

Economic Consequences of Intifada

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ABSTRACT *In 2003 the World Bank (WB) and the International Monetary Fund (IMF) published estimates of macro-economic indicators for 2002 of the economy of Palestine. The WB used a micro-founded recursive dynamic computable general equilibrium (CGE) model, calibrated on the 1998 Social Accounting Matrix (SAM) of Palestine, to which shocks were applied, whereas the IMF based its estimates on a macro-founded income-expenditure model relying on more recent data. It turned out that there were substantial differences: the estimate by the WB of the real gross national income (at 1998 prices) was 25% less than the corresponding figure calculated by the IMF. This huge difference is not only relevant for a full understanding of the economic consequences of the intifada, but also for the size of the international community intervention. In this paper we propose our own evaluation with the help of a static CGE model, based on the 1998 SAM and the so-called intifada shock derived from data of the WB that we constructed for the analysis of some forms of emergency assistance in a previous article. It turns out that our estimates, based on an entirely different methodology, are remarkably close to those of the IMF.*

KEY WORDS: Macro-economic indicators, computable general equilibrium model, Palestine

1. Introduction

The most recent years in Palestinian history, those of the second *intifada*, have witnessed a dramatic decline in all Palestinian economic and social indicators. Since September 2000, when the violent confrontations started, conditions for a normal life have nearly disappeared and the economic situation has steadily disintegrated.

Using a poverty line of US\$2.1 per day the World Bank (2003a, pp. i–xiv) estimated the poverty in Palestine in 1998 at 23.2% of the population, whereas by the end of 2002 the World Bank (WB) estimated the poverty to have risen to 59%. The unemployment rate that amounted to 16.2% in 1998 rose to 37% at the end of 2002. The overall gross national

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income (GNI) losses have reached US\$5.2 billion during the first 27 months of *intifada*, which is more than the GNI in 1998 or in 1999 (US\$5.1 billion).

Two main causes of the Palestinian economic crisis are closure, namely the imposition of restrictions on the movement of goods and people across borders and within Palestine, and the destruction of capital. In September 2000 the WB estimated the number of Palestinians working in Israel and the settlements at 128,000, while the estimate for the end of 2002 was about 32,000. The physical damage resulting from the conflict was estimated to be US\$305 million by the end of 2001 and US\$930 million by the end of 2002. As a result of damage and of the fall in investment, the real productive capital stock declined by US\$1.7 billion between 1999 and 2002.

It is clear, in some way even obvious, that an already fragile economy has been hit very hard by the conflict. However, there is no consensus on the extent and the order of magnitude by which the Palestinian economy has suffered during the last years of conflict. Specifically, we will see in the next section that the evaluations coming from the WB (World Bank, 2003a, b, c) are substantially different from those of the International Monetary Fund (IMF, 2003). Just to anticipate one figure, according to the WB the GNI in 2002 is 25% less than the corresponding figure calculated by the IMF. It goes without saying that such a huge difference is relevant not only to a full understanding of the economic consequences of the conflict, but arguably to the size of the international community intervention as well. This is the reason why in this paper we propose our own evaluation of the economic consequences of the conflict, with the help of a computable general equilibrium (CGE) model calibrated on the social accounting matrix (SAM) of 1998, a part of which has been presented in Appendix 1 of Missaglia and de Boer (2004).

The rest of the paper is organized as follows. The next section illustrates the different assessments proposed by the WB and the IMF. In the third section, we provide a description of the model used for our own evaluation. The section after describes what we called the '*intifada* shock', i.e. the set of shocks the Palestinian economy has suffered as a consequence of the violent confrontations started in September 2000. The fifth section illustrates the results and compares them with those obtained by the IMF.

2. Assessments by the WB and the IMF

In Table 1 we give the assessment by the WB and the IMF, as well as their ratio: the assessment of the WB as a fraction of the one by the IMF. In the Appendix we give account of how these different figures are calculated.

The reader may easily notice that the differences between the two evaluations (2002, in prices of 1998) are relevant and worth stressing. In a sense, one should not be too surprised: as given in the Appendix, the WB predictions are based on a micro-founded CGE model, whereas the IMF's are based on a macro, income-expenditure model; the WB based its study on the SAM of 1998, whereas the IMF study relied on some more recent data. It would not make any sense to assert that one model is better than the other, since they are usually employed for different purposes. What we want to stress here is the fact that the IMF macro figures are based on more recently available data and thus are likely to describe more appropriately the cost of the conflict. Is it possible to get closer to those (IMF) figures using some analytical tool, which is closer to the richer, micro-founded kind of model used by the WB? This is the question we try to answer in the rest of this paper.

Table 1. Comparison between the assessment by the WB and the IMF

	1998 (US\$million)			2002 (current prices, US\$million)			2002 (prices 1998, US\$million)		
	WB	IMF	Ratio*	WB	IMF	Ratio*	WB	IMF	Ratio*
Private consumption	4014	4245	0.946	2756	3709	0.743	2357	3956	0.596
Public consumption	976	954	1.023	1757	1020	1.723	1203	1041	1.156
Total fixed investment	1668	1494	1.116	119	598	0.199	114	661	0.172
Exports	624	886	0.704	345	413	0.835	307	426	0.721
Imports	3052	3321	0.919	1581	2766	0.572	1340	2896	0.463
Gross domestic product	4230	4258	0.993	3396	2974	1.142	2450	3188	0.769
Net factor income	828	903	0.917	372	431	0.863	269	465	0.578
Gross national income	5058	5161	0.980	3768	3405	1.107	2719	3653	0.744

* The ratio is the figure of the WB divided by the one of the IMF.

3. Description of the Model

3.1. Introduction

In the model we have five types of economic agents: eight producers, one household, a bank that allocates savings over investments, the Palestinian Authority (PA) and the rest of the world (RoW). In their Appendix 2, Missaglia and de Boer (2004) present the glossary of symbols and in their Appendix 3 the equations of the model.

3.2. The Producers

Intermediate inputs are combined into the intermediates by means of a Leontief technology, whereas capital and labor are combined into value added by means of a constant elasticities of substitution (CES) technology. Both aggregates are, using the Leontief assumption, combined into the supply of the domestically produced commodity. This commodity is transformed via a constant elasticities of transformation (CET) function into an export commodity and into a domestic commodity supplied to the domestic market. This commodity is combined with imports to produce the composite commodity. To that end we adopt the Armington assumption by using a CES functional form. This commodity is either used in the production process (intermediate demand) or for final purposes: consumption, consumption of the PA and investment.

3.3. The household

The household owns the capital, receives transfers from the PA and from the RoW, and it disposes of a time endowment. The household is assumed to maximize its utility in two stages: in the first one it allocates its time endowment over labor supply and leisure. We allow for unemployment so that the labor demand is smaller than the labor supply. We assume that the unemployed do not receive unemployment benefits.

In the model we use the unemployment theory delineated in the migration literature by Harris and Todaro (1970) to describe the wage gap between rural and urban jobs. Compared to the modified version proposed by Ruppert Bulmer (2001), we stay closer to

the original Harris–Todaro model. The core of the theory is described by the following arbitrage condition (acting as a wage curve). That is,

$$PL = \left(\frac{LF}{LF + UNEMP} \right) \times b \times PLF$$

The wage rate paid by Palestinian firms to Palestinian workers, PL , must be equal, in equilibrium, to the expected wage rate of the Palestinian workers employed in Israel or in the settlements. The latter is equal to the wage rate prevailing in Israel and the settlements, PLF , multiplied by the probability of getting a job in Israel or in the settlements and a factor b . The probability of getting a job in Israel or in the settlements is simply given by the ratio of the Palestinian workers actually employed in Israel or in the settlements (LF) to the workers who look for a job there: those who manage (LF) and those who do not ($UNEMP$). The factor b is interpreted to be the inverse of the probability of getting a job in Palestine. Then, the arbitrage condition states nothing but the equality between two expected wages:

$$P(\text{Job in Palestine}) \times PL = P(\text{Job in Israel or in the settlements}) \times PLF$$

All sources of income (capital, transfers and wages earned in Israel, the settlements and Palestine) together yield the household income. The household pays income taxes and saves a fixed fraction out of its income after taxes. Subtracting taxes and savings from income yields the budget that it devotes to the purchase of commodities. In the second stage the household maximizes a utility function, with the consumption of these commodities as arguments, subject to its budget constraint. For both stages we use a Linear Expenditure System.

3.4. *The Palestinian Authority (PA)*

The PA derives its revenues from two sources: taxes (on imports, capital, labor, consumption commodities and on household's income) and foreign aid. These revenues are spent on transfers, savings and on other expenditures. With respect to the latter we assume that the PA maximizes a Cobb–Douglas utility function with its purchases of the two commodities 'Private Services' and 'Public Services' as arguments subject to the expenditure constraint.

3.5. *The Bank*

The household savings, the PA savings and the foreign savings are allocated over the investment demand for the commodities. To that end the bank is assumed to maximize a Cobb–Douglas utility function subject to the constraint that savings are equal to total investments.

3.6. *The Rest of the World (RoW)*

For the Palestinian economy, the RoW basically coincides with Israel and its settlements, at least as far as foreign trade is considered. In 1998, 76% of imports and 96% of exports

came from, and were directed toward, Israel and its settlements (Astrup and Dessus, 2001). Obviously, the picture is different if one looks at foreign aid disbursements. For instance, out of a total of US\$1.1 billion by the end of 2002, US\$840 million came from Arab League countries and US\$230 million from the EU (World Bank, 2003b). Palestine earns revenues from the RoW via exports and other sources: foreign aid accruing to the PA, remittances from the workers employed in Israel or in the settlements, foreign transfers directly accruing to the households and foreign savings, i.e. the deficit in the current account balance. These revenues are spent on imports of goods. Imports and exports are treated in a rather standard way, through, respectively, an Armington–CES and a CET assumption.

4. The 1998 Social Accounting Matrix (SAM) and the Counterfactual SAM

4.1. The 1998 SAM

The CGE model used in this paper is calibrated around the SAM constructed by the WB for 1998. Compared to this original version, we aggregate the several sectors and sub-sectors included in it to eight main sectors: Food, Other Agriculture, Manufacturing, Construction, Transport, Trade, Private Services and Public Services, each of them producing one good. The food sector is an aggregation of the food producing agricultural activities and of those activities that, although belonging to the Manufacturing sector in the SAM, produce food items as well (for instance the ‘food and beverages’ activity). For more details we refer to Section 2.1 of Missaglia and de Boer (2004).

4.2. The Counterfactual SAM

We built a ‘counterfactual’ SAM by giving the 1998 benchmark a big ‘*intifada shock*’ that comprises the following eight elements.

- First, a reduction in the capital stock. According to World Bank (2003b), physical damages resulting from the conflict (private and public buildings, infrastructure, productive trees and soils, etc) amounted to 14% of 1998 GNI by the end of August 2002, a huge reduction in the productive capital stock. But what we are mainly interested in is the reduction in capital income rather than in capital stock. Missaglia and de Boer (2004) infer that capital income decreased by at least 30%.
- Second, a dramatic fall in the level of labor income earned in Israel or in the settlements. According to World Bank (2003b), from September 2000 to the end of 2002, the number of permits was reduced from 128,000 to 32,000. It would make sense to assume a 75% reduction in this source of income but, taking into consideration the rather large number of Palestinians who manage to cross into Israel or its settlements illegally, we have given this variable a 50% shock.
- Third, an increase in donors’ disbursements. According to World Bank staff calculations (2003b), total disbursements increased from around US\$400 million to around US\$1.1 billion.
- Fourth, a reduction in the household’s propensity to save by 25%.

- Fifth, a reduction in PA saving by 90%. It must be noted that one of the main reasons for this reduction is the withholding of Israel's transfers to the PA concerning the tax revenue collected by the former on behalf of the latter.
- Sixth, an increase in the transfers paid by the PA to the households and in the labor subsidies handed out to the 'Public Services' sector. We assumed that 25% of the increase in foreign aid was used by the PA to fund social transfers to the households, whereas the remaining percentage was devoted to the payment of labor subsidies, which is a convenient way of modeling the intervention of the PA aimed at absorbing, however partially, the labor market shock suffered by the Palestinian economy (see Missaglia and de Boer, 2004).
- Seventh, an increase in the labor force. According to data of the Palestinian Central Bureau of Statistics (PCBS) (see www.pcbs.org), the labor force growth was around 8%.
- Eighth, an increase in the parameter b that describes the inverse of the probability of getting a job in Palestine. Its calibrated 1998 value turned out to be 1.178 (equivalent to a probability of getting a job in Palestine of 85%); we multiplied it by 2.5 (equivalent to a 34% probability of getting a job in Palestine).

5. Results and Comparison

In Table 2, we summarize our results (DBM) and compare them with those of the IMF. As the reader may easily see from the column '2002, prices 1998, US\$ million', the main difference between our results (DBM) and the IMF results concerns total fixed investment, which is larger in DBM, and private consumption, which is lower in DBM. One reasonable explanation for this difference can be found in the role played in our model by the 'Construction' sector. Indeed, 'in the Palestinian economy more than half of total investment is concentrated into unproductive investment, such as residential building...' (Astrup and Dessus, 2002, p.18). This kind of investment (or at least a part of it: its annual equivalent) should be assimilated, from the point of view of its economic impact, to consumption, something that does not add anything to the productive capacity of the economy. However, in the SAM we used to calibrate the model almost the whole output of the 'Construction' sector is classified as 'investment'. This may explain the

Table 2. Comparison between DBM and the IMF

	1998 (US\$million)			2002 (prices 1998, US\$million)		
	DBM	IMF	Ratio*	DBM	IMF	Ratio*
Private consumption	3977	4245	0.937	3658	3956	0.925
Public consumption	976	954	1.023	1130	1041	1.085
Total fixed investment	1675	1494	1.121	997	661	1.508
Exports	729	886	0.823	467	426	1.096
Imports	3053	3321	0.919	2831	2896	0.978
Gross domestic product	4304	4258	1.011	3421	3188	1.073
Net factor income	779	903	0.863	390	465	0.839
Gross national income	5083	5161	0.985	3811	3653	1.043

* The ratio is the figure of DMB divided by the one of the IMF.

origin of the observed difference. The other items of DBM and IMF are extremely close to each other, which means that the ‘*intifada shock*’ we imposed on the model is reasonable and, arguably, the modeling itself makes sense.

Consequently, it turns out that it is possible to get closer to the IMF figures using our model, which is closer to the richer, micro-founded model used by the World Bank. The conviction that our model can be profitably used to simulate, for instance, the impact of different foreign assistance policies and eventually other policy shocks (see Missaglia and de Boer, 2004) has been reinforced by the outcomes of this study.

Notes

¹The reports of the World Bank (2003 a,b,c) and of the IMF (2003) can be found at <http://people.few.eur.nl/pmdeboer/research>.

²The index of real private consumption, for instance, is equal to: $(1 + 0.075)(1 - 0.056)(1 - 0.155) \times (1 - 0.148) = 0.731$.

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Appendix: Assessments by the WB and the IMF

Assessment by the World Bank

The estimates of the World Bank are based on ‘...a quantitative model which describes the economic relations between households, producers, government and the rest of the world through a set of accounting and behavioral equations...’ (cf. World Bank, 2003a, footnote 41).¹ The description of this CGE model can be found in Astrup and Dessus (2001, 2002). The following two tables are derived from the ‘Summary of Macroeconomic Trends and Projections’ that has been published in World Bank (2003c) and contains the same data as published in Table 7 of World Bank (2003a) but in more detail.

In Table A.1 we calculate from the annual changes provided by World Bank (2003c) the index² of the real components of gross domestic production (GDP), of real gross domestic

Table A1. Indexes 2002 (1998 = 1)

	Real annual change (NIS, prices 1998)				Index 2002 (1998 = 1)
	1999	2000	2001	2002	
Private consumption	0.075	-0.056	-0.155	-0.148	0.731
Public consumption	0.203	0.310	-0.021	-0.006	1.534
Total fixed investment	-0.083	-0.283	-0.769	-0.440	0.085
Exports	0.023	-0.088	-0.134	-0.243	0.612
Imports	0.054	-0.162	-0.290	-0.129	0.546
GDP per capita	0.031	-0.053	-0.195	-0.225	0.609
GNI per capita	0.039	-0.075	-0.232	-0.234	0.565

product per capita and of real gross national income (GNI) per capita in New Israeli Shekels (NIS, 1998 prices).

In the first panel of Table A.2 we give the data on the components of GDP for 1998 in US\$ million (World Bank, 2003c) and calculate the 1998 amounts in NIS based on the exchange rate prevailing in 1998. From Table A.1 we take the indexes 2002 (1998 = 1) and the amounts in real NIS and in real US\$, based on the exchange rate prevailing in 2002), easily follow. The real GDP of 2002 in NIS and US\$ is derived by taking the sum of the expenditure components and subtracting the imports. The nominal amounts

Table A2. Estimate of the real gross national income and its components (in US\$million, prices 1998)

	1998 (1 US\$ = 3.81 NIS) (population mid-year: 2731 × 1000)		2002 Index (1998 = 1)	2002 (1 US\$ = 4.74 NIS) (population mid-year: 3231 × 1000)		
	US\$	NIS		Real NIS	Real US\$	Nominal US\$
Private consumption	4014	15,293	0.731	11,173	2357	2756
Public consumption	976	3719	1.534	5703	1203	1757
Total fixed investment	1668	6355	0.085	541	114	119
Exports	624	2377	0.612	1454	307	345
Imports	3052	11,628	0.546	6351	1340	1581
GDP	4230	16,116		12,519	2641	3396
	US\$	Per capita NIS		Real per capita NIS	Real US\$	Nominal US\$
GNI	5058	7056	0.565	3990	2719	3768
GDP	4230	5901	0.609	3595	2450	3396
NFI	828	1155			269	372

in US\$ in 2002 are taken from World Bank (2003c). In the second panel of Table A.2 the GNI, GDP and net factor income (NFI) in US\$ are taken from the World Bank (2003c). Using the exchange rate and the population mid-year for 1998 (World Bank, 2003c), we arrive at the per capita values in NIS. From Table A.1 we take the indexes and calculate the real per capita GNI and GDP (in NIS). The estimate of the real NFI follows from subtracting real GDP from real GNI. The nominal amounts of GNI, GDP and NFI are taken from World Bank (2003c). It should be noted that the estimate of GDP reported in the first panel of Table A.2 (US\$2641 million) is 10.8% higher than the one reported in the second panel (US\$2450 million).

Assessment by the International Monetary Fund

In June 2003, the PCBS published, with the technical assistance of the IMF, a set of annual national accounts statistics for the years 1994 to 2000 (IMF, 2003, p. 22). With the aid of an income-expenditure model the IMF estimated GNI and its components for the years 2001 and 2002. We quote from Box 2.5. 'A simple Income-Expenditure Model to Estimate GDP Developments', IMF (2003, p.27):

The income-expenditure model starts with the identity *GDP equals Exports minus Imports plus Consumption plus Investment*. Information on exports in 2001 can be obtained from the preliminary balance of payments (BOP) prepared by the PCBS and the PMA. For 2002, Israeli BOP figures are available, that identify Israeli imports from the 'Palestinian Authority', which is broadly equivalent to WBG excluding East Jerusalem in this context. According to trade statistics from the PCBS, about 90 percent of Palestinian exports go to Israel. Imports and private consumption are both assumed to be a linear function of private disposable income (PDI). PDI is equal to GNI less domestic taxes (available from ministry of finance data) plus transfers from abroad (for which some limited data is available from banks). GNI is equal to GDP plus net factor income from abroad, which is

Table A3. GDP and GNI (current prices, US\$ million) 1998 and 2002

	1998		2002	
	Fraction	US\$ Million	Fraction	US\$ Million
Private consumption	0.997	4245	1.247	3709
Public consumption	0.224	954	0.343	1020
Private investment	0.264	1124	0.166	494
Public investment	0.064	273	0.035	104
Change inventories	0.023	98	0	0
Exports	0.208	886	0.139	413
Imports	0.780	3321	0.930	2766
GDP	4.258	4258	2.974	2974
NFI	0.212	903	0.145	431
GNI	1.212	5161	1.145	3405
Net current transfers	0.096	409	0.589	1752
Gross disposable income	1.308	5569	1.734	5157

Table A4. Estimate for 2002 of Real GNI, GDP, NFI (US\$ million, prices 1998) and CPI (base year 1998)

	Real annual change (US\$, prices 1998)				Index 2002 (1998 = 1)	US\$ Million 2002 (prices 1998)
	1999	2000	2001	2002		
Real GNI	0.084	-0.068	-0.162	-0.164	0.708	3653
Real GDP	0.089	-0.054	-0.150	-0.145	0.749	3188
Real NFI						465

mostly labor income from Israel (estimates based on quarterly labor market survey). Public consumption is derived from the fiscal accounts (which are up to date). Investment is based on partial information on public investment from donors project financing and even more partial information on private investment in construction (based on indicators of cement imports and building permits).

The model provides estimates for GDP and certain components in nominal terms. In order to derive GDP in real terms, each demand component is deflated. The most important component of the deflators is the CPI which is complemented by several other price series, such as oil prices and prices in Israel. Historically, the GDP deflator and the CPI index have in fact been very similar.

In Table A.3 we make use of the fractions of GDP and of the nominal GDP figures reported by IMF (2003, Table 2.2) to derive the components for 1998 and 2002. IMF (2003, Table 2.1) gives the annual growth of GDP and GNI. In Table A.4 we use these figures in order to derive the GDP, GNI and, residually, the net factor income (NFI), all in US\$ millions, prices 1998 (recall from Table A.3 that in 1998 the GNI was US\$5161 million and the GDP US\$4258 million). Using the fractions of real GDP in 1997 that IMF (2003, Table 2.3) reports for 2002, and using the figure of US\$3188 million, we arrive at Table A.5.

Table A5. Estimate of the real components of GDP 2002

	Fraction	US\$ Million* (prices 1998)
Private consumption	1.041	3956
Public consumption	0.274	1041
Private investment	0.144	547
Public investment	0.030	114
Change inventories	0	0
Exports	0.112	426
Imports	0.762	2986
GDP	0.837	3188

* We balanced the figures to arrive at GDP = 3188