus through migrant remittances. Table 1 presents the main macroeconomic performance indicators as percentage of real GDP between 2000 and 2010. As indicated in the table, there have been significant developments between 2000 and 2004 but after 2007 then performance of North Cyprus economy started to slow down.

| | 2000 | 2004 | 2007 | 2010 |
|-----------------------|-------|-------|-------|---------|
| Total Investment | 17.31 | 20.75 | 23.66 | 18.70 |
| Fixed Investment | 15.82 | 18.99 | 23.12 | 18.11 |
| Public Investment | 6.38 | 5.97 | 5.69 | 3.60 |
| Private Investment | 9.44 | 13.02 | 17.42 | 14.50 |
| Total Savings | 17.31 | 20.75 | 23.66 | 18.70 |
| Foreign Savings | 3.16 | 0.82 | 7.06 | 7.40 |
| Domestic Savings | 14.14 | 19.93 | 16.60 | 11.30 |
| Public Revenues | 37.38 | 41.65 | 37.78 | 37.54 |
| Total Expenditure | 51.12 | 52.03 | 46.15 | 47.40 |
| Current Expenditure | 19.87 | 17.98 | 20.25 | 20.31 |
| Foreign Trade Balance | -4.15 | -6.91 | -9.64 | - 10.50 |

Table 1. Percentage Shares of Savings, Investment and Trade Balance in Real GDP

Source: State Planning Organization of TRNC.

In North Cyprus, growth trend between 2003 and 2007 was partly due to investment climate and positive expectations on uniting Cyprus with the EU. In this period the real growth rate of GDP and GNP progressed 10.6 to 14.2% and 11.4 to 15.4% respectively according to State Planning Organization of North Cyprus. As an important element of the sustainable development process, the investment growth in real GDP increased by 23.66% in 2007, then the share of investments in real GDP was only 18% in 2010. In order to maintain a healthy rate of growth in economies, investment rate of at least 25% is required. However, the share of foreign trade balance is widened in real GDP as a result of greater import demand. Greater government income provided expansion on public current expenditures and public investments, but public savings are maintained in the share of real GDP as public expenditures increased parallel to public revenues. Private sector investment expenditures have increased more than consumption expenditures, improvement was achieved in private sector savings designated for investments between 2004 and 2007.

Table 2 presents the sector shares in real GDP between 2000 and 2010. The lowest share has been experienced in agriculture due to negative climatic conditions in Cyprus.

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|--------------------------------|------|------|------|------|
| | 2000 | 2004 | 2008 | 2010 |
| Agriculture | 6.9 | 9.1 | 5.1 | 5.9 |
| Industry | 10.5 | 9.4 | 10.7 | 9.8 |
| Quarrying | 0.6 | 0.5 | 0.8 | 0.6 |
| Manufacturing | 5.7 | 4.8 | 4.0 | 2.3 |
| Electricity – Water | 4.3 | 4.0 | 5.9 | 6.9 |
| Construction | 4.5 | 4.3 | 7.1 | 5.6 |
| Trade-Tourism | 16.1 | 15.9 | 14.2 | 16.0 |
| Wholesale and Retail Trade | 10.0 | 10.8 | 9.7 | 10.7 |
| Hotels and Restaurants | 6.1 | 5.2 | 4.5 | 5.4 |
| Transport-Communication | 13.0 | 10.5 | 12.1 | 9.4 |
| Financial Institutions | 6.4 | 7.6 | 7.0 | 7.2 |
| Ownership Of Dwellings | 2.4 | 2.5 | 3.5 | 3.9 |
| Business and Personal Services | 8.0 | 9.2 | 10.3 | 11.6 |
| Public Services | 24.0 | 20.8 | 21.7 | 21.0 |
| Import Duties | 8.2 | 10.7 | 8.2 | 9.6 |

Table 2. Distribution of GDP by Sectors, %

Source: State Planning Organization of TRNC.

The largest sector share in GDP belongs to public services, followed by trade and tourism sector, transport and communications. Positive development and growth in physical production during the 2003–2007 period have been due to the increase in foreign demand. The construction sector has increased its share in the economy as a result of speeding up infrastructural investments. Apart from larger amount of new investments in tourism, renovation, local and foreign demand for dwellings and higher public infrastructural investments have all caused rapid growth in the construction and related sectors. Although indicators in Table 1 and 2 present the macroeconomic performance of North Cyprus economy, they do not indicate whether economic well-being has improved or not since 2003. Investments contribute to GDP, but they only concern the year's spending made. For this reason, investments only to a limited extent account for gains and losses in natural, economic and social assets, which are important for long-term sustainable development.

General equilibrium models are widely used when it comes to show the distributional effects of changes in economic circumstances such as impacts on economic activity, employment, trade and investment at the level of individual industries, impacts on households and impacts on the economy as a whole. Iyjaz and Aftab (2011) analyzed the welfare impact of labor emigration and workers' remittances and their findings suggest that remittances are an important financial inflow and a big source of foreign exchange earnings. The surge in migration and remittances has received increasing attention for decades and the effect of migration remittances on competitiveness constitute an inflow of finance which may lead to an appreciation of the real exchange rate, undermining the competitiveness of the traded-goods sector and, in particular, of exports (Bayangos and Jansen, 2011). However, an increase in remittances may affect competitiveness through other channels. An increase in remittance inflows is associated with outmigration of workers, decreasing domestic labor force; moreover, households receiving remittances may use higher income to reduce work efforts and increase leisure or education, which will further reduce labor supply. In an economy with heterogeneous skills, natives respond to inflow of immigrants by moving around and upgrading their jobs, as there are complementarities between the skills and services produced by natives and immigrants. Large inflows of worker remittances have been perceived as a macroeconomic challenge for recipient countries; worker remittances challenge the equilibrium mechanism as large inflows of worker remittances could lead to the emergence of "Dutch disease," that is, remittance inflows could result in an appreciation of the equilibrium real exchange rate undermining international competitiveness of domestic production (Barajas et al., 2011). The reduction of labor supply may also lead to an increase in the wage level, which will increase production cost and reduce competitiveness. Study by Ottaviano and Peri (2007) analyzed the consequences of migration on wages, consumption and housing prices of natives using the supply-driven component of immigration in a simple general equilibrium framework. Their findings showed positive and significant wage and housing price effects caused by immigration.

3.Methodology and Algebraic Modeling. The single-country general equilibrium model in a perfectly competitive environment is constructed as follows. There are 2 goods "tradable and non-tradable", 4 factors of production for 13 industries. In the production process we use a 3-level nested CES function and here we decompose labor into skilled and unskilled workers to analyze their contribution in production separately. However, capital and land & natural resources are also present in the nest-ed CES production function. Household's utility maximization is constrained by their income which are factor' income and the transfers they receive. A constrained optimization function for investment demand is represented by Cobb-Douglas function and government spends fixed proportion of revenues on goods and services. Finally, trade closure is determined by Armington and CET functions for import demand and export supply of goods and services.

Households: There is only one type of household which demand goods and services. Households have the utility function:

$$U = \sum_{i=1}^{n} C_{i}^{alphaC_{i}} \quad i = 1,...,13,$$
(1)

where $\sum_{i=1}^{n} alphaC_i = 1$.

Household's income comes from the factors of production and from the government transfers shown by:

$$MY = Iw \times LS + hw \times HS + kw \times KS + rw \times RS + Trans + REMIT.$$
 (2)

Household's disposable income is

$$M = (1 - tm) \times MY - SH.$$
(3)

Households maximize their utility subject to their budget and the derived demand for commodities is shown as:

$$C_{i} = \frac{1}{PC_{i}} \times alphaC_{i} \times M.$$
(4)

Production: Primary factors of production, unskilled labor, skilled labor, capital and land are represented by the 3-level nested CES production function. Production at the intermediate level is represented by the Leontief function that is based on the 1998 input-output table. Output for the whole economy is produced by adding the sum of intermediate inputs to the value added. The production process is formulated with the following CES function.

$$XD_{i} = A_{i} \left\{ \delta_{i} \left[\left(\beta_{i} \left[\left(\gamma_{i} \times K_{i}^{\mu_{i}} + (1 - \gamma_{i})_{\mu_{i}}^{\mu_{i}} \right)^{\gamma_{\mu_{i}}} \right]^{p_{i}} + (1 - \beta_{i})H_{i}^{p_{i}} \right]^{q_{i}} + (1 - \delta_{i}) \times R_{i}^{\theta_{i}} \right\}^{\gamma_{\theta_{i}}}, \quad (5)$$

where $i = 1, ..., 13$ and $A_{i} = \frac{XD_{i}}{1 + 1 + 1}$.

Producers minimize the average costs of production subject to the nested CES production function and factors demand derived from the optimization are as follows:

$$\mathcal{K}_{i}^{*} = \frac{\gamma_{i}^{e_{i}} \times \mathcal{K}_{i}^{-e_{i}}}{\left(\gamma_{i}^{e_{i}} \times \mathcal{K}_{i}^{1-e_{i}} + (1-\gamma_{i})^{e_{i}} \times \mathcal{I}_{i}^{1-e_{i}}\right)^{\left(e_{i}/1-e_{i}\right)}} \times J_{i}; \tag{6}$$

$$\mathcal{L}_{i}^{*} = \frac{(1 - \gamma_{i})^{e_{i}} \times I_{i}^{-e_{i}}}{\left(\gamma_{i}^{e_{i}} \times \kappa_{i}^{1-e_{i}} + (1 - \gamma_{i})^{e_{i}} \times I_{i}^{1-e_{i}}\right)^{\left(\frac{e_{i}}{1-e_{i}}\right)}} \times J_{i};$$
(7)

$$H_{i}^{*} = \frac{(1 - \beta_{i})^{se_{i}} \times h_{i}^{-se_{i}}}{\left(\beta^{se_{i}} \times i^{1-se_{i}} + (1 - \beta_{i})^{se_{i}} \times h^{1-se_{i}}\right)^{\left(\frac{se_{i}}{1 - se_{i}}\right)}} \times G_{i};$$
(8)

$$R_{i}^{*} = \frac{(1 - \delta_{i})^{ge_{i}} \times r_{i}^{-ge_{i}}}{(2ge_{i} - 1 - ge_{i})^{1 - ge_{i}} \times r_{i}^{-ge_{i}}} \times XD_{i}.$$
(9)

Investment: Investment expenditures by private and public corporations are financed by total savings. Total savings consist of private savings, public savings and foreign savings. Private and foreign savings are determined in the model endogenously and public savings are exogenously fixed. Investment demand is determined through Cobb-Douglas function:

$$I_i^* = \mathbf{S} \times (\alpha I_i) \mathbf{P}_{I_i}^{-1}, \tag{10}$$

where $\sum_{i=1}^{n} \alpha I_i = 1$.

Public Sector: Government collects direct and indirect taxes and spends the fixed proportion of the revenue on community services and consumption goods. Government also makes transfer payments and inclusion of the transfer payment is shown in Eq. (2).

In our model, government expenditures are exogenous, tax instruments are endogenous to reflect (increase) the revenues and thus, government balance remains fixed. Following equation represents the government's behavior in the CGE model:

$$EG = \sum_{i=1}^{n} CG_i + Transf \text{ and } TAXR = EG + SG.$$
(11)

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Rest of the World: Demand for imported commodities is represented by CES function with Armington (1969) assumption to identify traded goods and services inuse, separately. Armington assumption is widely used in the CGE models to define the demand for domestically produced commodities, as well as the demand for imported goods when products are nationally differentiated (Lloyd and Zhang, 2006). With the Armington structure, 2-stage budgetary allocation procedure is assumed. Budget is allocated among domestically demanded commodities and then expenditure on each commodity is allocated between domestic and imported commodities, firms minimize their cost, subject to their CES type production function and solving the problem yields the following import demand functions.

$$XDD_{i} = (1 - \varphi T_{i})^{\xi T_{i}} \times PDD_{i}^{-\zeta T_{i}} \times \times (12)$$
$$\times \left[(1 - \varphi T_{i})^{\xi T_{i}} \times PDD_{i}^{1 - \zeta T_{i}} + (\varphi T_{i})^{\xi T_{i}} \times PIM_{i}^{1 - \zeta T_{i}} \right]^{\frac{\zeta T_{i}}{1 - \zeta T_{i}}} \times \frac{SX_{i}}{AR_{i}};$$

$$IM_{i} = (\varphi T_{i})^{\varepsilon T_{i}} \times PIM_{i}^{-\varsigma T_{i}} \times \left[(1 - \varphi T_{i})^{\varepsilon T_{i}} \times PDD_{i}^{1-\varsigma T_{i}} + (\varphi T_{i})^{\varepsilon T_{i}} \times PIM_{i}^{1-\varsigma T_{i}} \right]^{\frac{\varsigma T_{i}}{1-\varsigma T_{i}}} \times \frac{SX_{i}}{AR_{i}}.$$
(13)

For the supply of exported commodities, each industry produces a composite commodity XD_i which can be exported and/or sold domestically at a market. In this structure, exports and domestically sold products are assumed to be differentiated by market (with respect to their prices), with the relationship between them being represented by a constant elasticity of transformation (CET) function. CET function describes the market transformation process and each firm allocates its output between domestic and export markets. Domestic supply function for goods is derived from the first order conditions and following supply functions are obtained.

$$\begin{aligned} XDD_{i} &= (1 - \gamma T_{i})^{\frac{1}{1 + \rho T_{i}}} \times PDD_{i}^{-\frac{1}{1 + \rho T_{i}}} \times \\ &\times \left[\gamma T_{i}^{\frac{1}{1 + \rho T_{i}}} \times PE_{i}^{\frac{\rho T_{i}}{1 + \rho T_{i}}} + (1 - \gamma T_{i})^{\frac{1}{1 + \rho T_{i}}} \times PDD_{i}^{\frac{\rho T_{i}}{1 + \rho T_{i}}} \right]^{\frac{1}{\gamma} \rho T_{i}} \times \frac{XD_{i}}{\alpha T_{i}}; \end{aligned}$$
(14)
$$E_{i} &= \gamma T_{i}^{\frac{1}{1 + \rho T_{i}}} \times PE_{i}^{-\frac{1}{1 + \rho T_{i}}} \times \left[\gamma T_{i}^{\frac{1}{1 + \rho T_{i}}} \times PE_{i}^{\frac{\rho T_{i}}{1 + \rho T_{i}}} + (1 - \gamma T_{i})^{\frac{1}{1 + \rho T_{i}}} \times PDD_{i}^{\frac{\rho T_{i}}{1 + \rho T_{i}}} \right]^{\frac{1}{\gamma} \rho T_{i}} \times \frac{XD_{i}}{\alpha T_{i}}.$$
(15)

Finally, the trade balance is shown in Eq. (16), where foreign saving (SF) is fixed.

$$\sum_{i=1}^{n} PMW_{i} \times IM_{i} = \sum_{i=1}^{n} PEW_{i} \times E_{i} + SF + REMIT.$$
(16)

4.Data and Calibration. In practice data, representing benchmark equilibrium in CGE models are retrieved from the national accounts database and from other government data sources. Consistent input-output table is available only for 1998 in North Cyprus. The data is aggregated for 13 industries and is used as a part of the production process at the intermediate level. Production at the intermediate level is represented by Leontief production function in our model. For static CGE models it is crucial that we have a consistent social accounting matrix (SAM) which is based on consistent input-output tables and is shown in Appendix.

National accounts data of North Cyprus is widely used to determine the initial public spending, investment, consumption, export and import expenditures in the model. Direct taxes, foreign savings and transfer payments are also provided from the National Accounts and calibration technique is used to calibrate the rate of taxes. General Census data for 1996 provided detailed information on the number of employed people by literacy within each industry so that we determined the shares of the skilled and unskilled employment and thus the shares are used to calibrate some of the model variables. Distribution parameters are calibrated at each stage of the process and elasticity of substitution parameters are taken exogenously from various sources. Then the system is validated and the model was solved for the benchmark year without imposing any changes in the parameters or exogenous variables so that the optimal solution replicates the original values for the benchmark year. System constraints are satisfied through the optimization processes and finally, equilibrium conditions (Walrasian constraints) are set to equate demand and supply in both goods and factor markets. For the labor market, we assume there is no unemployment and thus labor supply equals labor demand. At the final stage to verify the reliability of the model, the homogeneity tests are applied.

5.Simulation and Results. Labor mobility and resulted income shocks in North Cyprus have recently set a good example to study the implications of these shocks on economic well-being. In this paper we performed a simulation that external income is increased by 12.5 mln. TL (in 1998 prices) while reducing the supply of unskilled labor by 10%. Here we keep other factors such as land, skilled labor supply and foreign exchange rate, public savings, foreign savings fixed but let wages, rent and price of capital adjust. Following tables present impact of these external shocks on the main macroeconomic indicators – savings, income, final demand, and output and factor prices. We observed the combined impact of shocks stimulates the demand side but the supply side of North Cyprus economy is deteriorated.

| | Benchmark | | After S | Shock | |
|---------------------|-------------|----------------|----------|-------------|----------|
| | (in TL) | Nominal Impact | % Change | Real Impact | % Change |
| Investment | 49,779,827 | 55,405,120 | 11.30 | 54,124,322 | 8.73 |
| Consumption | 188,419,094 | 196,020,741 | 4.03 | 191,489,337 | 1.63 |
| Public Expenditures | 62,884,655 | 65,785,620 | 4.61 | 64,264,857 | 2.19 |
| Imports | 163,766,671 | 179,537,497 | 9.63 | 175,387,135 | 7.10 |
| Import Duties | 23,527,821 | 24,766,378 | 5.26 | 24,193,855 | 2.83 |
| Exports | 111,904,224 | 115,175,063 | 2.92 | 112,512,565 | 0.54 |
| GDP | 225 693 308 | 228 082 668 | 1.06 | 222.810.090 | -1.28 |

Table 3. Combine Impact of the shocks on GDP and Expenditures

Source: GAMS output for the North Cyprus Economy's CGE model.

Investment expenditures and public expenditures are increased by 8.73% and 2.19% respectively prior to the shock. Despite the positive growth in investments, public spending and consumption expenditures, GDP decreased by 1.28% in real terms due to the 10% rise in imports, including duties. Table 4 shows the combined effect of the shocks on factor prices and consumer price index. It is observed that wages of unskilled and skilled labor increased by 6.79% and 1.17% respectively and price of capital decreased by 0.92% in real terms. In our production function, capital and unskilled labor, the price of labor increases and that in turn affects the overall demand for labor. Here, scale effect must be taken into account since cost of producing output increases.

Depending upon the strength of the shock and factor elasticitities, substitute factor's price may rise, fall or remain the same. In our model, demand for capital decreases and thus capital price remains almost the same. Demand for unskilled labor and capital determines the level of composite input J in our nested CES production function. With a higher unskilled labor wages, demand of composite input (J) falls. J is substitute with skilled labor at the middle nested CES production function, therefore, price for skilled labor increases. At the final and upper nest, composite input G and land are substitutes; with higher skilled labor wages, demand for composite input G falls, increasing the price for land. All factor prices are increased in nominal terms, increasing the cost of production, deteriorating production. Output falls by 3.78% in real terms.

| | Benchmark | | After | Shock | |
|----------------------|-----------|----------------|----------|-------------|----------|
| | (TL) | Nominal Impact | % Change | Real Impact | % Change |
| CPI | 1 | 1.024 | | | |
| Unskilled labor wage | 1 | 1.093 | 9.32 | 1.068 | 6.79 |
| Skilled labor wage | 1 | 1.036 | 3.57 | 1.012 | 1.17 |
| Capital return | 1 | 1.014 | 1.42 | 0.991 | -0.92 |
| Rent | 1 | 1.025 | 2.55 | 1.002 | 0.18 |

| Table 4. Factor Price Effe | ct | |
|----------------------------|----|--|
|----------------------------|----|--|

Source: GAMS output for North Cyprus Economy's CGE model.

Simulation results on main macroeconomic variables are shown in Table 5. The results show that households' income in real terms is increased by 4.65%. Total savings which are used to finance investment expenditures are increased by 8.73%.

| | | • | | | |
|----------------|--------------|----------------|----------|-------------|----------|
| | Don oh mo al | | After S | hock | |
| | Dencimark | Nominal Impact | % Change | Real Impact | % Change |
| Income | 228,391,200 | 244,672,300 | 7.13 | 239,016,220 | 4.65 |
| Expenditure | 203,270,500 | 216,409,000 | 6.46 | 211,406,282 | 4.00 |
| Savings | 49,779,827 | 55,405,110 | 11.30 | 54,124,312 | 8.73 |
| HHs Saving | 24,650,628 | 27,759,780 | 12.61 | 27,118,058 | 10.01 |
| Foreign Saving | 51,862,450 | 51,862,450 | 0.00 | 50,663,548 | -2.31 |
| Public Saving | -23,657,300 | -23,657,300 | 0.00 | -23,110,415 | -2.31 |
| Tax Revenue | 50,226,930 | 53,127,890 | 5.78 | 51,899,735 | 3.33 |
| Transfer pay | 10,999,555 | 10,999,555 | 0.00 | 10,745,279 | -2.31 |
| M-EX | 51,862,447 | 64,362,434 | 24.10 | 62,874,570 | 21.23 |
| | | | | | |

Table 5. Saving-Investment & Income Effect

Source: GAMS output for North Cyprus Economy's CGE model.

The results indicate that Turkish Cypriots are willing to save more rather than spending their income; when private savings are increased by 10%, only 4% of external income is spent on commodities. However, 7.10% rise of imports and reduction in exports in real terms deteriorates the foreign trade balance. It is observed that trade deficit (as % in real GDP) is increased by 21.23%.

Table 6 shows the changes in output, domestic output supplied on the domestic market and the domestic sales of composite commodities demanded by intermediate users and final demanders. As indicated, supply side of Turkish Cypriot economy is worsened. Output decreased by 3.78% in real terms and there is also a negative effect on domestically sold output and composite commodities demanded in North Cyprus economy. Domestic output decreased by 5.46% while demand for composite commodities which include imported goods decreased by only 0.60% in real terms.

| | D | | After Sl | nock | |
|---------------------------------------------------|-------------|----------------|----------|-------------|----------|
| | Denchimark | Nominal Impact | % Change | Real Impact | % Change |
| Output (XD) | 377,115,512 | 371,440,999 | -1.50 | 362,854,412 | -3.78 |
| Domestic output supp- lied domestically (XDD) | 265,211,271 | 256,668,113 | -3.22 | 250,734,726 | -5.46 |
| Domestic Sales of Com- posite Commodities (SX) | 452,505,813 | 460,420,502 | 1.75 | 449,776,979 | -0.60 |

Table 6. Changes in Output, Domestic Supply and Demand

Source: GAMS output for North Cyprus Economy's CGE model.

6.Conclusion. For North Cyprus economy, the first CGE model is constructed to analyze the combined impact of unskilled labor outmigration and resulted external income in terms of remittances on economic well-being. Simulation results showed that external factor income and outmigration of unskilled workers induce increase in investments and savings which stimulates the demand side of the economy. In contrast, due to a greater import demand, trade balance is deteriorated, real GDP decreased by 1.28%. Although a positive and significant influence on the demand side, supply side of the economy is worsened, output decreased by 3.78% in real terms.

Economic isolation from the world economy due to the current political situation has led to limited production capability in North Cyprus. Due to market inefficiency in goods and factors market, North Cyprus economy fails to utilize its resources and thus it has been extremely difficult to achieve its economic goals. Remittances in North Cyprus positively and significantly affect savings and investment but unless investments are sufficiently used on human capital development, on existing resources and on physical capital, it will be extremely difficult to achieve sustainable growth.

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Appendix:



Chart 2. CGE Model – Domestic Final Demand

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| Cyprus |
|------------|
| of North |
| Matrix |
| Accounting |
| Social |
| Aggregated |
| N. |
| Table |

| | | Factors of | Production | | | | | Age | ents | | | |
|-----|-------------|---------------|------------|--------------|----------------------|-------------------|-------------|------------|-------------|------------------|------------|-------------|
| | Labor L | Labor H | Land R | Capital K | Factors (1+2+3+4) | Industries (1–13) | Households | S-I | Government | Rest of World | Taxes | Total |
| | 1 | 2 | s | 4 | 0 | 9 | 7 | 80 | 6 | 10 | 11 | 12 |
| - | 29,740,138 | | | | | | | | | | | |
| 2 | | 72,178,787 | | | | | | | | | | |
| s | | | 4,575,385 | | | | | | | | | |
| 4 | | | | 110,897,340 | | | | | | | | |
| ເດ | | | | | | 228,769,256 | | | | | | 228,769,256 |
| 9 | | | | | | 148, 346, 249 | 188,419,094 | 52,855,776 | 62,884,655 | 111,904,224 | | 564,409,999 |
| 7 | | | | | 217,391,650 | | | | 10.999.555 | | | 228,391,205 |
| × | | | | | | | 24,650,610 | | -23,657,300 | 51,862,450 | | 52,855,760 |
| 9 | | | | | | | | | | | 50,226,925 | 50,226,925 |
| 10 | | | | | | 187, 294, 492 | | | | | | 187,294,492 |
| 11 | | | | | 11,377,602 | | 15,321,502 | | | 23,527,821 | | 50,226,925 |
| 12 | | | | | 228, 769, 252 | 564,409,997 | 228,391,206 | 52,855,776 | 50,226,910 | 187,294,495 | 50,226,925 | |
| Sou | rce: Author | r's creation. | - | | - | | - | | - | - | | - |

НОВИНИ СВІТОВОЇ НАУКИ

АКТУАЛЬНІ ПРОБЛЕМИ ЕКОНОМІКИ №8(146), 2013

| | | les | | |
|--------------------------------|-----------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------|--|
| °. | : Consumption demand of commodities | VĄ | Value added | |
| <i>I</i> , | : Final demand of investment expenditures | SX, | Domestic sales of composite traded commodifies and | |
| CG _i | : Public consumption expenditures . Torial dovernment expenditures | , DD | services Domestic output subolied on the domestic market | |
| IM, | : Imports | C | Household's utility | |
| E_i | : Exports | PDD | Prices of domestic commodities | |
| $\boldsymbol{\mathcal{X}}_{i}$ | : Demand for capital | PIM | Prices of imported commodities | |
| L_i | : Demand for unskilled labor | j _i , g _i | Composite prices of composite inputs | |
| H, | : Demand for skilled labor | PC | Market price for commodities | |
| R, | : Demand for productive land resource | σ | Commodity prices | |
| J, | : Composite value of capital-and-unskilled labor | σ | Market price for investment commodities | |
| G _i | . (كمسممطية بيمانية مع مسطع يسططالا المكمس منط ماطالما المكمس | k_i, l_i, h_i, r_i | Prices of capital, unskilled labor, skilled labor and rent | |
| | . сощровле уаще от сариагана чизкинса таки зкинеа таког | PE | Price for exported commodities | |
| , N | : Domestic output | Xd | Drive of commosite commodities | |
| PMW | : World price of imports | i V | t rector composite commonates Household's hirdset | |
| PEW | : World price of exports | ΜΥ | Factor's income | |
| TAXR | : Sum of direct and indirect taxes | S | Total savings | |
| Transf | : Covemment transfer payments | SG | Housenold s savings Public savings | |
| REMIT | : Remittances | SF | Foreign savings | |
| | | | | |

Table 8. The Model Notation

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The end of Table 8

| | Param | eters | |
|--------------------------|---------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------|
| A, | : Efficiency parameter for CES production function | φ <i>T</i> , | Distribution parameter for the CES import demand function |
| AR_i | : Efficience parameter for CES innort demand function | μ, | Substitution parameter for the nexted CFS production function |
| αT_i | : Efficience parameter for CET export supply function | Ρ, | Substitution parameter for the nested CES production function |
| \boldsymbol{e}_{i} | : Elasticity of substitution parameter at the first nest of the | Θ_i : | Substitution parameter for the nested CES production function |
| as | production process | δ _i : | Distribution parameter for the nested CES production function |
| producti | : Elasticity of substitution parameters at the middle nest of the on process | В. | Distribution parameter for the nested CES production function |
| ge_i | : Elasticity of substitution parameters at the upper nest of the | γ, : | Distribution parameter for the nested CES production function |
| producti - | on process | αI_i : | Distribution parameter for investment |
| ς <i>ι i</i> finction | : Elasticity of substitution parameter for the CES import demand | αG, | Distribution parameter for government |
| ρ <i>T</i> , | . Elsetister of adjutteries concernent for the OED second constru | alphaC _i | : Distribution parameter for consumption |
| function | : Elasuary of subsummon parameter for the CET export supply | : sdu | Marginal propensity to save |
| γT_i | : Distribution parameter for the CET export supply function | io _i | Input-output coefficient |

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