Abstract

This thesis finds the economic impact of using solar energy to generate electricity instead of fossil fuels (oil, natural gas and coal) - traditional technique- in Palestine. The thesis especially emphasizes the impact on public finance, external trade, labor market, and households' total income. It is important to study the impact on the public finance because of the accumulated debt to the Israeli Electricity Company which has exceeded NIS 1 billion in 2013. These amounts are usually deducted from the customs clearance. The study also finds the impact on foreign trade, especially trade with Israel because of the dependency of the Palestinian economy on the Israeli economy. In fact, electricity imports forms 10% from total imports from Israel.

The Palestinian economy is characterized by being a 'service economy'. The service sector[1] contributes for the largest share in GDP, which amounts to 75.1% including the electric service. This means that the contribution of the productive sectors such as the agricultural and industrial sectors in GDP is smaller which reflects the fragility of the Palestinian economy. Improving the electricity sector, as part of the service sector, is very necessary for the development of the Palestinian economy in general and the development of the productive sectors, agricultural and industrial in particular.

This study fills the literature gap on energy and the economy in Palestine by analyzing economic effects of solar energy use by using a computable general equilibrium (CGE) model. In addition, it quantifies these effects. Such quantitative analyses have not been done before for the Palestinian economy. Being the first to investigate this important issue, it provides the basis for a more elaborated model that directly addresses renewable energy production for policy recommendations. This study is important to attract the attention of politicians and stakeholders due to its importance in improving the difficult economic situation in Palestine. This study

[1]There are four main sectors in Palestine, agriculture, industry, constructions and services sector (PCBS, 2014). What service sector includes is fully detailed in chapter 1.

utilizes the PalMod CGE model (USAID, 2013) which is based on the Palestinian Social Accounting Matrix for the year 2011. This analysis is carried out using the General Algebraic Modeling System (GAMS) computer package. The data required for the SAM is available from the Palestinian Central Bureau of Statistics (PCBS).

The impact is measured under two different approaches. The first approach assumes no changes in the model and SAM, and assumes changes in the electricity sector according to three scenarios. Scenario1 assumes an increase of total factor productivity in the electric sector by 10% which reflects solar energy technology. Scenario2 assumes an increase of excise tax on electricity imports by 10%. Scenario3 assumes an increase of both total factor productivity as an indicator of increase in domestic electricity production, and excise taxes as a government intervention to decrease the level of imports. The Second Approach alters the model and SAM and adds a new sector after which two scenarios are conducted. Scenario1 alters the SAM only by adding "solar energy sector" with initial values reflecting the current situation, and then assumes an increase of domestic production for this sector. Scenario2 alters model's equations such that electricity imports from Israel are determined residually (imports are the difference between domestic demand and supply), and then assumes an increase of domestic production of the new sector by 10% and 200%.

The results show that solar energy has a positive impact on government budget, external trade, labor market and households. As for the first approach, under the scenario1, budget deficit will decrease by 0.09%, electricity imports from Israel will increase by 0.76%, labor demand will increase by 1.18%. Finally, households' total income will increase by 0.36%. Under the scenario2, budget deficit will decrease by 0.23%, electricity imports from Israel will decrease by 6.07%, labor demand will decrease by 10.17% and households' total income will decrease by 0.74%. Under the scenario3, budget deficit will decrease by 0.138%, electricity imports from Israel will decrease by 5.37%, labor demand will decrease by 9.13% and households' total

income will decrease by 0.4%. As for the second approach, under the scenario1 when assuming that the value of production from solar energy sector is $0.2 million followed by a 10% increase in production, in general there were positive but small effect on public finance, external trade, labor market and households' income. Under the scenario2 an increase of domestic production by 200% will lead to a decrease in budget deficit by 0.0008%, decrease in electricity imports from Israel by 0.467%, decrease in unemployment level by 1.107% and increase in households' total income by 0.505%.

Key words: solar energy, CGE, SAM.