UN-ESCWA

Measuring the Costs of Israeli Restrictions on the Palestinian Economy:

A Computable General Equilibrium (CGE) Approach

Contents

Acknowledgments

The lead author of this report is Mr. Ohan Balian with the contribution and support of Mr. Ali Bayar (EcoMod network), as well as Mr. Fernando Cantu-Bazaldua and Mr. Rabi Bashour, under the guidance of Mr. Tarik Alami, Director of Emerging and Conflict related Issues Division (ECRI) at UN-ESCWA. The preliminary findings of this report were first presented at the workshop Palestine and the Occupation: Towards a Deeper Understanding and a Targeted Research Agenda organized by ESCWA in Beirut on 25-26 November 2015.

EXECUTIVE SUMMARY

Israeli restrictions on the Palestinian economy have long been a source of weak economic performance by misallocating scarce Palestinian resources. The unequal trade relations between Israel and Palestine have also made it increasingly difficult for Palestinian producers to compete with foreign imported goods and services. Various studies have attempted to quantify the impact of these restrictions but few have succeeded in doing so objectively by looking at the impact of these restrictions on Palestinian households, producers, investment, savings, and on the government. Perhaps the World Bank has been the main proponent of such a *general equilibrium* approach for assessing the economy-wide impacts of these restrictions but even their latest model is based on an outdated database in the form of a Palestinian Social Accounting Matrix (SAM) for 1998.

The Computable General Equilibrium (CGE) model developed and simulated in this report is based on the most recent SAM for 2011 with the objective of using it for on-the-ground policy prescriptions for both Israeli and Palestinian policy makers, in addition to providing donor countries accurate assessments of the sectoral, allocative, and distributional costs of the various Israeli restrictions on the Palestinian economy. The so-called model PALECOMOD was constructed by Bayar, A. (2013) which is a multi-sector general equilibrium model and has powerful capabilities for impact and scenario analysis. PALECOMOD incorporates the economic behavior of four economic agents: producers (firms), households (consumers), government (PA), and the Rest of the World which is composed of two regions: Israel (ISR) and the Rest of the World excluding Israel (ROW). The CGE model does not take into account the behavior of individual firms but of *groups* of similar ones aggregated into branches. The model distinguishes 16 branches of activities as described in Section 2.2, and each branch of activity produces several types of goods or services. It is calibrated on the SAM for 2011 and is solved using the General Algebraic Modeling System (GAMS) software.

The model is able to identify and describe the structural characteristics and production technologies of the Palestinian economy before conducting any policy simulations. Section 2.3 calculates the shares of factors (labor and capital) and intermediate inputs (commodities) in the total output of each sector. By calculating the share of GDP generated by each sector, we are in effect determining which sectors contributed the most to value-added. Our findings show that the Palestinian economy depends heavily on Public Services and Trade (wholesale and retail) at 19.6% and 18% respectively. Manufacturing, construction, and education also account for relatively large shares of GDP at about 9% each. The most labor-intensive sectors are transportation, public services, accommodation, and education. The most capital-intensive sectors are agriculture, mining, trade, finance, and ICT. Together these calculations describe the structural characteristics of production in the Palestinian economy. The model also calculates the share of each primary factor (L & K) and intermediate input (commodity) payments in the value of gross output. We are in effect determining sectors' production technologies. In other words, we are calculating the amount of each input required to produce

one unit of each sectors' output. *We found out that in Palestine manufactured goods are the most important intermediate inputs in almost all sectors.* This information on sectors' production technologies allows us to estimate the "linkages" between the various sectors.

These calculations show that there are important *inter-sectoral linkages* between the 16 sectors of the Palestinian economy because the output of one sector is used as an input in all other sectors (known as the input-output linkages) so any disruption (exogenous shock) in the output of one sector will have direct (on that sector) and indirect (on other sectors) effects which will be amplified over time depending on how much of the output of a specific sector is used in the production of the output of all the other sectors. By calculating the share of all inputs (L&K and intermediate inputs) in the value of gross output, we are in effect determining the production technologies. This information on production technologies allows us to estimate the linkages between the various sectors. So we deduce that any disruption caused by Israeli restrictions on the output, intermediate inputs, sources of household income, movement of labor, and the like, will affect these linkages among the sectors through the production technologies which are described and illustrated through the *Multiplier Effect* in Section 2.3.2.

The usual assumption for such a CGE model, and for PALECOMOD, is that producers operate on perfectly competitive markets and maximize profits (or minimize costs for each level of output) to determine optimal levels of inputs and output. The representative household receives all the capital and labor income plus transfers from the government plus transfers from ROW. Government transfers comprise of social benefits other than social transfers in kind. The household pays income taxes on domestic income at a certain rate , income taxes on income from abroad, and saves a share of the net income. The disposable income for consumption is allocated between different goods and services according to a specific utility function. The government collects all taxes such as current taxes on income, wealth, etc., tariffs, other taxes on products, social security contributions, and other taxes on production. The specification of foreign trade is based on the small-country assumption which means that the country is a price taker in both its imported and exported commodities. A distinction has been made in PALECOMOD between imports from different trade partners. We distinguish imports from Israel and imports from the rest of the world (ROW).

A standard assumption in CGE models is that the economy is initially in equilibrium with the quantities normalized in such a way that prices of commodities equal unity. Due to the homogeneity of degree zero in prices , the model only determines relative prices. Therefore, a particular price is selected to provide the numeraire price level against which all relative prices in the model will be measured. In this case, the GDP deflator is chosen as the numeraire. The relationship between supply of labor and the demand for labor is defined in such a way that it takes into account unemployment. Furthermore, the responsiveness of the real wage rate to labor market conditions is given by the Phillips curve. Equilibrium in the product, capital, and labor markets requires that

demand equals supply at prevailing prices (taking into account unemployment for the labor market). The capital stock is sector specific such that the equality between demand for capital and supply of capital determines the return to capital by branch of activity. Separate market clearing equations are distinguished in the model for each commodity, and demand for inventories for each commodity is defined as a fixed share of private investment in each branch of activity.

The closure rules refer to the manner in which demand for and supply of commodities, macroeconomic identities, and factor markets are equilibrated *ex-post*. In other words, the closure rules determine which variables are *exogenous* (determined outside the system of the model equations) and which variables are *endogenous* (determined within the model equations). Due to the complexity of the model, a combination of closure rules is needed. The particular set of closure rules should also be consistent, to the largest extent possible, with the institutional structure of the Palestinian economy and with the purposes of the model. In mathematical terms, the model should consist of an equal number of independent equations and endogenous variables. The closure rules reflect the choice of the model builder of which variables are exogenous and which variables are endogenous, so as to achieve ex-post equality. The most widely accepted macro closure rule for CGE models implies the assumption that investment and savings balance. In our model, domestic savings and investments are assumed to adjust to the given foreign savings. This reflects an economy in which savings form a binding constraint. The interest rate is assumed to effectively balance the supply and demand for investments, even if the specific mechanism is not incorporated in the model.

The model is then used to conduct 2 policy simulations (1). An increase in "transaction costs" due to the increase in restrictions imposed by Israel; and (2). Easing of Israeli restrictions on Area C which contains almost 80% of Palestinian natural resources. The simulation results of the first scenario - an increase of 50 percent in "transaction costs" due to stricter restrictions imposed by Israel – show that this would have a major negative impact on the Palestinian economy. Real GDP would decrease by more than 27 percent in the short run. Real consumption would fall by more than 24 percent which means that the welfare and living standards of the Palestinian population would considerably deteriorate. Real investment would decrease by about 50 percent meaning that if dynamic effects are taken into account, the potential of the Palestinian economy would deteriorate significantly in the future and create a vicious cycle producing dynamic slowdown effects on growth and employment. The considerable negative impacts of increasing restrictions would produce a very large decrease in domestic production and employment. The agricultural, mining, and manufacturing sectors would contract the most. Energy production would also shrink significantly to satisfy the lower demand by a smaller economy. The construction sector would also contract as the demand for investment would decrease considerably in a slowing Palestinian economy. All these vicious effects would destroy a large number jobs. Exports would also fall dramatically, especially in agriculture, mining, manufacturing and in activities related to tourism (ac-

commodation, hotels, and restaurants). This is due to the fact that an increase in the restrictions would tremendously decrease the productive capacity of the Palestinian economy. Given that these restrictions are remarkably high in agriculture, in the use of natural resources, and in tourism services, the impacts of a further increase in the restrictions would be much stronger in these sectors. As a result of stricter restrictions, the economy would slowdown, investment would fall and therefore the construction and manufacturing sectors would lower their output, exports, and imports substantially as they are the two main sectors delivering goods for investment.

The simulation results of the second scenario – Easing of Restrictions on Area C – show that GDP would increase by 12%. The easing of restrictions on Area C is modeled by assuming that a *partial* relaxation of restrictions on Area C would allow Palestinians to increase the use of capital by 50% in the agricultural and mineral sectors. As a result, it is also assumed (very conservatively) that Total Factor Productivity (TFP) is also increased by 5%. The macroeconomic impacts show that GDP would increase by 12% ($860 million) with 10% and 45% increases in consumption and investment respectively. Total unemployment would also fall by 27%. As for the impact on production and employment at the sectoral level, it is shown that although agricultural output increases by 53%, there is a -8.2 decline in employment in this sector. This is because given that the agricultural sector is a highly capital intensive sector (because "capital" includes also "Land"), farmers have become more productive and hence the agricultural sector requires less labor per unit of output. AS for foreign trade, the biggest gainer is the agricultural sector with an increase in exports of 183% followed by the Mining & Quarrying sector at 112%. Since the agricultural and Mining & Quarrying sectors are closely linked to other sectors through input-output linkages, it is no surprise that this scenario would have sizable impacts on backward and forward production and consumption linkages which eventually translate into higher GDP growth rates through the multiplier effect. Perhaps the other interesting (and expected) result of this simulation is the fall in agricultural imports by -28% which literally highlights the high Import Penetration Ratio – IPR reinforcing the urgent need to ease access to Area C for improving the Palestinian economy's ability to compete with imports from Israel and from the Rest of the World excluding Israel.

1. LITERATURE REVIEW ON COST ASSESSMENTS

The first truly *macroeconomic* computable general equilibrium (CGE) model built for the Palestinian economy was by Astrup and Dessus (2001) of the World Bank Country Office in the West Bank & Gaza. Their model was designed to assess various trade policy options available to the Palestinian economy *other* than the Oslo Paris Protocol in which Israel and Palestine were considered as a Customs Union with severe restrictions on the freedom of movement of both goods and people. This model used 31 production sectors[1] and 4 foreign trade partners. Among other simulations for modeling alternative trade regimes, their results clearly showed that there were considerable improvements in Palestinian trade performance and that a departure from the Customs Union with Israel would considerably expand trade, especially Palestinian exports. Their results also showed that trade liberalization could lower investment costs and increase their rates of return. This positive outcome was in addition to an increase in wages which would naturally improve the welfare of the Palestinian people.

Astrup and Dessus (2005) modified their original model to include dynamics and conducted several trade liberalization simulations, namely, (1) a progressive re-opening of the Israeli labor market; (2) permanent closure of the Israeli labor market; (3) a progressive re-opening of the Israeli labor market, trade liberalization & VAT reform; (4) permanent closure of the Israeli labor market, trade liberalization & VAT reform; (5) a progressive re-opening of the Israeli labor market and aid increase; and (6) permanent closure of the Israeli labor market, trade liberalization & VAT reform, and aid increase. These simulations resulted in the following outcomes: (1) the larger the amount of Palestinian workers in Israel (labor exports), the lower the capacity of Palestinian sectors to export goods; (2) the depreciation of the real exchange rate in Palestine that may result from a restricted entrance of Palestinian labor into the Israeli labor market will not prevent income losses for the Palestinian people in the short run; (3) this will not remain the case, however, should the depreciation be accompanied by adopting appropriate trade and fiscal policies, which would then magnify GDP growth; and (4) providing external assistance to Palestine within such settings would be a favorable option with a larger developmental impact than a re-opening of the Israeli labor market to Palestinian workers.

The model by Balian (2002, 2009) constructs a static trade-focused computable general equilibrium model to analyze the effects of four policy scenarios on the Palestinian economy. The results of these four simulation exercises demonstrate that first, reductions in transaction costs substantially increase the volume of trade and improve the Palestinian terms of trade. Second, the lower dependency of the Palestinian workforce on Israel also increases exports by 8%, but real household income falls since workers who were previously employed in Israel are now forced to work at the lower Palestinian

[1] Note that some of these sectors were in practice "industries" because the Palestinian Central Bureau of Statistics (PCBS) classifies the economy into 16 distinct sectors.

wage rate. And third, simulations of the full-separation scenarios demonstrate that the outcome primarily depends on whether separation is achieved through peaceful negotiations or unilaterally through the Intifada. The simulation results of this last scenario show that the volume of trade is substantially reduced by as much as 56% for exports and 30% for imports.

In the aftermath of the second intifada in 2001, and in the wake of increasing levels of poverty, Missaglia and De Boer (2004) kept away from trade liberalization and instead focused on poverty alleviation by simulating *Cash-For-Work* and *Food-For-Work* programs. At the same time, the international donor community began increasing its financial support and the choices between these two programs became hot topics of discussion. Their simulation results, however, showed that the outcomes of these two programs were similar because the amount of Food-For-Work was not very large. They ultimately preferred the Cash-For Work program because this generated more employment. The economic impacts of the second intifada were further modeled by De Boer and Missaglia (2006) by introducing an "intifada shock", and because their model produced only *nominal* macroeconomic estimates such as GDP, they derived the *real* indicators by deflating each demand component using the CPI. The authors confirmed (through comparisons provided in their study) that their estimations were closer to those of the IMF (based on a simple macro-founded income-expenditure model) and that their developed data (the counterfactual post-intifada SAM) can be productively used to simulate various policies relevant to the Palestinian economy at that time, for instance the impact of international interventions. The same authors repeated their comparison exercise in 2010 after more consensus results were published by the World Bank and the IMF in 2007 (De Boer and Missaglia, 2010). The authors compared the values predicted by three models, namely the World Bank dynamic CGE model, the IMF macro-founded income-expenditure model, and the DBM (De Boer-Missaglia) static CGE model to the "actual" indicators of the *ex-post* consensus estimates of the IMF and World Bank of 2007. They concluded that the estimates of the static CGE model were closer to the true outcomes than those obtained with the two alternative models because the static CGE model accounted for the Intifada shock.

Missaglia and Valensisi (2014) argue that the Palestinian economy has a couple of special settings that must be considered when applying a CGE model. They stress, for instance, the prevalence of unemployment in a conflict-torn economy to be particularly counter to the theoretical assumptions applied in standard CGE models. Accordingly, they claim to enhance the consistency between the modeling assumptions and the uniqueness of the Palestinian economy and to assess the extent to which results obtained from previous simulation exercises in the context of Palestine were robust under alternative macro closures. These issues are incorporated in a CGE macro-model for the Palestinian economy that considers the institutional arrangements enshrined in the Paris Protocol, the asymmetric integration of the economy with Israel, and the influence of the recurrent conflicts on the economy.

Their modifications on the models of Astrup and Dessus (2001; 2005) include (1) an adoption of a Leontief production function for the substitution between production factors to rule out factor substitutions and allow for incremental capital share changes and a mark-up pricing rule with the mark-up rate depending parametrically on the degree of competition, hence, *imperfect competition* prevails; (2) a replacement of the Armington assumption[2] by a different conceptual approach for both imports and exports. For imports, a log-linear demand function was adopted to relate the imports of final goods to the real output and relative price of domestically produced and imported goods, while the unitary income elasticity of import was avoided in a Constant Elasticity of Substitution (CES) setting that substitutes demand for imported goods from Israel and the rest of the world by applying a predetermined elasticity value. For exports, the Constant Elasticity of Transformation (CET) was replaced by *ad hoc* export functions that capture sales of Palestinian goods to Israel or the rest of the world (using two substitution elasticities for exports to the two regions) and the relevant *real* exchange rates; (3) a consideration of fiscal policy specificity in Palestine. The authors argue that it is hard to assume that public expenditures in Palestine are predetermined and public receipts (mainly from foreign donors) adjust endogenously to clear the government fiscal account. Another fiscal aspect is that, according to the Paris Protocol, VAT and tariffs, which represent a large share in public receipts, are collected by Israel and are subject to the political environment. Hence, they postulate that tax revenues collected directly by the Palestinian Authority are endogenous, while the budget deficit is exogenous to depict its dependency on revenues collected by Israel and those coming from international donors; and (4) a different assumption related to the balance of payments that assumes endogenous financial flows from the rest of the world to Palestinian households. By this, the authors tend to capture the effect of large capital inflows transiting through the financial account, while acknowledging the magnitude of remittances and official donor assistance inflows to Palestine and the endogenous attribute of the latter. It also considered the overlapping use of multiple currencies, namely the US dollar, the Jordanian dinar, and the Israeli shekel. The modified model was then calibrated to a simplified macro-SAM for Palestine with the required parameters being taken from the literature.

Three different experiments related to trade liberalization were simulated: (1) elimination of tariffs and purchase taxes on imports from the rest of the world; (2) elimination of tariffs and purchase taxes on imports from Israel; and (3) elimination of tariffs and purchase taxes on imports from all origins. Each of the three experiments was run using two different closure rules. The first closure fixed government real expenditures and net position at the base and allowed tax revenue to adjust, while the second closure fixed government savings to the base level and applied the pre-determined tax-rates.

[2] The Armington assumption says that products traded internationally are differentiated by country of origin. An Armington elasticity is an economic parameter commonly used in models of consumer theory and international trade. It represents the elasticity of substitution between products of different countries. See Armington, Paul (1969), "A Theory of Demand for Products Distinguished by Place of Production". International Monetary Fund Staff Papers, XVI (1969), 159-78.

Major findings of the study are that trade liberalization may neither have huge developmental nor growth implications on the economy of Palestine, as the authors found the economy to be relatively open to international trade. Nevertheless, the consequent public expenditure losses indicate that trade liberalization may turn out to be slightly contractionary. The authors suggest that these negative consequences of trade liberalization can only be overcome by combining such policies with complete transfer of taxes and duties collected by Israel on behalf of Palestine. The authors also identified some areas for future development of CGE research on Palestine, including the incorporation of detailed productive structure, disaggregated accounts for production factors (especially skilled and unskilled workers) and possibly a clear distinction between residential and non-residential investments.

The model by Bayar (2013, PALECOMOD) was developed in close collaboration with the various ministries and government agencies of the PA. It was calibrated using a newly constructed 16 sector SAM for 2011 with two foreign trading partners – Israel and the rest of the world. Perhaps one of the most distinguishing characteristics of PALECOMOD was its ability to also trace forward and backward production and consumption linkages to assess the impact of various restrictions on the Palestinian economy. The model was utilized to conduct three simulations; (1) an increase in VAT, (2) an increase in tariffs on imports from the rest of the world to model the increase in the costs of imports caused by Israeli restrictions, and (3) a reduction in transaction costs for modeling the easing of these restrictions. With respect to the first simulation, the results showed that almost all sectors experienced a decrease in domestic demand *except* for the construction sector. This was because the pre-tariff price for construction good and services fell as a result of the fall in total investment demand. The ultimate results of this simulation showed that the impact of an increase in VAT is to reduce economic activity and private consumption but government revenue would naturally increase.

With respect to the increase in import tariffs, the simulation results showed that this would have a negative impact on the economy by reducing real GDP. An increase in import tariffs would increase import prices, reduce real disposable incomes, private consumption, household savings, and investment. As a result, prices for consumers, investors, as well as for producers using imported goods in the production process would increase. Given that the Palestinian economy relies heavily on imported intermediate inputs in its aggregate production function, domestic producers, in most sectors, would not gain much in the short-run from the import substitution effects caused by the increase in import tariffs except in the manufacturing and public sectors. Finally, the third simulation provided the most promising outcome showing that a reduction in restrictions would have a major positive impact on the Palestinian economy by increasing private consumption and investment, and ultimately GDP by large amounts.

There have been many other less technical studies on the Palestinian economy by MoNE & ARIJ, World Bank, UNCTAD, RAND, and others which have attempted to quantify the impact of Israeli restrictions. In a joint 2011 study conducted by the Pales-

tinian Ministry of National Economy (MoNE) and ARIJ (Applied Research Institute – Jerusalem), the cost of Israeli restrictions was estimated at almost the GDP of the entire Palestinian economy. The total costs imposed by the Israeli occupation on the Palestinian economy were estimated at almost USD7 billion in 2010, almost 85% of total GDP. In other words, had the Palestinians not been subject to the Israeli occupation, their economy would have been almost double in size than it is today. These huge costs of the Israeli restrictions were determined by a myriad of Israeli policies, including the almost complete closure to international trade, the disruption caused to the electricity production, the limited access to the sea resources and the continued shelling of infrastructure. In addition, the restrictions on access to water and on access to natural resources deprive the Palestinians of enormous sources of revenues associated with the economic activities based on these natural resources. Other losses imposed by the occupation include the extra costs of electricity and water provision faced by the Palestinians, who are dependent on Israeli supplies for such provision due to the restrictions imposed on the electricity generation and on the access to water; the costs imposed by the restrictions on exports and imports, which translate into unavailability of inputs and higher production costs; the costs associated with the barriers to the movement of goods and people both between and within the oPt, and the destruction of productive assets, particularly the uprooting of trees. Despite the magnitude of the estimated losses, the study highlights the possibility that these are likely to be a severe under-estimation of the real costs imposed by the occupation on the Palestinian economy, as they have not been able to measure all the different costs of the occupation due to a lack of data. For example the prohibition to import goods such as lathe machines, which are essential inputs in the machinery production, has most probably stifled the development of the whole Palestinian manufacturing sector. However in the absence of an estimation of the potential size of the sector in the absence of such restrictions, it was not possible to quantify their costs.

The study by the World Bank ("Area C and the Future of the Palestinian Economy" 2014) looks at the impact of lifting restrictions on Area C which encompasses about 60% of the West Bank and contains almost 80% of its natural resources primarily agricultural, water, mineral deposits, and stone quarries. The study adopts the "value-added" approach for 6 loosely defined "sectors", namely, agriculture, minerals, stone mining and quarrying, construction, tourism, and telecoms. The total value-added generated by lifting restrictions on these sectors in Area C is estimated at $2.2 billion. However, they acknowledge that their study does not take into account *"spillover effects* (that is, induced effects) *generated when additional income generated by new activities is spent to purchase goods and services"* (Executive Summary, p5). Perhaps one of the main shortcomings of their study is that it only looks at the contributions of labor and capital (value-added) without considering the impact on intermediate inputs in the output of these activities in Area C. Apart from the weakness that this is a "partial" equilibrium analysis in which these 6 "sectors" in Area C are looked at in isolation from the rest of the economy, the absence of a fully disaggregated sectoral decomposition of the Palestinian economy into the 16 sectors as included in this report, their model does not take into

account the Multiplier Effects as explained in Section 2.3.2. The upshot of this shortcoming is that there are no guarantees that the contribution of value-added generated by these 6 sectors will indeed be as large as $2.2 billion because a lot of intermediate inputs are imported from the rest of the world which results in a "leakage" of these benefits to foreign producers. Similarly, the share of final imported goods in the consumption basket of Palestinian households is large which again results in a "leakage" to the foreign producers of these final goods when we take into account *forward* and *backward* production and consumption linkages between the 16 sectors and the rest of the world in our model as extensively discussed and numerically illustrated in Section 2.3.2.

The study by UNCTAD ("Palestinian Fiscal Revenue Leakages to Israel under the Paris Protocol on Economic Relations" 2014) focuses on the Paris Protocol sections dealing with imports, customs, and value added tax (VAT) policies, highlighting its main shortcomings. These stem mainly from the fact that the Protocol is outdated and related to a transitional period that was supposed to end in 1999. As a result, it no longer addresses the current challenges before the Palestinian economy or its prospects within an independent Palestinian State; neither does it mention the lack of Israeli commitment to the terms of the Protocol, such as the obligation to transfer to the Palestinian National Authority its full financial entitlements to the collection by the Government of Israel of purchase taxes and customs duties on Palestinian imports cleared through Israeli ports of entry. The study reviews in detail all the tax and customs policies arising from the Paris Protocol and the Israeli tax system which it embodies, as applied in the Occupied Palestinian Territory. The policy framework has caused continued instability and uncertainty for the Palestinian treasury, fiscal leakage resulting from a restrictive trade relationship that allows for indirect imports through Israel, minimal Palestinian control over the flow of external trade, inconsistencies in the working mechanism for collection of purchase taxes and evasion of customs duties. The study finds that these problematic issues are largely caused by the type of trade relationship engendered by the Paris Protocol and the Israeli logic in applying it. The study also proposes a methodology to estimate fiscal leakage resulting from importing from or through the Israeli market, and the ensuing evasion of customs duties. This estimate is made on the basis of official Palestinian statistics of total imports from Israel. Customs duties evasion is estimated by identifying relevant percentages and indicators from the available data. The analysis shows that fiscal leakage from the aforementioned sources exceeded $310 million in 2011, equivalent to 3.6 per cent of total gross domestic product (GDP) and 18 per cent of the tax revenue of the Palestinian National Authority. Around 40 per cent of the fiscal leakage is related to direct and indirect imports from Israel, and the remaining 60 per cent is in the form of evasion of customs duties. The study suggests a number of recommendations pointing to the pressing need to change the modus operandi of the Palestinian import regime to ensure Palestinian rights in all economic, trade, financial and taxation areas. This will require new trade arrangements that cover borders, customs and a tax collec-

tion mechanism to prevent fiscal leakage to Israel. With regard to indirect imports, information should be exchanged regularly between the Palestinian and Israeli authorities, customs and monitoring systems should be developed and the Government of Israel should acknowledge Palestinian financial entitlements to purchase taxes on goods made in Israel and sold on the Palestinian market and to the customs duties and purchase tax revenue collected on products indirectly imported through Israel.

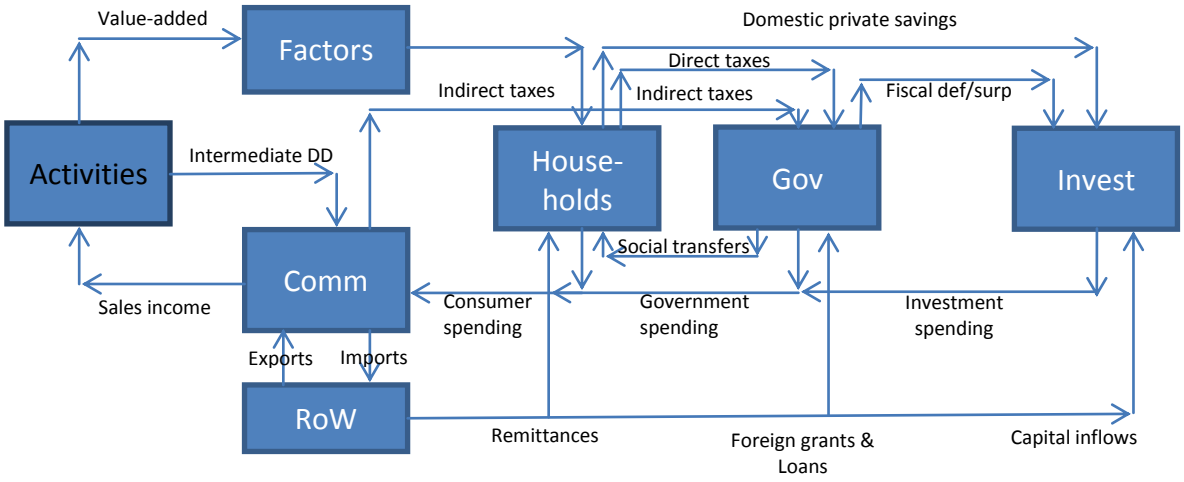
The study by RAND ("The Costs of the Israeli-Palestinian Conflict" 2015) uses a "counterfactual approach" to explore the question of *"how specific outcomes might have differed if conditions had been different"*. The study estimates the costs and benefits over a 10 year period (2014-2024) of 5 scenarios – a two state solution; coordinated unilateral withdrawal; uncoordinated unilateral withdrawal; non-violent resistance; and violent uprising. These counterfactual scenarios are then compared with the costs and benefits of the *status quo* impasse that evolves in accordance with current "business-as-usual" trends. It is no surprise that the results of this study show that the two state solution is the best outcome for both Israelis and Palestinians in which Israelis gain over twice more than Palestinians in absolute terms ($123 billion vs. $50 billion) but Palestinians gain proportionately more with average per capita incomes increasing by 36% compared to 5% for Israelis over this 10 year period. Although the current political impasse affects Israelis and Palestinians mainly through its impact on the economic, security, and socio-psychological dimensions of their lives, they only look at the economic dimension which focuses on GDP, GDP per capita, and public and private expenditures in both Palestine and Israel. The study also looks at both direct and indirect costs (opportunity cost) of these 5 counterfactual scenarios compared to the "business-as-usual" current scenario. Perhaps the biggest deficiency of their approach is that their outcomes depend on the *subjective assumptions* adopted in these counterfactual scenarios which are very ambiguous based on both historical grounds and on the perceptions of both Palestinians and Israelis to live side-by-side in any one of these scenarios. Their approach is akin to a "crude forecasting" methodology without any solid macroeconomic framework and is not based on any *behavioral microeconomic objective assumptions* regarding Palestinian and Israeli economic agents, sectors, and institutions as in our model. Our model also adopts a "counterfactual" but it is firmly based on a data-rich benchmark (Social Accounting Matrix) which represents the state of the Palestinian economy describing its production technologies and macroeconomic structural characteristics. The RAND study looks only at overall growth rates and trends in *total* GDP and other aggregate economic variables without any reference to specific sectors, linkages between these sectors, income groups, trading partners, and the like, all of which make their approach not very useful for practical policy prescriptions to address resource allocation and income distribution issues which are captured, modeled, and addressed in our model.

2. ANALYTICAL FRAMEWORK

2.1 Circular-flow-of-economic activity in the Palestinian economy

Figure 1 below shows the stylized depiction of the circular-flow-of-income in the Palestinian economy. Producers (also known as activities) produce output and services which are then sold in the commodity market. These producers then pay wages and interest to the factors of production (labor and capital) in addition to payments for intermediate inputs (all the inputs other than labor and capital) purchased from the commodity market. Palestinian households (or consumers) receive this factor income to make purchases for daily consumption goods and services, they also pay direct taxes (in the form of income and other taxes), and they save the rest (or dis-save if consumption expenditure is greater than factor income). Palestinian households also receive income from remittances from the rest of the world (in the form of transfers from relatives working abroad) and social transfers from the government (in the form of unemployment benefits and pension payments). The commodity market is differentiated from the production market because each production activity can produce more than one commodity. The commodity market also deals with imports and exports and pays indirect taxes (such as VAT and import tariffs) to the government.

Figure 1 A stylized representation of the circular-flow-of-economic activity for the Palestinian economy



The government is a big player which makes payments for goods and services purchased from the commodity market. It receives income from taxes (both direct and indirect taxes) and also in the form of foreign grants and loans which, as we see later, is a large amount for the Palestinian economy relative to its GDP. The difference between total government income and total government expenditure is the fiscal surplus or deficit depending on their relative magnitudes.

In the circular-flow-of-income, by definition, total expenditures must be equal to total income in the economy and for this reason all savings are channeled to investors who in turn purchase investment goods from the commodity market in the form of private and public investments depending on whether these investors are from the private or from the public sectors. The rest of the world in this circular-flow-of-economic activity is separated into "Israel" and the "rest of Israel" to take into account the specific conditions under which Palestinian trade is conducted with these two distinct regions. The rest of the world includes all transaction (both payments and receipts) between the Palestinian economy and foreign markets for both imports and exports. Finally, Palestinian production activities are separated into 16 sectors as classified by the Palestinian Central Bureau of Statistics (PCBS): *Agriculture, forestry, and fishing; Mining and quarrying; Manufacturing; Electricity, water, and gas; Construction; Wholesale and retail trade; Transportation and storage; Financial and insurance activities; Information and communication; Accommodation and food service activities; Real estate activities; Professional, scientific, and technical activities; Education; Human health and social work activities; Public administration and defense;* and *Other service activities.*

2.2 Social Accounting Matrix (SAM) for Palestine

2.2.1 A macro SAM for Palestine (2011)

Table 1. A macro Social Accounting Matrix for Palestine for 2011 (million $US)

		1	2	3	4	5.1	5.2	6.1	6.2	6.3	7	TOTAL
		Activities	Comm	Factors	House holds	Gov	Net taxes on products; taxes on factors	Private Inv	Public Inv	Changes in inventories	RoW	
1	Activities		13,847									13,847
2	Comm	6,000			9,432	2,920		1,650	370	-332	1,510	21,550
3	Factors	7,168									750	7,917
4	Households			7,917		521					346	8,784
5.1	Gov				141		1,977				859	2,977
5.2	Net taxes on products; taxes on factors	48	1,928									1,977
6.1	Private Savings	631			-789	-834					2,311	1,319
6.2	Public Savings					370						370
6.3	Changes in inventories							-332				-332
7	RoW		5,775									5,775
TOTAL		13,847	21,550	7,917	8,784	2,977	1,977	1,319	370	-332	5,775	

Source: Bayar, A., 2013 (ECOMOD).

Starting with the activity account in Table 1, total activity income was $13,837 m which was income received from the commodity market in the form of domestic supply.

Total intermediate inputs used in the production process was $6,000 m and total value-added was $7,168. To obtain gross value-added at factor cost, we deduct taxes on products and production, and taxes on factors of production from gross value-added at market prices. These taxes are important sources of income for the PA and include taxes on labor (health insurance), taxes on capital (property tax), VAT on domestic production, Customs on domestic production, Excises on domestic production, "other" taxes on consumption, VAT on imports, Customs on imports, Excises on imports, "other" taxes on imports, purchase tax on imports, and subsidies. Total taxes on factors of production were $48 m and total taxes on commodities were $1,928 m. Consumption of fixed capital was $631 m which was obtained as 4% of output[3]. The difference between gross value-added at market prices and the sum of all taxes gives us net value-added at factor cost which was $7,168 m. The column sum total of the activities account gives us gross output which was $13,847 m.

Moving to the commodity account, the row sum gives us total demand ($21,550 m) which is comprised of intermediate demand ($6,000 m), household consumption demand ($9,432 m), government demand ($2,920 m), private investment demand ($1,650 m), public investment demand ($370 m), and foreign demand for Palestinian exports ($1,510 m). (There is also an inventory allowance of $-332 m). This total demand is composed of expenditures on domestic supply, sales and import taxes, and payments for imports, giving us total supply. The factors account (labor and capital which are not disaggregated into their separate components yet) show that total factor income was $7,917 m of which $7,168 m was earned domestically in the production process and $750 m was earned from abroad in the form of wages mainly Palestinian wage income earned in Israel. Total factor income is subsequently transferred to Palestinian households.

Households therefore earn their income from factors of production ($7,917 m), they also receive transfer payments from the government ($521 m) and wages earned from abroad ($346 m) giving them a total income of $8,784 m. This household income is consequently spent on commodities ($9,342 m), and paid to the government in the form of direct taxes ($141 m) giving us a total household expenditure of $8,784 m. Note that the difference between household income and expenditure is private savings which is a *residual*, and in this case negative ($-789 m) which is expected since Palestinian consumers spend more than they earn because of their limited sources of income under the Israeli restrictions. The government in turn receives income from households (in the form of direct income taxes), from net taxes on products and factors ($1,977 m), and from the rest of the world in the form of grants and loans ($859 m). This government revenue is spent on commodities ($2,920 m), transferred to households in the form of transfer payments by the PA ($521 m), and the rest is saved which determines the budget deficit or surplus. Note that the government account is separated into net taxes even in this macro-SAM which includes all net tax receipts ($1,977 m) which are subse-

[3] This 4% depreciation rate was obtained from the Economic Survey Series carried out by PCBS (2011).

quently transferred to the government account. Finally, the rest of the world account represents export earnings ($1,510 m), remittances from abroad ($750 m), wages earned in the rest of the world ($346 m), foreign grants and loans ($859 m), and the current account balance ($2,311 m).

2.2.2 A disaggregated SAM for Palestine

Table 2. A disaggregated Social Accounting Matrix for Palestine for 2011 (million $US)

INSERT Table 2 HERE

See Word Doc A3 which was sent separately
(Please print on A3 paper)

2.3 Key macroeconomic characteristics of the Palestinian economy

2.3.1 Production, Commodity, Demand, Household, and macro *shares*

PRODUCTION SHARES

Table 3. Activity production values ($million)

		Activity																
		Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	Total
Commodity	Agr	190	0	406	8	14	9	1	0	0	39	0	1	1	1	0	1	**671**
	Min	0	8	97	1	33	21	1	0	0	0	0	1	0	0	0	0	**162**
	Man	381	24	817	43	655	143	161	3	26	40	2	28	35	98	26	20	**2502**
	Elc	52	2	44	112	8	46	1	1	6	3	1	3	5	6	6	6	**302**
	Con	0	0	0	1	54	5	0	0	0	0	0	0	2	1	9	1	**73**
	Trd	19	0	0	0	1	3	8	0	0	0	0	0	0	0	6	0	**45**
	Tsp	1	1	2	0	0	82	4	4	60	0	1	6	4	4	14	4	**187**
	Fin	0	1	13	1	5	10	1	73	6	1	1	2	1	0	0	0	**115**
	ICT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Acc	0	0	1	0	0	10	0	0	0	14	0	1	1	1	1	2	**31**
	Rel	37	0	5	0	5	108	3	5	7	5	14	10	4	6	6	12	**227**
	Pro	0	0	1	0	3	25	1	3	7	0	0	13	3	3	6	2	**67**
	Edu	0	0	0	0	0	0	0	0	1	0	0	0	14	0	1	1	**17**
	Hth	67	0	0	0	0	1	0	0	0	0	0	0	0	26	0	0	**94**
	Pub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1401	0	**1401**
	Oth	0	0	1	0	18	2	6	2	0	0	0	1	6	9	40	24	**109**
	L	**14**	**9**	**282**	**23**	**229**	**180**	**90**	**57**	**69**	**31**	**65**	**41**	**526**	**159**	**1396**	**82**	**3252**
	K	**430**	**53**	**394**	**83**	**409**	**1122**	**7**	**262**	**444**	**8**	**244**	**115**	**129**	**138**	**13**	**61**	**3915**
	Total	**1191**	**98**	**2063**	**272**	**1434**	**1767**	**284**	**410**	**626**	**141**	**328**	**222**	**731**	**452**	**2925**	**216**	**13170**

Table 3.1 Gross Domestic Product (GDP) at factor cost

Sector	Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	
GDP	444	62	676	106	638	1302	97	319	513	39	309	156	655	297	1409	143	**7165**
GDP Share	6.2%	1%	9.4%	1.4%	9%	18%	1.4%	4.5%	7.2%	.5%	4.3%	2.2%	9.1%	4.2%	19.6%	2%	100%

Table 3.2 Value-added shares % (Tells us L's and K's contribution to each sector's GDP)

Sector	Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	
L	3	14	42	22	36	14	93	18	14	80	21	26	80	54	99	57	
K	97	86	58	78	64	86	7	82	86	20	79	74	20	46	1	43	
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

Table 3.3 Activity production shares % (Tells us the share of commodity and factor inputs in each sector's output)

		Activity																
		Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	ToT
Commodity	Agr	16		20	3	1	0.5	0.4	.	.	2.8	.	0.5				0.5	5.1
	Min		8	5	0.5	2	1	0.4					0.5					1.2
	Man	32	25	40	16	46	8	57	0.7	4.2	28	0.6	13	4.8	22	1	9.5	19.0
	Elc	4.5	2	2	42	0.5	2.5	0.4		1	2	0.3	1.4	0.7	1.3		2.8	2.3
	Con				0.5	3.8	0.3									0.3		0.6
	Trd	1.5						2.8										0.4
	Tsp		1	0.5	0.5		4.7	1.4	1	10		0.3	2.7	0.5	1	0.5	2	1.4
	Fin		1				0.5	0.4	18	1	0.7	0.3	1					0.9
	ICT																	0
	Acc						0.5				10		0.5				1	0.2
	Rel	3					6	1	1.2	1	3.5	4.3	4.5	0.6	1.3		5.5	1.7
	Pro						1.5	0.4	0.7	1			6	0.5	0.6		1	0.5
	Edu													2			0.5	0.2
	Hth	5.5													6			0.7
	Pub															48		10.6
	Oth							2.1	0.5				0.5	0.8	2	1.4	11	0.8
	L	1.5	9	14	8.5	16	10	32	14	11	22	20	18.5	72	35	47	38	24.7
	K	36	54	18.5	29	30.7	64.5	2.5	64	71	5.5	74	52	18	30	0.5	28	29.7
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 3 shows the contribution of each sector to total value-added. As can be seen from Table 3.1, Public Administration is the biggest contributor to GDP at 19.6% (this is expected because of the relatively large size of the Palestinian public sector) followed by the trade sector (wholesale and retail trade) at 18%. The manufacturing, construction, and education sectors are also relatively large sectors at about 9% each and the ICT sector contributes around 7% to GDP which, in recent years, has shown considerable growth potential primarily due to Israeli restrictions on the movement of goods and people which has driven employment in this non-tradable service sector by relatively large numbers of young Palestinian university graduates. The most labor-intensive sectors are Public Administration, transportation, accommodation, and education as shown in Table 3.2. The agricultural sector is highly capital-intensive which, to some extent, explains the inability of Palestinian farmers to access their lands, especially in Area C, because of the Israeli restrictions. The second most capital-intensive sector is mining and quarrying which is natural since this sector requires large capital investments to benefit from economies of scale. The ICT sector is the third largest capital-intensive sector followed by the real estate and professional service sectors.

Table 3.3 goes one step further and calculates the shares of factors (labor and capital) and intermediate inputs (commodities) in the total output of each sector. For example, in the agricultural sector, the share of manufacturing is 32% combined with the shares of all other intermediate commodities used as inputs in the production of the agricultural sector, in addition to 36% and 1.5% of capital and labor inputs respectively. The diagonal matrix in Table 3.3 shows *intra-industry* transactions in which a sector also uses its own output as an intermediate input. All of these sectors, except the trade and ICT sectors, use their own outputs as inputs in their productive activities. Also note the importance of the manufacturing sector in the Palestinian economy which is the only sector which supplies its own output as inputs to *all* other sectors including into its own production activities at 40% as highlighted in red in Table 3.3.

By calculating the share of GDP generated by each sector, we are in effect determining which sectors contributed the most to value-added. Our findings (Table 3.1) show that the Palestinian economy depends heavily on Public Services and Trade (wholesale and retail) at 19.6% and 18% respectively. Manufacturing, construction, and education also account for relatively large shares of GDP at about 9% each. The most labor-intensive sectors (Table 3.2) are transportation, public services, accommodation, and education. The most capital-intensive sectors are agriculture, mining, trade, finance, and ICT. Together these calculations describe the *structural characteristics* of production in the Palestinian economy. In Table 3.3, by calculating the share of each primary factor (L & K) and intermediate input (commodity) payments in the value of gross output, we are in effect determining sectors' *production technologies*. In other words, we are calculating the amount of each input required to produce one unit of each sectors' output. We found out that in Palestine manufactured goods are the most important intermediate inputs in almost all sectors. This information on sectors' production technologies allows us to estimate the "linkages" between the various sectors.

COMMODITY SHARES

Table 4. Commodities

	Commodity ($million)																
	Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	
Imports from RoW	70	0	2803	0	3	0	29	0	20	0	0	46	0	0	0	1	2972
Imports from IL	112	134	677	426	49	0	419	2	296	0	0	673	0	0	0	15	2803
Exports to RoW	3	1	98	0	407	0	48	0	126	0	0	55	0	0	0	7	745
Exports to Israel	19	3	596	0	94	0	11	0	29	0	0	13	0	0	0	2	767

Table 4.1 Trade shares (%) (Share of each commodity in imports and exports)

	Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	
Imports from RoW	2.4	0	94.3	0	0.1	0	1	0	0.7	0	0	1.6	0	0	0	0	100%
Imports from IL	4	4.8	24.2	15.2	17.5	0	15	0	10.6	0	0	24	0	0	0	0.5	100%
Exports to RoW	0.5	0	13.2	0	48.2	0	6.5	0	17	0	0	7.4	0	0	0	1	100%
Exports to Israel	2.5	0.4	77.7	0	12.3	0	1.4	0	3.8	0	0	1.7	0	0	0	0.2	100%

Table 4.2 Total , intermediate, and final demand for each commodity ($million)

	Commodity																
	Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	ToT
Intermedd	671	162	2502	302	73	37	187	115	0	31	227	67	17	94	1401	109	5995
Final dd	527		4676	495	2449	104	1093	2	475	521	1105	81	437	461	2695	436	15557
Total dd	1198	161	7178	797	2522	141	1280	117	475	552	1332	148	454	555	4096	545	21552

Table 4.3 Import penetration ratio and export intensity (%)

	Commodity (%)																
	Agr	Min	Man	Elc	Con	Trd	Tsp	Fin	ICT	Acc	Rel	Pro	Edu	Hth	Pub	Oth	
Share of imports from RoW in domestic dd (IPR)	5.8	0	39	0	0	1	2.3	0	4.2	0	0	31	0	0	0	0.2	
Share of imports from Israel in domestic dd (IPR)	9.4	83	9.5	54	2	0	33	1.7	63	0	0	455	0	0	0	2.8	
Share of exports to RoW in gross output (EIR)	0.2	1	4.6	0	28	0	16	0	19	0	0	24	0	0	0	3	
Share of exports to Israel in gross output EIR)	1.5	3	28	0	6.4	0	3.5	0	4.3	0	0	5.7	0	0	0	1	

Note: *Import-Penetration Ratio (IPR)* is the share of imports in total domestic demand; *Export-Intensity Ratio (EIR)* is the share of exports in gross output.

DEMAND SHARES

Table 5. Sources of demand ($million)

		Intermed dd	HsH dd	Gov dd	Inv dd	Export dd from RoW	Export dd from IL	Total
Commodity	Agr	671	512	0	0	3	19	**1205**
	Min	162	0	0	0	1	3	**166**
	Man	2502	4192	0	105	98	596	**7493**
	Elc	302	493	0	0	0	0	**795**
	Con	73	36	0	1915	407	94	**2525**
	Trd	37	104	0	0	0	0	**141**
	Tsp	187	1035	0	0	48	11	**1281**
	Fin	115	4	0	0	0	0	**119**
	ICT	0	320	0	0	126	29	**475**
	Acc	31	521	0	0	0	0	**552**
	Rel	227	1103	0	0	0	0	**1330**
	Pro	67	14	1	0	55	13	**150**
	Edu	437	315	121	0	0	0	**873**
	Hth	94	353	107	0	0	0	**554**
	Pub	1401	50	2644	0	0	0	**4095**
	Oth	109	380	47	0	7	2	**545**
	TOT	5995	9432	2920	2020	745	767	22300

Table 5.1 Demand shares by commodity (%)

		Intermed dd	HsH dd	Gov dd	Inv dd	Export dd from RoW	Export dd from IL	Total
Commodity	Agr	11.2	5.4	0	0	0.4	2.5	**5.4**
	Min	2.7	0	0	0	0	0.4	**0.7**
	Man	41.7	44.5	0	6.2	13.2	77.7	**33.5**
	Elc	5.0	5.2	0	0	0	0	**3.6**
	Con	1.3	0.4	0	93.8	54.6	12.3	**11.3**
	Trd	0.6	1.1	0	0	0	0	**0.6**
	Tsp	3.2	11.0	0	0	6.5	1.5	**5.8**
	Fin	2.0	0	0	0	0	0	**0.5**
	ICT	0	3.4	0	0	17.0	3.8	**2.2**
	Acc	0.5	5.5	0	0	0	0	**2.5**
	Rel	3.9	11.7	0	0	0	0	**6.0**
	Pro	1.2	0.2	0	0	7.4	1.7	**0.7**
	Edu	7.3	3.3	4.2	0	0	0	**3.8**
	Hth	1.6	3.8	3.7	0	0	0	**2.5**
	Pub	24.0	0.5	90.5	0	0	0	**18.4**
	Oth	18.0	4.0	1.6	0	1.0	0.2	**2.5**
	TOT	100%	100%	100%	100%	100%	100%	100%

Table 5.2 Demand shares by demand source (%) Shows share of dd from each source for each commodity

		Intermed dd	HsH dd	Gov dd	Inv dd	Export dd from RoW	Export dd from IL	Total
Commodity	Agr	55.7	42.5	0	0	0.2	1.6	**100%**
	Min	97.6	0	0	0	0.6	1.8	**100%**
	Man	33.4	56.0	0	1.4	1.3	8.0	**100%**
	Elc	38.0	62.0	0	0	0	0	**100%**
	Con	2.9	1.4	0	76.0	16.0	3.7	**100%**
	Trd	26.3	73.7	0	0	0	0	**100%**
	Tsp	14.6	80.8	0	0	3.8	0.9	**100%**
	Fin	96.6	3.4	0	0	0	0	**100%**
	ICT	0	67.4	0	0	26.5	6.0	**100%**
	Acc	5.6	94.4	0	0	0	0	**100%**
	Rel	17.0	83.0	0	0	0	0	**100%**
	Pro	44.7	9.3	0.6	0	36.7	8.7	**100%**
	Edu	50.1	36.1	13.8	0	0	0	**100%**
	Hth	17.0	64.0	19.0	0	0	0	**100%**
	Pub	34.2	1.2	64.6	0	0	0	**100%**
	Oth	20.2	70.3	8.5	0	1.5	0.5	**100%**
	TOT	27.0	42.3	13.0	9.0	3.3	3.4	100%

HOUSEHOLD SHARES

Table 6. Household Expenditure Values ($ million)			
		HsH expenditure	TOTAL
Commodity	Agr	512	**512**
	Min	0	**0**
	Man	4192	**4192**
	Elc	493	**493**
	Con	36	**36**
	Trd	104	**104**
	Tsp	1035	**1035**
	Fin	4	**4**
	ICT	320	**320**
	Acc	521	**521**
	Rel	1103	**1103**
	Pro	14	**14**
	Edu	315	**315**
	Hth	353	**353**
	Pub	50	**50**
	Oth	380	**380**
	Tax on Y-earned in PAL	133	**133**
	Tax on Y-earned in RoW	8	**8**
	Household savings	-789	**-789**
	Total Hsh Expenditure	8784	8784
Table 6.1 Household Expenditure Shares (%)			
Commodity	Agr	5.8	5.8
	Min	0	0
	Man	47.7	47.7
	Elc	5.6	5.6
	Con	0.5	0.5
	Trd	1.2	1.2
	Tsp	11.8	11.8
	Fin	0.1	0.1
	ICT	3.7	3.7
	Acc	6.0	6.0
	Rel	12.6	12.6
	Pro	0.2	0.2
	Edu	3.6	3.6
	Hth	4.0	4.0
	Pub	0.5	0.5
	Oth	4.3	4.3
	Tax on Y-earned in PAL	1.5	1.5
	Tax on Y-earned in RoW	0.1	0.1
	Household savings	-9.0	-9.0
	Total Hsh Expenditure	100%	100%

Table 6.2 Household Income Values ($ million)					
	Labor (L)	Capital (K)	Gov (Transfers)	RoW (Remit)	Total
Source of income	4002	3915	521	346	**8784**
Table 6.3 Household Income Shares (%)					
	Labor (L)	Capital (K)	Gov (Transfers)	RoW (Remit)	Total
Source of income	45.6	44.5	5.9	4.0	**100%**

Table 4 sheds light on the structure of imports and exports in the Palestinian economy. For analytical purposes, we have separated Palestinian external trade partners into Israel (IL) and the rest of the world (RoW). We see from Table 4.1 that Palestinians primarily export construction and manufactured goods to both the rest of the world and to Israel. 48.2% of total exports to the rest of the world are in construction while 12.3% are exported to Israel. Similarly, 13.2% of manufactured goods are exported to the rest of the world while a very large share of 77.7% of manufactured goods are exported to Israel. The picture is similar for imports where 94.3% of imported goods form the rest of the world are in the form of manufactured goods while 24.2% of imported goods from Israel are in the form of manufactured goods. We also note that imports from Israel of professional services, electricity, construction, and transportation are relatively large shares at 24%, 15.2%, 17.5%, and 15% respectively. This trade pattern somewhat reveals the close and interlocked trade relationship between Israel and Palestine.

Another way of understanding the relative importance of trade for different commodities is to calculate the Import Penetration Ratio (IPR) and Export Intensity Ratio(EIR) where IPR = Imports/Total Demand, and EIR = Exports/Gross Output as calculated in Table 4.3. Intuitively, IPR shows the extent of competition in domestic demand from imports. We see that the Palestinian manufacturing sector faces the highest level of competition from imports from the rest of the world with 39% of total demand supplied by the rest of the world (excluding imports from Israeli). Once we separate the external sector into the "rest of the world" and "Israel", we see that almost all Palestinian sectors face intense competition from Israeli imports with the highest in professional services at 455% followed by mining at 83%, ICT at 63%, electricity at 54%, and agriculture and manufacturing at 9.5% each. These high Import Penetration Ratios by Israeli imports do not bode well for promoting a vibrant domestic Palestinian economy. As for the Export Intensity Ratio, we see that most Palestinian exports are in construction and manufacturing where the Palestinian economy exports 28% of its construction activities to the rest of the world, 24% of professional services, 19% of ICT, and 16% of transportation to the rest of the world. These export shares are considerably reduced when one looks at exports to Israel where only about 5.7% of professional services are exported to Israel, 4.3% of ICT, 3.5% of transportation, and 3% of mining. The only product which is exported to Israel with a relatively large share is manufacturing at 28% which is due to subcontracting arrangements between Israeli and Palestinian manufacturers of labor-intensive products. On the whole, the Import Penetration and Export Intensity Ratios clearly demonstrate the one-sided nature of trade patterns between Israel and Palestine with intense competition from imports from Israel and limited access to foreign markets for Palestinian exporters due to the on-going Israeli restrictions on the movement of both goods and people.

Table 5 demonstrates the different sources of commodity demand including demand for intermediate inputs into the Palestinian production process, private household and public government consumption demand, investment demand, and external

demand for Palestinian exports separated into the "two" trading partners; RoW (the rest of the World) and IL (Israel). We see from Table 5.1 that the largest share of intermediate demand is for manufactured goods at 41.6% ($2502 m) by the manufacturing sector itself, followed by a 24% intermediate demand for public goods and services ($1401 m), and an 11.2% intermediate demand for agricultural goods ($671 m). Private household consumption demand is the highest for manufactured goods at 44.5% ($4192 m) followed by household demand for real estate services at 11.7% ($1103 m) and transportation at 11% ($1035 m). Not surprisingly, we note that most spending by the government is on the output of the public sector at slightly above 90% ($2644 m) while private investment expenditure is mostly on physical construction assets at about 94% ($1915 m) and the rest on manufacturing at 6% ($105 m). The largest share of demand for Palestinian exports from the rest of the world (excluding Israel) comes from construction sector at 54.6% ($407 m) while the largest share of demand for Palestinian exports by Israel is for manufactured goods at 77.7% ($596 m). Since the share of manufacturing in total value-added in the Palestinian economy is about 10%, Israeli restrictions on market access to both Israeli and non-Israeli markets will have considerable negative impacts on Palestinian employment and growth which is evidenced by the current statistics on high youth unemployment and low GDP growth rates.

Table 6 shows household income and expenditure values and shares. We see that the largest component of household expenditure is on manufactured goods at 47.7% ($4192 m) followed by spending on real estate and transportation at 12.6% ($1103 m) and 11.8% ($1035 m) respectively. However, a more important share for assessing the impact of Israeli restrictions on Palestinian living standards is to identify the *sources* of household income. Table 6.3 shows that 45.6% of household income is earned from labor ($4002 m) while 44.5% is received from Capital ($3915 m). Government transfer payments to Palestinian households constitute about 6% ($521 m) of their total income while 4% ($346 m) of total household income comes from remittances by family members who are working abroad (outside Israel) mostly in the GCC and neighboring countries. It takes very little imagination to see the adverse effects of Israeli restrictions on Palestinian labor movements on household incomes which will have considerable adverse impacts on household expenditures and ultimately on total spending through the multiplier effect which is the subject of the next section.

2.3.2 SAM multiplier analysis

The preceding discussion in Section 2.3.1 shows that there are important intersectoral linkages between the 16 sectors of the Palestinian economy because the output of one sector is used as an input in all other sectors (known as the input-output linkages) so any disruption (exogenous shock) in the output of one sector will have *direct* (on that sector) and *indirect* (on other sectors) effects which will be amplified over time depending on how much of the output of a specific sector is used in the production of the output of all the other sectors. By calculating the share of all inputs (L&K and intermediate inputs) in the value of gross output, we are in effect determining the *production*

technologies. In other words, we are calculating the amount of each input required to produce *one* unit of each sectors' output. We found out that in the Palestinian economy (Table 3.3) manufactured goods are the most important intermediate input in all sectors. This information on production technologies allows us to estimate the linkages between the various sectors. So we deduce that any disruption caused by Israeli restrictions on the output, intermediate inputs, sources of household income, movement of labor, and the like, will affect these linkages among the sectors through the production technologies.

When we talk of "exogenous demand-side shocks" to an economy, we are referring to changes in export demand, government spending, or investment demand. The impacts of these shocks have both *direct* and *indirect* effects. Direct effects are those pertaining to the sector that is directly affected by the shock. For example, suppose Israeli restrictions on agricultural exports are eased which would cause an increase in demand for agricultural products. However, this exogenous increase in demand caused by the easing of Israeli restrictions may also have indirect effects as a result of its linkages with other sectors and other parts of the economy. These indirect linkages can, in turn, be separated into *production* and *consumption* linkages. When we add up all direct and indirect linkages, we arrive at a measure of the shock's multiplier effect, or *how much a direct effect is multiplied by the indirect linkage effects*.

Production linkages are determined by sectors' production technologies, which are contained in the input-output part of a SAM. They are differentiated into *backward* and *forward* linkages. Backward production linkages are the increases in demand for additional inputs used by producers to supply additional goods or services. For example, when agricultural production in the Palestinian economy expands because of the lifting of restrictions on access to Area C (which contains about 80% of Palestinian agricultural resources), it will require more intermediate inputs such as manufactured goods, electricity, water, trade, real estate services, healthcare, and others. This demand then stimulates production in other sectors to supply these intermediate goods. As a rule of thumb, the more input-intensive a sectors' production technology is, the stronger its backward production linkages will be. Forward production linkages account for the increased supply of intermediate inputs to upstream sectors. For example, when Palestinian agricultural output expands because of easier access to Area C, the agricultural sector can supply more products to the food-processing sector (which is part of the manufacturing sector) which in turn will cause expansion of output in the manufacturing sector. As a rule of thumb, the more important a sector is for upstream sectors, the stronger its forward production linkages will be.

Stronger forward and backward production linkages lead to larger multipliers. Traditional input-output multipliers measure the effects of production linkages only. They do not consider *consumption* linkages, which arise when an expansion of production generates additional incomes for factors and households, which are then used to purchase goods and services. For example, when agricultural production expands, it

raises farmers' incomes, which are used to buy consumer goods. Depending on the share of imported and domestic goods in households' consumption baskets, domestic producers benefit from greater demand for their products. The size of consumption linkages depends on various factors, including the share of factor income distributed to households; the composition of the consumption basket; and the share of domestically supplied goods in consumer demand. Evidence from developing countries suggests that consumption linkage effects are much larger than production linkage effects. SAM multipliers therefore tend to be larger than input-output multipliers because they capture both production and consumption/income linkages.

Economic linkages are fairly static and are determined by the structural characteristics of an economy (that is, sectors' production technologies and the composition of households' consumption baskets). Multiplier effects, on the other hand, capture the combined effects of economic linkages over a period of time. For example, forward production linkages tell us that increasing agricultural production will stimulate production of processed foods by increasing the supply of inputs to this sector. This is the first-round linkage effect between agriculture and food processing. However, in the second round, the increase in processed food production will have additional forward production linkage effects to other sectors, such as to the restaurant sector, which uses processed foods as an intermediate input. Similarly, in the third round, the expansion of the restaurant sector will generate even more demand for other sectors. This process continues over many rounds as the effects of increasing agricultural production ripple throughout the economy, eventually becoming small enough that they effectively cease.

SAM multipliers measure the value of all production and consumption linkage effects. They capture direct and indirect effects in the first and all subsequent rounds of the circular income flow. More specifically, multipliers translate initial changes in exogenous demand (for example, increased agricultural export demand) into total production and income changes of endogenous accounts. Three types of multipliers can be distinguished. First, an *output multiplier* combines all direct and indirect (consumption and production) effects across multiple rounds and reports the final increase in gross output of all production activities. This is the combined increase in agricultural and nonagricultural production. Second, a *GDP multiplier* measures the total change in value-added or factor incomes caused by direct and indirect effects. Finally, the *income multiplier* measures the total change in household incomes.

The size of a multiplier depends on the structural characteristics of an economy. For example, a key determinant is the share of imported goods and services in households' consumption demand. If households consume domestically produced goods, then increasing household incomes will benefit domestic producers and the circular flow of income will lead to further rounds of indirect linkage effects. However, if households demand imported goods, then it is foreign producers who benefit and the indirect linkage effects will be smaller. Import demand is therefore a leakage from the circular flow of income. Similarly, when the government taxes factor incomes, it limits how much of

the returns to production are earned to households, and so reduces consumption linkages. Ultimately, these kinds of leakages make the round-by-round effects slow down more quickly and reduce the total multiplier effect.

We previously identified and calculated that the largest contributor to GDP is the public sector at 19.6% followed by the trade sector (wholesale and retail trade) at 18% and equal shares of about 9% each for manufacturing, education, and construction sectors respectively. Given the production technologies for each sector of the Palestinian economy, we saw that the government is the biggest spender on public services at 48% of its expenditures and 47% of its spending goes to labor in the form of public sector wages which are subsequently transferred to Palestinian households. As can be seen from the production technology of the public sector in Table 3.3, this sector's output is not a very important input in the production of other sectors. However, since 47% of its expenditure is on labor, then this is an important source of income for Palestinian households. Any disruptions in the source of this income will naturally have negative impacts throughout the Palestinian economy due to the production and consumption linkages explained above. For example, the withholding of monthly customs revenue transfers by the Israeli authorities (about $150 m per month) will reduce household incomes by about 10% who will in turn reduce their consumer spending. This will in turn have backward and forward production linkages to other sectors as outputs produced in these sectors fall, inputs in the production of these outputs also fall, and the return on capital will also be reduced with an eventual negative impact on GDP growth. But the question is by how much? This is determined by the size of the multiplier which will be calculated in the CGE model below.

Another real-world example is the impact of Israeli restrictions on the movement of Palestinian workers who cross from the West Bank into Israel on a daily basis. (These workers number around 35,000 people per day. Again, this is an important and sizable source of income for Palestinian households and any disruptions to this source will have negative effects on other sectors depending on the production technologies in each sector and the associated forward and backward production and consumption linkages between these sectors. But perhaps the most interesting variable to consider is the Import Penetration Ratio (IPR). As explained above, the IPR tells us the share of imported goods in domestic Palestinian demand and for analytical purposes Palestinian external trade has been separated into "the rest of the word" (excluding Israel) and "Israel". The intuition behind this ratio is that it shows the extent of competition between domestically produced and imported goods from these two external sources. As Table 4.3 showed, the share of imports from the "rest of the world" (excluding Israel) was the highest for manufactured goods at 39% followed by professional services at 31%. This relatively high share of imports in domestic demand can be partly explained by the nature of these imported manufactured goods most of which are in the form of intermediate goods used in the production process of all sectors of the Palestinian economy ($2502 m). Any disruptions in the supply of these intermediate goods (due to custom clearing delays, security checks, high import tariffs, and the like) will have multiplier effects on other

sectors' outputs which would then affect household incomes and expenditures, government revenue and spending, prices, and on a host of other variables which would all have negative impacts on the rate of growth of GDP.

The picture changes dramatically when we consider imports from Israel. We see that the share of imports from Israel of mining is 83%, for electricity 54%, for transportation 33%, for ICT 63%, and a whopping 455% for professional services. There are two important considerations regarding this high IPR with Israel: first, it clearly demonstrates that certain Palestinian sectors are heavily saturated with cheap Israeli products and services which does not encourage Palestinian producers to adopt an import substitution strategy; and second, since the demand by Palestinian households for these imported Israeli goods and services is high, then it is Israeli producers who will be benefitting most from increases in Palestinian household incomes. Conversely, any decrease in Palestinian household incomes will impact Israeli producers negatively. *So the IPR with Israel can be looked at as a double-edged sword where in the first case it kills the incentives of Palestinian producers to compete with Israeli products through import substitution strategies, and secondly, Israeli producers will also be losing from any restrictions on the free flow of goods and services as a result of check points, outright bans, and other non-traditional non-tariff barriers (NTNTBs) to Palestinian trade*.

2.4 The Computable General Equilibrium (CGE) model

The Palestinian CGE model, PALECOMOD, is a state-of-the-art multi-sector general equilibrium model and has powerful capabilities for impact and scenario analysis. PALECOMOD incorporates the economic behavior of four economic agents: producers (firms), households (consumers), government (PA), and the Rest of the World which is composed of two regions: Israel (ISR) and the Rest of the World excluding Israel (ROW). The CGE model does not take into account the behavior of individual firms but of groups of similar ones aggregated into branches. The model distinguishes 16 perfectly competitive branches of activities and each branch of activity produces several types of goods or services. There are 16 types of commodities which follow the disaggregation presented in Section 2.1. It is calibrated on the Social Accounting Matrix for 2011 in Section 2.2 and is solved using the General Algebraic Modeling System (GAMS) software.

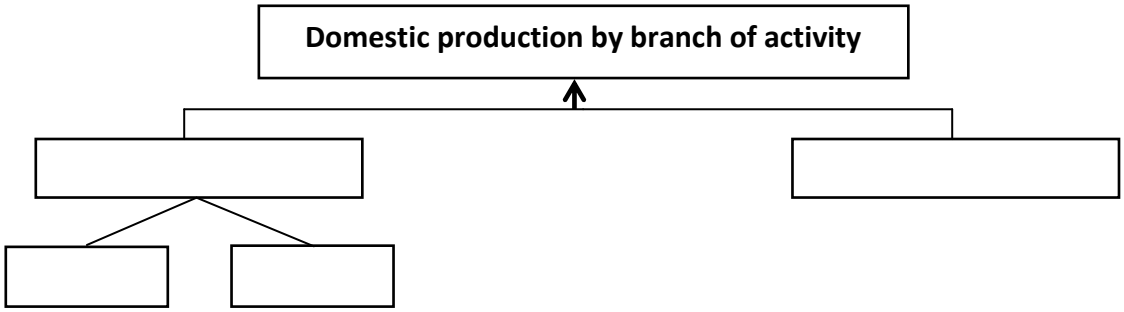
2.4.1 Producers

The usual assumption for such a model is that producers operate on perfectly competitive markets and maximize profits (or minimize costs for each level of output) to determine optimal levels of inputs and output. For example, for producers operating internationally, the world market dictates the output price to a large extent, so, for an optimal outcome they have to produce as efficiently as possible. Some other producers are constrained in the costs level by domestic competitors. Thus, the optimizing pro-

ducers minimize their production costs at every output level, given their production technology. Furthermore, production prices equal average and marginal costs, a condition that implies profit maximization for a Constant Returns to Scale (CRTS) technology.

The level of production for each branch of activity is determined by a nested production structure. For each branch of activity, producers are assumed to choose in the first stage between intermediate inputs and a capital-labor mix according to a Leontief production function. In the second stage, value-added is given by a Constant Elasticity of Substitution (CES) production function of capital and labor as shown in Figure 2 below:

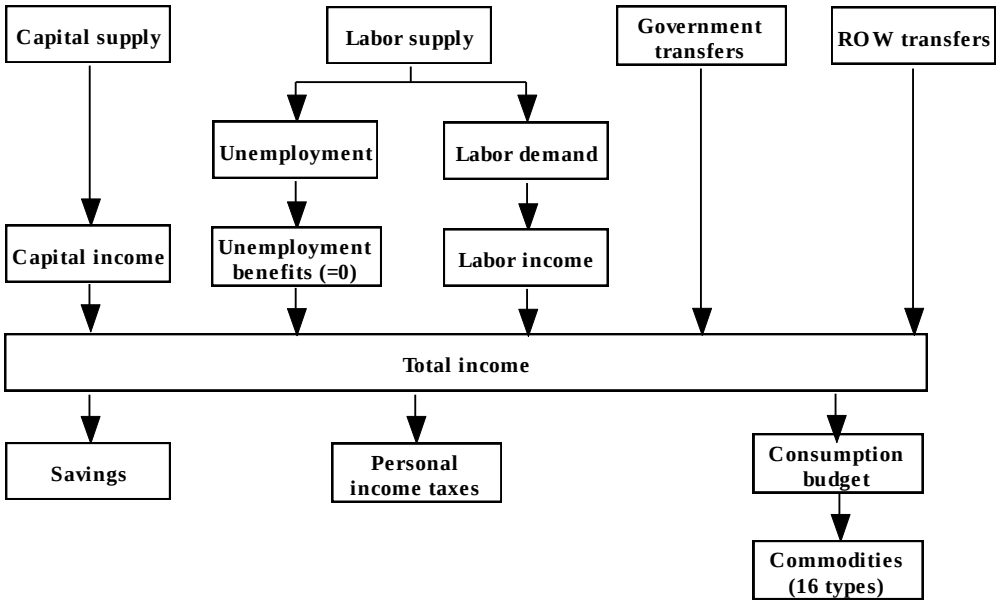
Figure 2. Nested Leontief and CES production technology for domestic production



2.4.2 Households

The representative household receives all the capital and labor income plus transfers from the government plus transfers from ROW. Government transfers comprise of social benefits other than social transfers in kind. The household pays income taxes on domestic income at rate , income taxes on income from abroad, and saves a share of the net income. The disposable income for consumption is allocated between different goods and services according to a Stone-Geary utility function. A schematic representation of households' decisions is given in Figure 3 below:

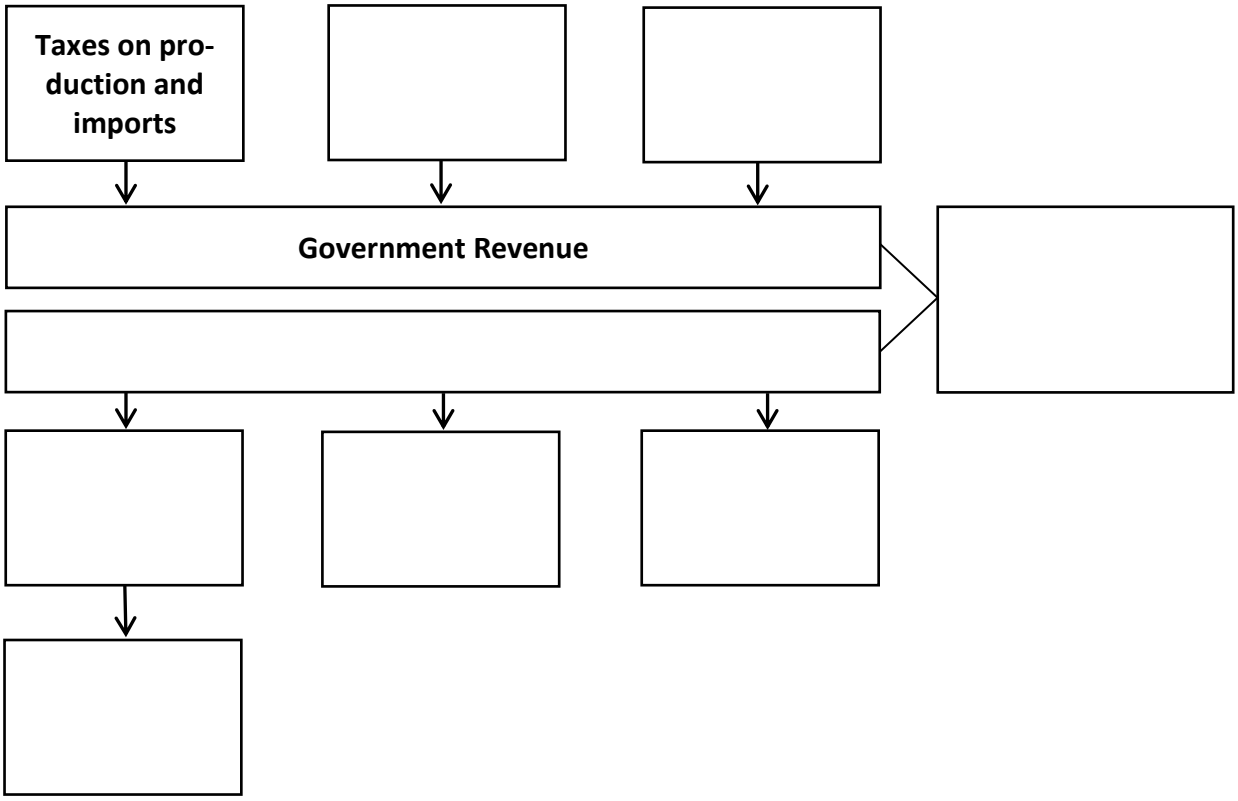
Figure 3. A schematic representation of households' decisions



2.4.3 Government (Palestinian Authority)

The government collects all taxes such as current taxes on income, wealth, etc., tariffs, other taxes on products, social security contributions, and other taxes on production (see Figure 4). Tariffs and other taxes on products are differentiated in the model according to the category of consumption on which they apply: private consumption or imports. In the derivation of each category of tax revenue, the tax rate is applied to the corresponding tax base. Total government revenue is given by total tax revenues and transfers received from the Rest of the World, and total government expenditure comprises of government final consumption expenditure , transfers composed of social benefits other than social transfers in kind , and subsidies on consumption. The difference between government revenue and government expenditure gives net government lending (+)/net borrowing (-) in real terms and is expressed in nominal terms using the consumer price index.

Figure 4. Structure of the government budget



2.4.4 Foreign Trade

The specification of foreign trade is based on the small-country assumption which means that the country is a price taker in both its imported and exported commodities. A distinction has been made in PALECOMOD between imports from different trade partners. We distinguish imports from Israel and imports from ROW. On the import side, in the first stage, imperfect substitution is assumed between domestically produced and (total) imported goods and services according to the Armington assumption[4]. Thus, domestic consumers use composite goods of imported and domestically produced goods according to a Constant Elasticity of Substitution (CES) function. Similarly, the differentiation between the exported goods by domestic producers and the domestic goods supplied on the domestic market is captured through a Constant elasticity of Transformation (CET) function, and the differentiation between the exported goods

[4] The Armington assumption postulates that internationally traded commodities are differentiated by country of origin. This allows for *intra-industry* trade which explains why countries import and export similar commodities.

by trade partners (Israel and ROW) is also captured through a Constant Elasticity of Transformation (CET) function.

2.4.5 Investment and Savings

Total savings are used to purchase investment goods, and the allocation of private gross capital formation (private investment) in real terms between different commodities is given by a Leontief function. Similarly, the allocation of public gross capital formation (government investment) in real terms between different commodities is also given by a Leontief function.

2.4.6 Prices

A standard assumption in CGE models is that the economy is initially in equilibrium with the quantities normalized in such a way that prices of commodities equal unity. Due to the homogeneity of degree zero in prices[5], the model only determines *relative* prices. Therefore, a particular price is selected to provide the *numeraire* price level against which all relative prices in the model will be measured. In this case, the GDP deflator is chosen as the numeraire.

2.4.7 Labor Market

The relationship between supply of labor and the demand for labor is defined in such a way that it takes into account unemployment. Furthermore, the responsiveness of the *real* wage rate to labor market conditions is given by the Phillips curve[6].

2.4.8 Market Clearing

Equilibrium in the product, capital, and labor markets requires that demand equals supply at prevailing prices (taking into account unemployment for the labor market). The capital stock is sector specific such that the equality between demand for capital and supply of capital determines the return to capital by branch of activity. Separate market clearing equations are distinguished in the model for each commodity, and demand for inventories for each commodity is defined as a fixed share of private investment in each branch of activity.

[5] Homogeneity of degree zero in prices implies that if prices are multiplied by a constant, there are no changes in quantities.
[6] The Phillips curve is the trade-off between inflation and unemployment.

2.4.9 Closure Rules

The closure rules refer to the manner in which demand for and supply of commodities, macroeconomic identities, and factor markets are equilibrated *ex-post*. In other words, the closure rules determine which variables are *exogenous* (determined outside the system of the model equations) and which variables are *endogenous* (determined within the model equations). Due to the complexity of the model, a combination of closure rules is needed. The particular set of closure rules should also be consistent, to the largest extent possible, with the institutional structure of the Palestinian economy and with the purposes of the model. In mathematical terms, the model should consist of an *equal number of independent equations and endogenous variables*. The closure rules reflect the choice of the model builder of which variables are exogenous and which variables are endogenous, so as to achieve ex-post equality.

Three macro balances are usually identified in CGE models that can be a potential source of *ex-ante* disequilibria and must be reconciled ex-post:

- The savings-investment balance;
- The government balance;
- The external balance.

The most widely accepted macro closure rule for CGE models implies the assumption that investment and savings balance. In the model, domestic savings and investments are assumed to adjust to the given foreign savings. This reflects an economy in which savings forms a binding constraint. The interest rate is assumed to effectively balance the supply and demand for investments, even if the specific mechanism is not incorporated in the model.

2.5 Model calibration

This CGE model was then *calibrated* to the data in the SAM such that the "solution" of these equations (using powerful programming such as GAMS – General Algebraic Modeling Syntax) *replicated* the data in the SAM. In plain English, it will give us the starting point from which we can begin carrying out the cost assessments using various simulations of the Israeli restrictive policies.

3. SIMULATIONS AND INTERPRETATION OF RESULTS

3.1 Introduction

This report provides an interpretation of the 2 policy simulations run with the PALECOMOD model.

PALECOMOD is a state-of-the-art multi-sector general equilibrium model for the Palestinian economy. It has powerful capabilities for impact and scenario analysis.

PALECOMOD incorporates the economic behavior of four economic agents: firms, households, government and the rest of the world. The rest of the world is disaggregated into two regions: Israel and "other" trade partners.

PALECOMOD distinguishes 16 branches of activities, consisting of both public and private enterprises (see Table 1).

Sectors and products
1. Agriculture, forestry and fishing
2. Mining and quarrying
3. Manufacturing
4. Electricity, gas, steam and air conditioning supply, water supply; sewerage, waste
5. Construction
6. Wholesale and Retail Trade, repair of motor vehicles and motorcycles
7. Transportation and storage
8. Financial and insurance activities
9. Information and communication services
10. Accommodation and food service activities
11. Real estate activities
12. Professional, scientific, technical activities, administrative and support services
13. Education
14. Human health and social work activities
15. Public Administration and Defense
16. Other service activities

Table 1 Disaggregation of branches of activity and commodities in PALECOMOD

As a multi-sector general equilibrium model, PALECOMOD is designed to measure the direct and indirect economic impacts of policy changes on the Palestinian economy. Simulation results provide the impacts of shocks on all the endogenous variables of the model such as:

- Capital demand (by activity)
- Capital supply (exogenous)

- Consumer expenditure
- Consumer price index
- Domestic output delivered to home market (by commodity)
- Domestic producer prices (by commodity)
- Domestic production delivered to home and foreign markets (by commodity)
- Domestic sales of composite commodity (by commodity)
- Employment (by activity)
- Export prices in national currency (by commodity)
- Exports by commodity (total)
- Exports to Israel (by commodity)
- Exports to the Rest of the World (by commodity)
- Foreign savings from Israel (current account balance)
- Foreign savings from the ROW (current account balance)
- GDP at constant market prices
- GDP at current market prices
- GDP deflator
- Government demand for goods and services (by commodity)
- Government final consumption
- Government final consumption expenditure to GDP ratio
- Government net lending (+) net borrowing (-) to GDP ratio
- Government savings
- Gross domestic output (by activity)
- Household income (nominal)
- Household income (real)
- Household savings
- Import prices in local currency (by commodity)
- Imports (by commodity)
- Imports from Israel (by commodity)
- Imports from the Rest of the World (by commodity)
- Labor income from Israel
- Labor supply (endogenous)
- Number of unemployed people
- Price index for value-added (by activity)
- Price of domestic output (by activity)
- Price of domestic output delivered to home market (by commodity)
- Price of domestic production delivered to home and foreign markets (by commodity)
- Price of exports to Israel in foreign currency (by commodity)
- Price of exports to Israel in local currency (by commodity)
- Price of exports to the Rest of the World in foreign currency (by commodity)
- Price of exports to the Rest of the World in local currency (by commodity)
- Price of imports from Israel in local currency (by commodity)
- Price of imports from the Rest of the World in foreign currency (by commodity)
- Price of imports from the Rest of the World in local currency (by commodity)

- Price of investment goods bought by the private sector (by commodity)
- Price of investment goods bought by the public sector (by commodity)
- Prices of composite commodities (by commodity)
- Private consumption (by commodity)
- Real average return to capital
- Real exchange rate
- Return to capital (by activity)
- Supply of investment goods (by commodity) for public investment
- Supply of investment goods (by commodity) to the private sector
- Total government expenditures
- Total government revenues
- Total private investment in nominal terms
- Total private investment in real terms
- Total public investment in nominal terms
- Total public investment in real terms
- Total savings
- Total transfers received from the ROW
- Total tax revenues
- Total transaction costs
- Total transfers received by the household
- Transfers received by the household from the government
- Transfers received by the household from the Rest of the World
- Value-added (by activity)
- Variation of stocks (by commodity)
- Wage rate (nominal)
- Wage rate (real)
- World price of exports in foreign currency (by commodity)
- World price of imports in foreign currency (by commodity)

It has the inter-industry detail from input-output and Supply & Use Tables. This enables the model to trace the extent and the channels of changes in policy and the international environment. It allows for behavioral responses to housing and consumer prices, wages, and production costs as in computable general equilibrium models. The resulting price changes affect the demand for sectoral outputs and alter the resource allocation of factors.

PALECOMOD can be used for detailed impact and scenario analysis at the sectoral level. It helps the users understand the macro and the sectoral effects of economic shocks and the impacts of policy measures.

3.2 Policy scenarios

This report presents the results of 2 policy simulations as an illustration of the model use. The following scenarios have been simulated:

1. An increase of 50 percent in “transaction costs” due to increased restrictions imposed by Israel.

2. An easing of restrictions on Area C.

3.3 Results

The results are presented in levels and in percentage changes with respect to the reference levels.

3.3.1 Scenario 1: Increase of 50% in restrictions (transaction costs)

This scenario simulates an increase of 50 percent in Israeli restrictions imposed on the Palestinian economy.

Israeli restrictions prevent the Palestinian economy from accessing fully the agricultural land and from exploiting most of the natural resources; they isolate the local economy from global markets increasing the costs of imports, exports, and labor movements, and they fragment the territory into small and weakly connected areas. All these restrictions increase the cost of production, the cost of exports and imports, consumer prices, and reduce labor movements and labor income. These transaction costs are taken into account in PALECOMOD by five types of transaction costs:

1. transaction costs on imports
2. transaction costs on exports
3. transaction costs on domestic sales
4. transaction costs on production
5. transaction costs on labor

The macroeconomic results are presented in Table 2. The results show that a 50% increase in transaction costs would have a major negative impact on the Palestinian economy. Real GDP would decrease by more than 27 percent in the short run. Real consumption would decrease by more than 24 percent which means that the welfare and living standards of the Palestinian population would deteriorate dramatically. Real investment would decrease by more than 48 percent meaning that if dynamic effects are taken into account, the potential of the Palestinian economy would decrease significantly in the future and create a vicious cycle[7] producing dynamic slowdown effects on growth and employment.

	In level	*In % change*
GDP at constant market prices	6,632	-27.33
Real consumption	6,233	-24.44

[7] A vicious cycle refers to a complex chain of events that reinforces itself through a negative feedback loop. An increase in transaction costs would *discourage* new investments, FDI and new technology inflows, physical and human capital accumulation, economies of scale, and lead to lower production efficiency. All these factors would reinforce a negative dynamic feedback loop creating lower growth, unemployment, lower investment, lower consumption, and lower exports.

Real investment	661	-48.12
Real net export (E-M)	-5,745	-16.14
Unemployment		24

Table 2 Macroeconomic impacts

The considerable negative impacts of increasing restrictions would produce a very large decrease in domestic production and employment as illustrated in Table 3. The agricultural, mining, and manufacturing sectors would fall the most. Energy production would also decrease significantly by a rapidly slowing down of the economy. The construction sector would also fall as the demand for investment would decrease considerably in a rapidly slowing Palestinian economy. All these vicious effects would destroy a large number of jobs as shown in the last column of Table 3.

Products	*Production*	*Employment*
Agriculture, forestry and fishing	-54.74	-24.98
Mining and quarrying	-89.51	-63.19
Manufacturing	-44.11	-32.30
Electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities	-33.76	-25.84
Construction	-36.97	-32.02
Wholesale and Retail Trade, repair of motor vehicles and motorcycles	-23.55	-27.64
Transportation and storage	-25.47	-13.07
Financial and insurance activities	-30.11	-69.79
Information and communication services	-21.21	-20.38
Accommodation and food service activities	-38.40	-26.46
Real estate activities	-20.41	-19.36
Professional, scientific, technical activities, administrative and support service activities	-25.77	-22.03
Education	-12.64	-19.99

Human health and social work activities	-9.10	-13.88
Public Administration and Defense	-10.66	-10.86
Other service activities	-25.47	-15.21

Table 3 Impacts on production and employment (in % change with respect to the base-line)

Table 4 presents the effects of increasing restrictions on foreign trade. Exports would decrease dramatically, especially in agriculture, mining, manufacturing and in activities related to tourism (accommodation, hotels, and restaurants). This is due to the fact that an increase in the restrictions would considerably lower the productive capacity of the Palestinian economy and increase the costs of exports and imports.

Given that these restrictions are traditionally high in agriculture, in the use of natural resources, and in tourism services, the impacts of an increase in the restrictions would be much stronger in these sectors. As a result of increasing restrictions, the economy would slowdown, investment would collapse and therefore the construction and manufacturing sectors would decrease their production, exports, and imports substantially as they are the two main sectors delivering goods for investment.

Products	*Exports*	*Imports*
Agriculture, forestry and fishing	-198.68	0.85
Mining and quarrying	-181.56	-11.92
Manufacturing	-57.86	-24.39
Electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities	0.00	-15.36
Construction	-33.62	-45.62
Wholesale and Retail Trade, repair of motor vehicles and motorcycles	0.00	0.00
Transportation and storage	-27.08	-23.87
Financial and insurance activities	9.71	-98.82
Information and communication services	-15.59	-32.59
Accommodation and food service activities	-100.44	0.00
Real estate activities	0.00	0.00
Professional, scientific, technical activities, administrative and support service activities	-23.57	-28.52
Education	0.00	0.00

Human health and social work activities	0.00	0.00
Public Administration and Defense	0.00	0.00
Other service activities	-30.85	-19.52

Table 4 Impacts on foreign trade (in % change with respect to the baseline)

Policy recommendation

Israeli restrictions prevent the Palestinian economy from accessing fully the agricultural land and from exploiting most of the natural resources; they isolate the local economy from global markets increasing the costs of imports, exports, and labor movements, and they fragment the territory into small and weakly connected areas. All these restrictions increase the cost of production, the cost of exports and imports, consumer prices, and reduce labor movements and labor income preventing the economy from using its potential.

The simulation results show that a 50% increase in these restrictions would have a major negative impact on the Palestinian economy. Real GDP would fall by more than 27 percent in the short run. Real consumption would decrease by more than 24 percent which means that the welfare and living standards of the Palestinian population would deteriorate dramatically. Real investment would fall by more than 48 percent meaning that if dynamic effects are taken into account, the potential of the Palestinian economy would decrease significantly in the future and create a vicious cycle retarding both GDP growth and employment.

3.3.2 Scenario 2: Easing of restrictions on Area C

This scenario assumes that there is a "partial" easing of restrictions on Area C which would allow an increase of 50% of capital[8] to agricultural and mineral sectors. As a result of this "capital-deepening" into Area C, Total Factor Productivity (TFP) would also increase by 5% which is a very conservative assumption.

	In % change
GDP at constant market prices	12.09
Real consumption	9.5
Real investment	44.8

[8] Capital also includes "land" in our model. One important modification of our model would be to include Land explicitly in our model as the "third" factor of production, in addition to the intermediate inputs used in the production process.

Unemployment	-27

Table 5 Macroeconomic impacts

The macroeconomic impacts in Table 5 show that GDP would increase by 12% ($860 million) with 10% and 45% increases in consumption and investment respectively. Perhaps the biggest impact would be on unemployment which would fall by 27%.

Products	*Production*	*Employment*
Agriculture, forestry and fishing	52.8	-8.2
Mining and quarrying	53.4	31.2
Manufacturing	15.9	29.5
Electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities	6.4	8.1
Construction	23.7	58.8
Wholesale and Retail Trade, repair of motor vehicles and motorcycles	8.5	27.9
Transportation and storage	11.1	7.9
Financial and insurance activities	14.7	65.7
Information and communication services	6.4	11.2
Accommodation and food service activities	20.6	23.2
Real estate activities	5.8	4.1
Professional, scientific, technical activities, administrative and support service activities	7.7	10.5
Education	9.7	6.6
Human health and social work activities	7.1	4.4
Public Administration and Defense	0.07	-4.76
Other service activities	8.9	7.27

Table 6 Impacts on production and employment (in % change with respect to the baseline)

Table 6 shows the impact on production and employment at the sectoral level. Note that although agricultural output increases by 53%, there is a -8.2 decline in employment in this sector. This is because given that the agricultural sector is a highly capital intensive[9] sector (because "capital" includes also "Land"), farmers have become more productive and hence the agricultural sector requires *less* labor per unit of output. All other sectors (except Pubic Admin) exhibit substantial increases in both output and employment as shown in Table 6 above.

Products	*Exports*	*Imports*
Agriculture, forestry and fishing	182.4	-27.9
Mining and quarrying	111.4	0.5
Manufacturing	14.6	15.5
Electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities	0.00	15.2
Construction	5.1	76.4
Wholesale and Retail Trade, repair of motor vehicles and motorcycles	0.00	0.00
Transportation and storage	11.7	12.1
Financial and insurance activities	-25.1	90.1
Information and communication services	0.9	19.1
Accommodation and food service activities	37.1	0.00
Real estate activities	0.00	0.00
Professional, scientific, technical activities, administrative and support service activities	5.1	14.5
Education	0.00	0.00
Human health and social work activities	0.00	0.00
Public Administration and Defense	0.00	0.00
Other service activities	9.4	10.8

Table 7 Impacts on foreign trade (in % change with respect to the baseline)

[9] The factor-intensity of the agricultural sector was calculated in Section 2.3.1 as being highly capital-intensive where the share of "capital" (including "land") is 97% and the share of labor is 3%. (See Table 3.2 Value-added shares (%) - **Production Shares**).

Table 7 shows the impact of the 50% increase in "capital" to Area C on Palestinian exports and imports. As expected, the biggest gainer is the agricultural sector with an increase of exports of 183% followed by the Mining & Quarrying sector at 112%. Since the agricultural and Mining & Quarrying sectors are closely linked to other sectors through input-output linkages, it is no surprise that this scenario would have sizable impacts on backward and forward production and consumption linkages which eventually translate into higher GDP growth rates through the multiplier effect. Perhaps the other interesting (and expected) result of this simulation is the fall in agricultural imports by -28% which literally highlights the high Import Penetration Ratio - IPR (as calculated in Section 2.3.1), reinforcing the urgent need to improve access to Area C to improve the Palestinian economy's ability to compete with imports from Israel and from the Rest of the World excluding Israel.

4. CONCLUDING REMARKS

Perhaps the most difficult task is to calculate the economic costs of policies on which policy-makers have no or very little control. This best exemplifies the current state of the Palestinian economy which has been constrained by a plethora of Israeli restrictions on imports, on exports, on inputs of various kinds, on labor, on capital, and on every other factor of production and natural resource that one can think of. Many heuristic attempts have been made by Palestinian and international organizations to measure the costs of these restrictions for the purpose of informing the international community of the dwindling economic opportunities available in the occupied Palestinian territories. Some studies have even attempted to estimate the cost of this conflict on the Israeli economy at about $123 billion over a 10 year period. The CGE approach was first proposed and used by the World Bank in the 90's because it was considered as the ideal tool for assessing the costs of an economy experiencing severe "structural shocks" as is the case in the Palestinian economy. Several attempts have been made by various analysts as discussed in this report to adopt the CGE approach to the Palestinian economy most of which have suffered from a lack of accurate and timely data. Another shortcoming of these CGE models was that most of them focused on assessing the costs and benefits of "trade liberalization" as an alternative to the Paris Protocol trade agreement between Israel and Palestine. But perhaps the biggest shortcoming of these early CGE models was the lack of a sufficiently disaggregated database in the form of a Social Accounting Matrix (SAM).

These shortcomings of the CGE approach for measuring the costs of Israeli restrictions were overcome in 2013 when a highly disaggregated representation of the Palestinian economy was constructed in the form of a SAM for 2011. The model described and simulated in this report is based on this SAM which enabled us to measure the costs of the occupation on specific sectors (16 sectors) and on specific economic agents (producers, consumers, the PA government, and the Rest of the World separated

into Israel and the rest of Israel). The "positive" approach adopted in CGE modeling differs from all other non-CGE "normative" approaches as described in this report. These "normative" approaches are based on measuring the "opportunity cost" of restrictions by asking the normative question: "*What would have been the cost of a specific event if this event did or did not occur?*" Consequently, most of these non-CGE quantifications of the Israeli restrictions are based on highly simplifying assumptions, and in the very extreme case, some are akin to "wishful thinking" exercises. The CGE approach used in this report asks the very "positive" question: *"How much prices, unemployment, input costs, prices of imports, prices of exports, and a host of many other important economic variable change as a result of an Israeli restriction?"* The 2 simulations conducted in this report – an "Increase in Transaction Costs" and an "Easing of Restrictions on Area C" – reflect the harsh realities on the Palestinian ground and measure the costs of these restrictions explicitly (without any "scenarios") as borne by the Palestinian people on the ground on a daily basis.

Much more can be done to take full advantage of the calibrating power of this state-of-the-art CGE approach. A further disaggregation of the SAM database into the West Bank and Gaza would enable us to measure the *different* costs of these restrictions on these two regions which have different factor endowments, different production technologies, different input constraints, and different unemployment, saving, and investment rates. This would require the construction of an updated SAM for 2014-2015 (upon data availiabity at PCBS) which differentiates between these regions based on realities on-the-ground and not based on "wishful thinking" assumptions. Another modification of our CGE model would be to further disaggregate Palestinian households into rural, urban, and "refugee camp" households which would tell us the cost of the restrictions on these specific income groups for specific targeted policy responses especially for "refugee camp" households who, very often, bear a disproportionality larger share of the total cost. One can think of many other examples to considerably expand the analytical scope of our CGE approach to measure the actual costs of these restrictions depending on the policy question to be explored, traced, and answered.

KEY REFERENCES

Astrup, C., Dessus, S., 2001. Trade Options for the Palestinian Economy: Some Orders of Magnitude (SSRN Scholarly Paper No. ID 267832). Social Science Research Network, Rochester, NY.

Astrup, C., Dessus, S., 2002. Exporting Labor or Goods? Long-term Implications for the Palestinian Economy (SSRN Scholarly Paper No. ID 307422). Social Science Research Network, Rochester, NY.

Astrup, C., Dessus, S., 2005. Exporting Goods or Exporting Labor?: Long-term Implications for the Palestinian Economy. Rev. Middle East Econ. Finance 3, 38–60. doi:10.2202/1475-3693.1033

Balian, O., 2009. A CGE Analysis of Trade Policy Options for the Palestinian Economy. Lambert Academic Publishing, Germany.

Balian, O., 2002. A CGE Analysis of Trade Policy Options for the Palestinian Economy. PhD dissertation, The American University, Washington D.C.

Bayar, A., 2013 (PALECOMOD). Ecomod.net, 351 Pleasant St; Northampton, Massachusetts- 01060, USA.

De Boer, P., Missaglia, M., 2006. Economic consequences of intifada. Econ. Syst. Res. 18, 97–106. doi:10.1080/09535310500440779

De Boer, P., Missaglia, M., 2010. Predicting Negative Effects of the Second Intifada: An Ex-Post Evaluation of Some Models. Econ. Syst. Res. 22, 193–199. doi:10.1080/09535314.2010.484013

Doing Business, 2015. Going Beyond Efficiency: West Bank and Gaza. World Bank, Washington D.C.

Flaig, D., Siddig, K.H.A., Grethe, H., Luckmann, J., McDonald, S., 2013b. Relaxing Israeli restrictions on Palestinian labour: Who benefits? Econ. Model. 31, 143–150. doi:10.1016/j.econmod.2012.11.052

Ministry of National Economy in cooperation with the Applied Research Institute- Jerusalem (ARIJ), (2011), The economic costs of the Israeli occupation for the occupied Palestinian territory. Ramallah.

Missaglia, M., De Boer, P., 2004. Food-For-Work versus Cash-For-Work: Emergency Assistance in Palestine. Econ. Syst. Res. 16, 367–390. doi:10.1080/0953531042000304254

Missaglia, M., Valensisi, G., 2014. Trade policy in Palestine: A reassessment. J. Policy Model. doi:10.1016/j.jpolmod.2014.02.001

Office of the Quartet Representative (OQR), Sept 2014. Report for the Meeting on the Ad Hoc Liaison Committee on Action in Support of Palestinian State-Building. New York.

Office of the Quartet Representative (OQR), March 2014. Initiative for the Palestinian Economy: Summary Overview. Report for the Ad Hoc Liaison Committee, New York.

Office of the Quartet Representative (OQR), March 2013. Back to the Future: Integrating the Political and Economic Tracks. Report for the Ad Hoc Liaison Committee, New York.

Orhan Niksic, Nur Nasser Eddin, and Massimiliano Cali, 2014. Area C and the Future of the Palestinian Economy. World Bank, Washington D.C.

Ross C. Anthony, et al, 2015. The Costs of the Israeli-Palestinian Conflict. RAND Corporation, Santa Monica, CA.

UNCTAD, July 2015. Report on UNCTAD assistance to the Palestinian People: Developments in the economy of the Occupied Palestinian Territory. Geneva.

UNCTAD, Dec 2014. Mahmoud Elkhafif, Misyef Misyef and Mutasim Elagraa. Palestinian Fiscal Revenue Leakage to Israel under the Paris Protocol on Economic Relations. Geneva.

UN-OCHA, Various Issues 2014-2015. Gaza Crossings' Status: Monthly Update. United Nations, New York.

World Bank, May 2015. Economic Monitoring Report to the AD Hoc Liaison Committee. Washington D.C.