PALESTINE MONETARY AUTHORITY
(PMA)

INTERNATIONAL TRADE
IN
PALESTINIAN TERRITORY

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July, 2011
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**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>LCIM$</td>
<td>The weighted average prices set by foreign suppliers on the domestic market (cost of imports)</td>
</tr>
<tr>
<td>LCTEX</td>
<td>Total exports at current prices</td>
</tr>
<tr>
<td>LCTIM</td>
<td>Total imports at current prices</td>
</tr>
<tr>
<td>LPTEX</td>
<td>Export price deflator</td>
</tr>
<tr>
<td>LPTIM</td>
<td>The import price deflator</td>
</tr>
<tr>
<td>LRA</td>
<td>Domestic real absorption</td>
</tr>
<tr>
<td>LRTEX</td>
<td>Total exports at constant prices</td>
</tr>
<tr>
<td>LRTIM</td>
<td>Total imports at constant prices</td>
</tr>
<tr>
<td>LRWGDPAIMEX</td>
<td>The weighted average real GDP in Palestinian Territory main export and import markets</td>
</tr>
<tr>
<td>LWPEXPW$</td>
<td>The weighted average of the international prices in the main export market</td>
</tr>
<tr>
<td>NCDT</td>
<td>Number of closure days for trade</td>
</tr>
<tr>
<td>PMA</td>
<td>Palestine Monetary Authority</td>
</tr>
</tbody>
</table>
INTERNATIONAL TRADE IN PALESTINIAN TERRITORY

1. INTRODUCTION

The purpose of this analysis is to investigate the question as to whether there is a potential relationship between international trade and international competitiveness of domestic producers on the foreign and domestic markets on the one hand and future monetary or exchange rate policy in PT. The PMA inflation report has shown that there is a potential strong relationship between the exchange rate and domestic inflation. A strong currency in a small open economy has a favourable effect on inflation by restraining the effect of imported inflation pressures. On the other hand a strong currency might potentially have a negative impact on the international competitiveness of domestic producers in the export and import markets. The relationship between the exchange rate and the current account of the balance of payments (more precisely the balance of exports and imports of goods and services, hereafter called the trade balance) has to be analyzed taking into account all factors that might potentially impact on the net exports of goods and services. Therefore, the analysis will be based on a trade model that will be econometrically estimated, which will allow to explore some policy conclusions.

2. PAST AND RECENT DEVELOPMENTS OF EXPORTS AND IMPORTS

The analysis will be based on annual data mainly obtained from the national accounts. Figure 1 shows total exports and imports in current prices and the net balance between them (net exports). The data show a significantly large deficit on the trade balance. Furthermore this deficit shows an increasing trend since the mid – nineties, and is even strengthening in the most recent years, due to a much stronger positive trend in total imports as compared to total exports. As can be seen from Figure 2, the coverage ratio of total imports by total exports fluctuates around 20%.
Figure 1: Total exports and imports
(At current prices in millions USD)

Figure 2: Export coverage of total imports

This coverage ratio can be decomposed into a volume and a price effect (Figure 3). The ratio of exports to imports measured at constant prices does not show any negative long run trend. On the other hand the terms of trade (the ratio of the export price deflator over the import price deflator shows a strong negative trend since 2001. This means that on average the prices of imported goods and services rise stronger relative to the prices of exported goods and services. A decline in the terms of trade implies an income loss on behalf of the country’s residents.
The major part of exports and imports are exports and imports of goods respectively, although the share of exports of services is rising in recent years (Figures 4 and 5).
3. ANALYSIS OF THE EXPORT AND IMPORT MARKETS

Applied empirical analysis of the trade balance is mostly based on the estimates of the trade elasticities in the export and import markets. These can be estimated non-econometrically\(^1\) but are usually derived through the estimation of the parameters in a trade model using econometric techniques\(^2\). The basic reference for such a model is the well known Bickerdike-Robinson-Metzler model (the so-called elasticity model). The elasticity model distinguishes between the export and import markets. In both markets economic behaviour is explained by supply and demand equations and an equilibrium condition. In this analysis, we will extend the basic elasticity model with equations of domestic production costs and wage formation. But the extent of this extension remains relatively limited and is only intended to augment the realism of the model. This extended version of the elasticity model is presented in Annex 1 in mathematical format.

3.1 The export market

The supply of domestic producers on the international markets depends on the perceived profitability of this type of production, i.e. on the price domestic producers can charge in the foreign markets, compared to their production costs. Production costs themselves depend mainly on wage costs and domestic currency costs of imported inputs. Wage costs also depend on the general domestic price tendencies. When all these factors and interrelationships are taken into account, the supply side in the export market can be summarized by a price setting behaviour. Domestic exporters set prices of their exports ultimately with reference to the prices set by competitors on their export markets, to the domestic currency costs of imports and of a demand volume effect. Figure 6 shows the export price deflator (LPTEX) together with the weighted average of the international prices in the main export markets (LWPEXPWS) (derived from the calculation of the export weighted real effective exchange rate for PT) and the weighted average real GDP in PT’s main export and import markets (LRWGDPAIMEX). The prices are all expressed in USD.

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The demand from the rest of the world for domestic products depends on the price competitiveness of domestic products in the foreign markets and on the real income developments in the rest of the world. As mentioned above domestic export prices ultimately depend on international prices and a demand effect. Therefore in the end the foreign demand for domestic products depends positively on the weighted average of the prices of competitors (LWPEXPW$) and on the weighted average of real GDP developments (LRWGDAIMEX) in each of the main export markets. Besides these fundamental factors, exports during some periods have been hampered by events such as the number of closure days for trade (NCDT) and some specific political shocks. Figure 7 shows the relationship between these variables and the total exports at constant prices (LRTEX).

### 3.2 The import market
Domestic demand for imports at constant prices is proportional to total domestic absorption at constant prices. It also depends on the relative prices of foreign suppliers as compared to the prices of domestically produced alternatives, measured in common currency. But the price of domestic products depends on production costs, which in a small open economy are ultimately driven by imported inflation. Therefore in the end, domestic import demand volume depends on the weighted average prices set by foreign suppliers on the domestic market (LCIMS) and domestic real absorption (LRA). All prices are expressed in USD. Figure 8 shows the relationships between these variables.

![Figure 8 Explanatory factors of total imports at constant prices](image)

The import price deflator (LPTIM) ultimately depends on the prices set by foreign suppliers on the domestic market (LCIMS), both expressed in a common currency, the USD (see Figure 9).

![Figure 9 Explanatory factors of the import price deflator](image)
3.3 The trade balance

Having explained the export and import prices and volumes, the net exports of goods and services can be calculated as the difference between export value and import value. Export and import values depend of course on the same variables as those affecting prices and volumes (Figures 10 and 11).

Figure 10 Explanatory factors of the value of exports
(All variables in logarithms)

Figure 11 Explanatory factors of the value of imports
(All variables in logarithms)

4. EMPIRICAL RESULTS

Reduced form equations (1 to 4) derived in the Annex 1 was econometrically estimated. Table 1 shows the results of unit root tests on all variables. Both Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are reported. Results indicate that all variables in levels
are I(1) i.e. non-stationary, while first difference is a stationary I(0) at least for one of the tests. 

Table 1: Unit root test of variables in levels and first difference*

<table>
<thead>
<tr>
<th></th>
<th>ADF</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>C</td>
</tr>
<tr>
<td>LCTEX</td>
<td>Level</td>
<td>0.795</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.013</td>
</tr>
<tr>
<td>LCTIM</td>
<td>Level</td>
<td>0.946</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.026</td>
</tr>
<tr>
<td>LRTEX</td>
<td>Level</td>
<td>0.901</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.007</td>
</tr>
<tr>
<td>LRTIM</td>
<td>Level</td>
<td>0.945</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.015</td>
</tr>
<tr>
<td>LPTEX</td>
<td>Level</td>
<td>0.144</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.001</td>
</tr>
<tr>
<td>LPTIM</td>
<td>Level</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.016</td>
</tr>
<tr>
<td>LRA</td>
<td>Level</td>
<td>0.936</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.029</td>
</tr>
<tr>
<td>LRWGDPAIMEX</td>
<td>Level</td>
<td>0.366</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.164</td>
</tr>
<tr>
<td>LWPEXPW$</td>
<td>Level</td>
<td>0.841</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.524</td>
</tr>
<tr>
<td>LCIMS</td>
<td>Level</td>
<td>0.776</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.376</td>
</tr>
<tr>
<td>LNCNT</td>
<td>Level</td>
<td>0.631</td>
</tr>
<tr>
<td></td>
<td>1st difference</td>
<td>0.001</td>
</tr>
</tbody>
</table>

* Presented values represent the P-value.

Table 2 reports the result of the estimated equations of the trade model. Real and current total exports is estimated as a function of world real GDP (calculated using average import and export weights), world price in dollars and export weights, number of closure days for trade, and dummy variable which equals one for the years 2002 - 2003 and zero otherwise, to capture the effect of the Second Intifada which peaked during this two years.

Results indicate, as expected, that world real GDP and world prices positively influence the Palestinian exports both in real and current prices. On one hand, increasing world GDP and/or prices (mainly of the largest trade partner i.e. Israel) increases the demand on Palestinian goods therefore increasing total exports in the long run. On the other hand, closure days for trade have a negative influence on the Palestinian exports (real and current prices).

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1 ADF test indicate that the first difference of LRWGDPAIMEX, LWPEXPW$, and LCIMS are non-stationary I(1), while PP indicate that they are stationary. Hence LRWGDPAIMEX is stationary at 10% level of significant.
As for the import functions, they are estimated as a function of domestic absorption, cost of import index and dummy variable. Results indicate that real absorption has a positive influence on real and current imports in Palestine. Cost of import index represented in dollars, shows a disparate influence on the Palestinian imports on the long run, where it influences the current imports positively, while it has a negative influence on real imports. An increase in cost of imports implies an increase in the relative price of foreign goods compared to the domestic goods therefore the demand for imports in real terms will decline (i.e. the volume of imported goods will decrease). However, an increase of cost of imports will increase the value of imports in current price (i.e. the value of imported goods will increase and not the volume).

<table>
<thead>
<tr>
<th>Table 2: Estimated equations by OLS (1996 – 2010)</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>CONSTANT</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>LRWGDPAIMEX</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>LWPEXPW$</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>LNCIM$</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>LCIM$</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>LRA</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>DUM03</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>DUM05</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>DUM07</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>No. observation</td>
</tr>
<tr>
<td>Adjusted R2</td>
</tr>
</tbody>
</table>

Price of total exports is estimated as a function of world real GDP, world price (cost of import index) and dummy variables. Results indicate that an increase in world prices increases the price of Palestinian exports in the long run. This is because an increase in cost of imported goods will increase the cost of production therefore increasing the price of exports of goods and services.

Finally, price of imports mainly depends on the cost of imports and a dummy variable. However, results reported in table 2 above, indicate that cost of imports index positively
affect the price of imports. Where there is almost one-to-one relationship i.e. an increasing cost of imports by 1% will increase the price of imports by almost 1% in the long run, other things being equal. This result might explain by the fact that most of Palestinian imports are necessary goods and has no substitution.

To ensure the existence of the long-term relationship between variables, a stationary test on the residuals has been performed. Hence, a long run relationship exists between a set of variables if these variables are non-stationary I(1) and residuals from regression are stationary I(0). Therefore, we expect that residuals from the regression above are I(0) in order to ensure the long run relationship between variables.

Table 3 reports the ADF and PP tests which are used to investigate the stationary of residuals. Reported results show that all residuals are stationary I(0) which indicates a presence of long run relationship between variables in the above described models.

<table>
<thead>
<tr>
<th>Resid – LCTEX</th>
<th>ADF</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resid – LCTIM</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Resid – LRTEX</td>
<td>0.014</td>
<td>0.002</td>
</tr>
<tr>
<td>Resid – LRTIM</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Resid – LPTEX</td>
<td>0.012</td>
<td>0.012</td>
</tr>
<tr>
<td>Resid – LPTIM</td>
<td>0.025</td>
<td>0.006</td>
</tr>
</tbody>
</table>

Table 3: Unit root test (ADF, PP) of residuals

5. CONCLUSION

The paper investigated the main elements explaining the movements of exports and imports of goods both in constant and current prices as well as their deflators. This allows obtaining information concerning the long run determinants of the net exports of goods and services which is a main component of the current account of the balance of payments. From this analysis some policy conclusions can be derived. The main findings are the following:

- PT is confronted with a significantly large deficit on its trade balance (defined as total exports of goods and services net of total imports of goods and services). Furthermore this deficit is on an increasing trend since the mid-nineties. The coverage ratio of exports to imports fluctuates around 20%.
• Results based on the estimation of a simple trade model indicate the presence of long run equilibrium relationships between international variables (such as prices and income) as well as of domestic expenditures on the PT trade variables. In fact PT’s nominal effective exchange rate is embedded in the calculation of the international price indexes expressed in a common currency. Therefore the trade elasticities with respect to these international prices can be interpreted as the effects of changes in the PT’s effective exchange rate;

• The exchange rate elasticity of total exports in current prices is estimated to 1.45, whereas the same elasticity for total imports is estimated to be 0.66. Thus implies that a depreciation of the PT’s effective exchange rate by 1% would increase total nominal exports by 1.45% and would increase nominal imports by 0.66% (the net result of volume and price effects). The overall effect of such depreciation on the overall trade balance however would be negative due to the very low coverage ratio of exports to imports. With a coverage ratio of only 20%, a depreciation of the exchange rate by 1% would affect the trade balance negatively with an estimated amount equal to about 0.37% of current total imports. This implies that a strong currency on average with the main trading partners would not hurt the trade balance but on the other hand is not particularly helpful for the export volume which is the main factor from the point of view of economic growth and employment;

• Total imports show a nearly unitary elasticity with domestic expenditures, whereas exports react to the growth of world income with an elasticity of only 0.44%. The main strategy to improve the trade balance is therefore to develop the supply side of the economy and to gain market share in the world economy.
Annex

The elasticity model distinguishes between the export and the import markets. In both markets behavior is explained by a supply, a demand and an equilibrium condition. We have extended the basic elasticity model for equations in domestic production costs and wage costs. The extent of this extension remains relatively limited. The purpose is not to build a full fledged econometric model but only to incorporate the main interactions relevant for the purpose of the research question. Our extended version of the elasticity model can be presented as follows.

In the export market

Supply in volume of exports (e) depends on the profitability of production, measured as the ratio of the export price deflator (pe) over production costs (p). In implicit and exponential functional form:

\[ e = e \left( \frac{pe}{p} \right)^a \]

The volume of foreign demand for our products (imf) depends on our export prices converted in foreign currency by the exchange rate (s), relative to the prices of our competitors on the world markets (p*). It also depends on economic activity in the rest of the world, calculated as the weighted average of real GDP in our main trading partners (yw). In implicit and exponential functional form:

\[ imf = imf \left( \frac{pe}{s \cdot p} \cdot yw \right)^b \]

The equilibrium condition determines the export price:

\[ e = imf \]

Domestic production costs depend on wage costs and costs of imported products and services in foreign currencies (pimv), expressed in terms of domestic currency. In implicit and exponential functional form:

\[ p = p \left( w^+, s \cdot pimv^+ \right)^{c_1} \]

\[ p = w^{c_1} \left( s \cdot pimv \right)^{c_1} \]
In this simple model wage costs depend on the domestic price level. In implicit and exponential functional form:

\[ w = w \left( p^h \right) \]

The model can be log-linearized as:

\[ \ln e = a_1 \ln pe - a_1 \ln p \]

\[ \ln \ln = \ln e = -b_1 \ln pe + b_1(\ln sp^h) + b_2 \ln yw \]

\[ \ln p = c_1 \ln w + (1-c_1) \ln s.pimv \]

\[ \ln w = h_1 \ln p \]

Expressing the equations in terms of logarithms allows us to interpret the coefficients in terms of elasticities: \( a_1 \) denotes the price elasticity of export volume with respect to the export price, \( b_1 \) the price elasticity of foreign demand for our products, \( b_2 \) the foreign income elasticity of the world demand for domestic products, \( c_1 \) the share of wage costs in total production costs and \( h_1 \) measure the degree of indexation of nominal wages to the domestic price level.

It can now be written as one matrix equation:

\[
\begin{pmatrix}
1 & -a_1 & a_1 & 0 \\
1 & b_1 & 0 & 0 \\
0 & 0 & 1 & -c_1 \\
0 & 0 & -h_1 & 1
\end{pmatrix}
\begin{pmatrix}
\ln e \\
\ln pe \\
\ln p \\
\ln w
\end{pmatrix}
= \begin{pmatrix}
0 \\
\ln( s.p^* ) + b_1 \ln yw \\
(1-c_1) \ln( s.pimv ) \\
0
\end{pmatrix}
\]

From which the following reduced form model can be derived:

\[ \ln e = \frac{-a_1b_1(1-c_1)}{(a_1+b_1)(1-c_1,h_1)} \ln s.pimv + \frac{a_1b_1}{(a_1+b_1)} \ln s.p^* + \frac{a_1b_2}{(a_1+b_1)} \ln yw \]

\[ \ln pe = \frac{a_1(1-c_1)}{(a_1+b_1)(1-c_1,h_1)} \ln s.pimv + \frac{b_1}{(a_1+b_1)} \ln s.p^* + \frac{b_2}{(a_1+b_1)} \ln yw \]
\[
\ln w = \left( \frac{q - c_i}{q - c_i, h} \right) \ln (s \cdot pim),
\]
\[
\ln p = \left( \frac{q - c_i}{q - c_i, h} \right) \ln (s \cdot pim).
\]

**In the import market**

The volume of the foreign supply to our markets depends on the profitability of such production as expressed by the price of these products, which is our import price \(pim\), expressed in foreign currencies and relative to foreign production costs:

\[
\frac{pim}{s \cdot p} \cdot ef = \frac{pim}{s \cdot p} \cdot \frac{pim}{s \cdot p} \cdot ef = \left( \frac{pim}{s \cdot p} \right)^z, \]

Domestic demand for imports at constant prices \(im\) depends on the relative price of these imported products, relative to domestic prices of these products and on real domestic absorption \(a\):

\[
im = im \left( \frac{pim}{p} \cdot a \right) \quad im = \left( \frac{pim}{p} \right)^q \cdot a^q, \]

The equilibrium condition determines the import price:

\[
ef = im \]

The model can be written in log-linear form as:

\[
\ln ef = \ln im = z, \ln pim - z, \ln \left( s \cdot p \right),
\]
\[
\ln im = -q, \ln pim + q, \ln p + q, \ln a
\]
\[
\ln p = c_1, \ln w + (1 - c_i), \ln (s \cdot pim)
\]
\[
\ln w = h_i, \ln p
\]
Again the parameters of these equations reflect elastic ties: $q_1$ is the price elasticity of domestic demand for foreign products, $q_2$ is the income elasticity of domestic import demand and $z_1$ is the price elasticity of foreign supply on our markets.

The reduced form of the model looks like:

$$
\begin{pmatrix}
1 & -q_1 & q_1 & 0 \\
1 & z_1 & 0 & 0 \\
0 & 0 & 1 & -c_1 \\
0 & 0 & -h_1 & 1 \\
\end{pmatrix}
\begin{pmatrix}
\ln im \\
\ln pim \\
\ln p \\
\ln w \\
\end{pmatrix}
= 
\begin{pmatrix}
\ln a \\
-z_1 \ln (s \cdot p^*) \\
(1 - c_1) \ln (s \cdot pimv) \\
0 \\
\end{pmatrix}
$$

$$
\ln im = \frac{z \cdot q_1 (1 - c_1)}{(q_1 + z_1) (1 - c_1, h_1)} \ln (s \cdot pimv) - \frac{q \cdot z_1}{(q_1 + z_1)} \ln (s \cdot p^*) + \frac{z_1 \cdot q_2}{(q_1 + z_1)} \ln a
$$

$$
\ln pim = \frac{q_1 (1 - c_1)}{(q_1 + z_1) (1 - c_1, h_1)} \ln (s \cdot pimv) - \frac{z_1}{(q_1 + z_1)} \ln (s \cdot p^*) - \frac{q_2}{(q_1 + z_1)} \ln a
$$