ESTIMATION OF THE EQUILIBRIUM REAL EXCHANGE RATE IN THE OCCUPIED PALESTINIAN TERRITORY

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This paper aims at estimating the equilibrium real effective exchange rate (ERER) in the Occupied Palestinian Territory (OPT). Engle-Granger and the fully modified ordinary least squares methods are used to estimate ERER. Main results of this paper show that the real effective exchange rate (REER) appreciation in OPT is associated with productivity differential, share of private investment in GDP, and remittances as a share of GDP. Results show that the highest contributor in REER appreciation is the share of private investment in GDP, followed by productivity differential, while remittances played a minor role in REER appreciation. Exchange rate misalignment show high fluctuations at the beginning of the sample period, then less fluctuation afterwards with zero reversion mean.
Contents

I. INTRODUCTION ...................................................................................................................... 1

II. RECENT DEVELOPMENTS ................................................................................................. 2

III. THE EQUILIBRIUM REAL EFFECTIVE EXCHANGE RATE .................................. 4

   LITERATURE REVIEW ........................................................................................................... 4
   DETERMINANTS OF THE REAL EXCHANGE RATE ....................................................... 6
   DATA AVAILABILITY ........................................................................................................... 10
   THE ECONOMETRIC METHODOLOGY ......................................................................... 10
   INTERPRETATION OF THE RESULTS ............................................................................... 13

IV. CONCLUSION ................................................................................................................... 17

REFERENCES ....................................................................................................................... 18
I. Introduction

Real (effective) exchange rates are defined as nominal (effective) exchange rates between the currencies of countries adjusted for changes in the relative prices of these countries. They therefore can be considered to be an indicator of the country’s competitiveness and as a determinant of the current account balance.

If nominal exchange rates were to converge quickly to their Purchasing Power Parity (PPP) levels, real exchange rates would follow a stable and stationary path. But it has been widely recognized, based on the statistical observations of real exchange rate behavior, that deviations from PPP are generally large and long lasting. These deviations and the implied large swings in real exchange rates may be the consequence of lack of international arbitrage in the goods and services markets, transportation costs, tariffs, non-tariff barriers, information costs, and lack of labor mobility. These frictions certainly play a role but it should also be recognized that relative price movements are only one factor that affect current account balances. Real exchange rates may therefore reflect other factors such as supply and demand factors and policy measures.

This paper aims to explain the observed movements of the Real Effective Exchange Rate (REER) in OPT. The OPT economy will probably undergo transitions to a more stable environment in which the income generation is more diversified and more endogenous as compared to the current situation where income transfers from abroad play the major role. A major issue in this respect concerns the implication of these transitions for the Equilibrium Real Exchange Rate (ERER). An analysis of the driving forces of the REER may therefore provide useful information for the formulation of the future monetary policy strategy.

This paper uses the (reduced form) exchange rate equation to assess ERER. This approach estimates the long-run cointegrating relationship between the real exchange rate and its fundamentals suggested in the literature by Edwards (19986, 1989, and 1994), Elbadawi (1994), Montiel (1997), Williamson (1994), and others.
Results show that REER appreciation is associated with productivity differentials (PDIF) with respect to OPT’s trading partners, private investment share in GDP (PINV), and received remittances from abroad as a share of GDP (REMIT). These results tend to indicate that PINV has been the most important driving force of the REER appreciation, followed by PDIF and that REMIT has only played a minor role. Exchange rate misalignment ranged between -4.94 percent in 1998 and 4.40 in 1999 with zero mean reversion during the period, which reflects the long-run convergence tendency of actual REER towards ERER in OPT.

The rest of the paper is organized as follows. The next section presents the recent developments in effective exchange rates in OPT. Section III talks about the ERER in OPT. In this section we summarize the literature on ERER, introduce the econometric methodology and results, and then interpret these results. Section IV concludes.

II. Recent developments

OPT currently has no domestic currency and instead three foreign currencies are, mainly, used for daily transactions, saving, borrowing, pricing, and accounting purposes. These three currencies are NIS, USD, and JD. Thus PMA is deprived of using monetary and exchange rate policies, which are needed to stabilize the economy such as inflation, unemployment, current account, not to mention external competitiveness. In this section we will provide a descriptive analysis of the CPI-based REER calculated by PMA staff and documented in Dombrecht and Khalil (2011). It is worth mentioning that because CPI in OPT is calculated in NIS, NIS is used as an anchor currency in calculating REER for OPT.

One of the major indicators that present a country’s external competitiveness is the REER. NEER in OPT has appreciated significantly since 2005 (figure 1). The difference between REER and NEER indicates that inflation in OPT relative to its trading partners contributed to the appreciation of the real exchange rate during this period. The appreciation of NEER since 2005 indicates that NIS appreciated against OPT trading partners’ currencies.
Estimating the ERER in the OPT

Figure 1 Exchange rate and consumer price developments in OPT
(Index: 2005 = 100)

Figure 2 REER in OPT and some selected countries
(Index: 2005 = 100)

Figure 2 shows the CPI-based REER in OPT and some of OPT trading partners (Israel, Euro Area, UK, US, and China). REER started to diverge between the selected countries after the mid of 2007. China and Israel REER appreciated more than OPT.

3 Source: IMF. Data on REER for Jordan, Egypt, and other neighboring countries is not available.
REER while it depreciated in UK and US. The Euro area REER appreciated until the end of 2009 before it depreciates afterwards, but remains broadly stable compared with the other countries—suggesting that Euro area inflation rates were kept in line with those in partner countries.

III. The Equilibrium Real Effective Exchange Rate

This paper aims at estimating a reduced form equilibrium real exchange rate equation. The estimation of the ERER consists of two stages:

- **Stage 1:** Estimating a reduced form relationship between the real exchange rate and a set of fundamental variables.

- **Stage 2:** Deriving an equilibrium level for the real exchange rate from the estimated econometric relationship

Although the first stage is statistical, economic theory helps guiding the choice of fundamentals and assessing the plausibility of the results. The second stage is based on a theoretical macroeconomic model, where the equilibrium real exchange rate is defined. Before going to the first stage we’ll survey the literature on the equilibrium exchange rate, and then we’ll provide a theoretical description of the fundamental variables.

**Literature review**

Economists have developed several methodologies to assess equilibrium exchange rates. Isard (2007) describes six different approaches used by economists to estimate equilibrium exchange rates. The first approach is the Purchasing Power Parity (*PPP*) approach. PPP hypothesis has two main variants. The absolute *PPP hypothesis* states that the exchange rate between the currencies of two countries should equal the ratio of the price levels of the two countries. The relative *PPP hypothesis* states that exchange rate changes are related to the difference in inflation rates. The second approach is *PPP adjusted for Balassa-Samuelson and Penn effects*. Balassa-Samuelson and Penn effects come from
the observation that consumer price levels in richer countries are systematically higher than in poorer ones\(^4\).

The third approach is the *macroeconomic balance framework*. This framework focuses on the requirements for achieving internal and external balance simultaneously. The fourth approach is assessment of the competitiveness of the tradable goods sector. This approach looks more narrowly at the performance of the tradable goods sector of the economy and ask how well it is competing at the prevailing real exchange rate. The fifth approach is *assessments based on estimated exchange rate equation*. This approach is an econometric estimation of reduced form exchange rate equations. The last approach is *assessments based on general equilibrium models*.

The above different methodologies sometimes generate different quantitative estimates of equilibrium exchange rates (Isard, 2007). In this paper we are assessing the ERER based on a reduced form exchange rate equation. The estimation of ERER depends upon the fundamentals that determine the equilibrium real exchange rate. Most of the empirical work related to the estimation of the factors driving the REER and the calculation of ERER in emerging countries is based on a model developed by Edwards (1986, 1989, and 1994).

Edwards’ models explore the long-run co-movements of the real exchange rate with variables such as the terms of trade, productivity, net foreign assets, the fiscal balance and measures of openness of the trade and exchange system. Edward finds that only real (fundamental) variables influence the ERER in the long run. However, in the short run changes in monetary shocks can be important determinants. Montiel (1997, 1999) and Baffes et al (1999) use co-integration techniques to estimate the equilibrium exchange rate. Montiel (1997) suggests that the co-integration technique is a superior method of estimating the real exchange rate over the PPP methodology.

Many studies have failed to find a statistical link between real exchange rates and fundamentals. Edison and Melick (1999) failed to find cointegration between real

\(^4\) An economic model predicting these effects based on the assumption that productivity or productivity growth-rates vary more by country in the traded goods’ sectors than in other sectors (the *Balassa–Samuelson hypothesis*).
exchange rates and real interest rate differentials, and Rogoff (1996) found a mixed empirical track record of the Balassa-Samuelson effect on real exchange rates. Williamson (1994) advocated that the usage of reduced-form single equations for developing countries, as large models using the multi-dimensional approach, may not be appropriate for these countries due to their small economies. The value of this approach depends upon how well the regression results conform to theoretical priors about variables that ought to have significant explanatory power, as well as on whether the estimated coefficients on those variables are consistent with prior beliefs about their signs and approximate magnitudes (Isard, 2007).

**Determinants of the real exchange rate**

Economic literature has identified several factors as potential medium to long-run determinants of equilibrium exchange rates. These fundamentals are reviewed briefly below.

- **Terms of trade (tot)** is constructed as the ratio of exports price deflator to imports price deflator. An increase in terms of trade is expected to affect ERER in two different ways. The first effect is the substitution effect, which improves the current account and as a consequence exchange rate appreciates. The second effect is the income effect, which means that the improved relative price will increase domestic income and thus, domestic consumption of imported goods increases and as a result the equilibrium real exchange rate must depreciate to restore equilibrium. The final net effect of an increase in terms of trade depends upon which effect dominates the other.

- **Productivity (prod)** proxied by relative GDP per capita compared to foreign trading partners. This variable captures the well-known Balassa-Samuelson effect. Countries with higher productivity growth in the tradable sector experience higher relative prices of nontradables and therefore an exchange rate appreciation without losing competitiveness.
Estimating of the ERER in the OPT

- **Government consumption (gcons)** as a share of GDP. An increase in government consumption biased toward nontradables creates higher demand for nontradables (relative to the tradable sector). This greater demand boosts the relative prices of nontradable goods, causing the equilibrium real exchange rate to appreciate. However, if the increase in overall government consumption is biased toward the tradable sector, an increase in spending will cause the exchange rate to depreciate. The final effect depends upon where government consumption is biased to.

- **Government investment (ginv)** as a share of GDP. Investments might have high import content and thus a negative impact on the trade balance and as a consequence exchange rate depreciates. This variable may also capture technological progress and thus positive impact on the exchange rate. Therefore the overall impact of government investment on the exchange rate is ambiguous.

- **Private investment (pinv)** as a share of GDP. Similar to the government investment, pinv’s effect on the exchange rate is ambiguous.

- **Remittances (remit)** as a share of GDP. The recent empirical literature is inconclusive on the relationship between worker remittances and the exchange rate (see for example Rajan and Subramanian (2005); Li and Rowe (2007); Elbadawi et al. (2008); Lee et al. (2009); Mongardini and Rayner (2009); and Barajas et al. (2010)). Remittances generally can be spent on tradables and nontradables. Only spending that increases the demand in the nontradable sector would lead to an appreciation of the exchange rate. If remittances are used to increase competitiveness and ease supply constraints in the nontradable sector, the real exchange rate would depreciate.

- **Aid flows (aid)** as a share of exports. An increase in aid flows improves the external balance and thus causes the exchange rate to appreciate.

- The severity of trade restrictions, proxied by **openness (open)** to trade, is defined as the sum of exports plus imports as a share of GDP. In the Palestinian case,
trade restrictions can be proxied by *number of closure days on trade (closure)*. Protection of domestically produced goods via restrictions on cross-border trade (e.g. import tariffs and nontariff barriers) or the increase in *closure* leads to higher domestic prices and thus equilibrium real exchange rate appreciation. Consequently, lifting existing trade restrictions should cause the exchange rate to depreciate.

- *Net foreign assets (nfa)* as a share of GDP, a proxy for the country's net external position. An increase in capital inflows from abroad implies higher demand for domestic currency, thus causing the exchange rate to appreciate.

Figure 3 shows the evolution of some ERER determinants during 1997 – 2010. The figure shows that most of REER determinants show some fluctuations during the examined period. Terms of trade, productivity relative to trading partners, private investment as a ratio of GDP, workers remittances as a ratio of GDP, and openness as a ratio of GDP declined after 2000 as a result of the Israeli measures after the outbreak of the second Intifada on September 2000. Restriction on movements of labor and trade within OPT and between OPT and Israel and other countries led to a decline in productivity and worker remittances, and to an increase in costs of production and export prices, thus affecting negatively private investments.

Foreign aid fluctuates depending upon the political situation in OPT. Most of foreign aid goes for the support of the government budget; some of it goes for development activities like infrastructure and capacity building of the Palestinian institutions. Government consumption as a ratio of GDP increased until 2003 after which it declined until 2006 before it grew at lower rates. Openness declined after 2000 as a result of what we mentioned above regarding the restrictions imposed by the Israeli forces on the movements of labor and trade.
Estimating of the ERER in the OPT

Figure 3 REER and its determinants in OPT

![Charts showing REER and its determinants from 1997 to 2009.](image)

- **REER (2005=100)**
- **prod (2005=1)**
- **gcons (ratio of GDP)**
- **pinv (ratio of GDP)**
- **remit (ratio of GDP)**
Data availability

The major constraint in estimating the reduced-form relationship between the real exchange rate and its determinants is the availability of data, particularly in emerging countries. The time series does not exceed 14 years, which is not very satisfactory when annual data are employed. Data used in estimating the ERER have different time frequency, REER is available in monthly frequency while its determinants are available on annual basis. Thus we choose to estimate the ERER based on annual data.

Our sources include PCBS, PMA, and IMF’s International Financial Statistics (IFS). Data on exports, imports, GDP both in constant and current prices, consumer price index for OPT, remittances, government consumption and investment were compiled from PCBS. Data on REER, foreign aid, and net foreign assets were compiled from PMA. Regarding net foreign assets only a few number of annual data are available and thus we chose to exclude this variable from our analysis. Data on exchange rates, GDP per capita, and consumer price indices of our trading partners were compiled from IFS. Data on private investment were estimated by PMA staff.

The econometric methodology

There is an abundant applied empirical literature that estimates reduced form equations for the REER in many countries, not least in emerging market economies.
Most of these papers use co-integration tests among which the two-step Engle-Granger (EG) (1987) and Johansen’s Vector Error Regression (VER) (1991 and 1995) are the two most popular ones. Recently, a number of authors used Autoregressive Distributed Lag (ARDL) models to test for the existence of level variables equations (Pesaran and Shin 1999 and Pesaran et al 2001).

The ARDL approach is based on the estimation of a conditional single equation Error Correction Model (ECM). A Wald or F-test together with a t-test are used to test the presence of a vector in terms of the levels of the variables entering in the model. Unfortunately this approach cannot be applied to the estimation of the REER in OPT because of an insufficient number of observations in the available annual data set.

The limited sample size of the available data is even more restrictive as to the use of the Johansen’s VER, which needs even more observations as compared to the ARDL approach. Therefore the analysis for OPT is for the time being based on two alternative estimation methods: the EG and the Fully Modified OLS (FMOLS) co-integration estimation and testing.

The EG approach is based on the estimation and testing of a co-integration vector using Static OLS (SOLS) and Phillips-Ouliaris (PO) (1990) residual based co-integration tests. After exploring different REER theories on OPT data, the following long run equation was estimated using SOLS (equation 1, standard error between parentheses):

\[
LREER = -0.061 + 0.034^{*} LPDIF - 0.255^{*} LPINV + 0.148^{*} LREMIT
\]

\[
\text{Adjusted R-squared} = 0.83 \quad \text{DW} = 2.08 \quad \text{No. of Observations} = 14
\]

Where,

\begin{align*}
LREER & = \log \text{ of real effective exchange rate}, \\
LPDIF & = \log \text{ of productivity differentials}, \\
LPINV & = \log \text{ of private investment as a share of GDP}, \text{ and} \\
LREMIT & = \log \text{ of remittances as a share of GDP}.
\end{align*}
DW = Durbin-Watson statistic for serial correlation (close to 2 means no serial correlation)

Applying an Augmented Dickey-Fuller (ADF) test on the residuals of this equation rejects the null hypothesis of the presence of a unit root in these residuals as shown in table 1. The same result is obtained using a Phillips-Perron (PP) test on the same residuals.

Table 1 Unit root test of equation (1) residual

<table>
<thead>
<tr>
<th></th>
<th>ADF-test</th>
<th>PP-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residual of eq. (1)</td>
<td>0.0155</td>
<td>0.0195</td>
</tr>
</tbody>
</table>

We can therefore conclude that there exists a long run equilibrium relationship between the REER on the one hand and:

- The productivity differential between OPT and its main trading partners;
- The share of private investment in GDP;
- The remittances received from abroad.

As an alternative we use the Phillips and Hansen (1990) FMOLS estimator that eliminates problems caused by correlation between the co-integrating equation and the stochastic regressors innovations (equation 2). The results are very close to those obtained using SOLS.

\[
LREER = -0.047 + 0.034*LPDIFF - 0.274*LPINV + 0.167*LREMIT
\]  
(2)

\[
(0.0368) \quad (0.0096) \quad (0.0193) \quad (0.0209)
\]

Adjusted R-squared = 0.82    DW = 2.15    No. of Observations = 14

Long-run covariance estimate (Bartlett Kernel, Newey-West fixed bandwidth = 3.00)

Hansen’s instability test (Hansen, 1995) does not reject the null hypothesis that the series are co-integrated as shown in table 2.
Estimating of the ERER in the OPT

Table 2 Hansen's instability test for co-integration of eq. (2)

<table>
<thead>
<tr>
<th>Lc statistic</th>
<th>Stochastic Trends (m)</th>
<th>Deterministic Trends (k)</th>
<th>Excluded Trends (p2)</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.416782</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>&gt; 0.2</td>
</tr>
</tbody>
</table>

*Hansen (1992b) Lc(m2=3, k=0) p-values, where m2=m-p2 is the number of stochastic trends in the asymptotic distribution

We conclude from all this that a long run equilibrium relationship exists in OPT between the REER and the mentioned variables of productivity differentials, share of private investment in GDP and received remittances from abroad as a share of GDP. In the interpretation of the results we will focus on the results obtained from the two-step EG approach, knowing that the results obtained with the FMOLS are very similar.

We provide here the unit root tests of all variables used in the equations above. ADF- and PP-tests show that all variables are stationary on the first difference (integrated of order one I(1)). Unit root tests for the first difference of all variables are highly significant except for D(LREMIT), which is significant on 10 percent level.

Table 3 Unit root tests for LREER, LPDIFF, LPINV, and LREMIF

<table>
<thead>
<tr>
<th>P-Value</th>
<th>ADF-test</th>
<th>PP-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>LREER</td>
<td>0.9573</td>
<td>0.9177</td>
</tr>
<tr>
<td>D(LREER)</td>
<td>0.0020</td>
<td>0.0020</td>
</tr>
<tr>
<td>LPDIFF</td>
<td>0.1537</td>
<td>0.1718</td>
</tr>
<tr>
<td>D(LPDIFF)</td>
<td>0.0005</td>
<td>0.0006</td>
</tr>
<tr>
<td>LPINV</td>
<td>0.6239</td>
<td>0.7048</td>
</tr>
<tr>
<td>D(LPINV)</td>
<td>0.0057</td>
<td>0.0017</td>
</tr>
<tr>
<td>LREMIF</td>
<td>0.2336</td>
<td>0.4636</td>
</tr>
<tr>
<td>D(LREMIF)</td>
<td>0.0783</td>
<td>0.0783</td>
</tr>
</tbody>
</table>

Interpretation of the results

To obtain a more precise view on what drives the REER in OPT, we calculated the contributions of the explanatory variables in the estimated long-run equilibrium equation (see table 4). The cumulated sum of percentage changes in the REER since
1998 till 2010 was 18.4 percent. Productivity differential accounted for 2.6 percentage points of this accumulated REER appreciation, whereas the private investments and remittances accounted for 12.2 and 0.6 points respectively. In terms of percentages the accumulated appreciation over this period was due to productivity for 13.9 percent of this appreciation while relative private investment activity and received remittances as a share of GDP contributed respectively for 66.1 percent and 3.0 percent of the total appreciation. The remainder of 17.0 percent was caused by deviations of the REER from its estimated equilibrium values (misalignment).

These results tend to indicate that the share of private investment in total economic activity has been the most important driving force of the REER appreciation over this period, followed by the productivity differential and that remittances have only played a minor role. We will discuss each of these factors in a bit more detail.

Table 4 The contributions of the explanatory variables in the estimated long-run equilibrium equation

<table>
<thead>
<tr>
<th></th>
<th>DLREER</th>
<th>CDLPDIFF</th>
<th>CDLPINV</th>
<th>CDLREMIT</th>
<th>DLREERMIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>0.339932</td>
<td>1.696427</td>
<td>-1.31595</td>
<td>4.902595</td>
<td>-4.94314</td>
</tr>
<tr>
<td>1999</td>
<td>3.323717</td>
<td>4.644868</td>
<td>-6.18081</td>
<td>0.459291</td>
<td>4.400367</td>
</tr>
<tr>
<td>2000</td>
<td>0.335346</td>
<td>-3.80353</td>
<td>5.226245</td>
<td>-5.02152</td>
<td>3.934154</td>
</tr>
<tr>
<td>2002</td>
<td>-4.36555</td>
<td>-2.40684</td>
<td>0.801438</td>
<td>-1.93729</td>
<td>-0.82286</td>
</tr>
<tr>
<td>2003</td>
<td>2.147723</td>
<td>0.567903</td>
<td>-1.89261</td>
<td>2.118305</td>
<td>1.35413</td>
</tr>
<tr>
<td>2004</td>
<td>1.70513</td>
<td>0.247116</td>
<td>7.059466</td>
<td>-2.24674</td>
<td>-3.35831</td>
</tr>
<tr>
<td>2005</td>
<td>1.780911</td>
<td>1.217915</td>
<td>-3.34439</td>
<td>1.950045</td>
<td>1.957336</td>
</tr>
<tr>
<td>2006</td>
<td>1.66201</td>
<td>-1.39549</td>
<td>-2.95568</td>
<td>3.101316</td>
<td>2.911868</td>
</tr>
<tr>
<td>2007</td>
<td>1.341224</td>
<td>-0.54156</td>
<td>5.87107</td>
<td>-0.58539</td>
<td>-3.4029</td>
</tr>
<tr>
<td>2008</td>
<td>5.822274</td>
<td>-2.10335</td>
<td>3.322917</td>
<td>2.680326</td>
<td>1.922381</td>
</tr>
<tr>
<td>2009</td>
<td>-0.56531</td>
<td>2.466781</td>
<td>0.047367</td>
<td>-1.72804</td>
<td>-1.35141</td>
</tr>
<tr>
<td>2010</td>
<td>1.743149</td>
<td>0.05249</td>
<td>-4.02389</td>
<td>1.731134</td>
<td>3.983413</td>
</tr>
<tr>
<td>Sum</td>
<td>18.4094</td>
<td>2.56286</td>
<td>12.16335</td>
<td>0.5498</td>
<td>3.13383</td>
</tr>
<tr>
<td>Share</td>
<td>18.4094</td>
<td>13.92148</td>
<td>66.07144</td>
<td>2.986516</td>
<td>17.02056</td>
</tr>
</tbody>
</table>

Where,  

\[ DLREER = \text{Change in logarithm of the variable}, \]
Estimating of the ERER in the OPT

CDLPDIFF = Contribution of the change in the log of productivity differentials in the total rate of change of REER,

CDLPINV = Contribution of the change in the log of private investment in the total rate of change of REER,

CDLPDIFF = Contribution of the change in the log of remittances in the total rate of change of REER,

DLREERMIS = REER misalignment,

Sum = Sum of annual changes, and

Share = Average contributions of each variable to the total rate of change of REER.

As was observed, the REER in OPT has appreciated by some 20 percent from 1998 till 2010, which implies that measured in common currency the consumer prices in OPT have outpaced by some 20 percent those in the main trading partners (of which Israel represents by far the largest share). Normally, this could endanger OPT’s competitiveness on the international and domestic markets, unless it was caused by equilibrium factors which prevent this appreciation from hurting OPT’s overall competitiveness. It turns out that the observed appreciation of the REER in OPT went along with a significant decline over this period in the share of private investment in total GDP (see figure 3). According to the estimated long-run equilibrium relation, the share of private investment has a negative effect on the ERER. This effect is well documented in the literature. For example, Chudik and Mongardini (2007) argue that investments in low- and middle-income countries have high import content and thus a negative effect on the trade balance. The relatively strong decline over this period of the share of private investment expenditure has compensated for any negative effects of the declining price competitiveness. It should be added of course that if OPT would stimulate and be able to expand the private sector capital stock to enhance economic growth, this might require a more stable REER.
Labor productivity in OPT has not moved a lot relative to the main trading partners (among which Israel has the dominant weight). This effect is the so called Balassa-Samuelson effect and has been found to exert a significant positive effect on the ERER in almost all countries under investigation. But given the absence of a clear improvement in relative productivity in OPT, its effect on the ERER has been very modest.

Also the role played by remittances was limited. Remittances in percentage of GDP is currently lower than the levels observed in the period before 2000. In the literature the effect of remittances on the ERER was found to be relatively small in other countries as well (Barajas et al, 2010; Combes et al, 2011) and its effects on the ERER are found to be inconclusive (Weber and Yang, 2011).

Overall, the results found for OPT are well in line with those observed in many other countries.

We have computed the degree of misalignment which is simply the percentage deviation of actual REER from equilibrium REER (ERER). Misalignment is shown in table 4 last column and figure 4. Positive deviations (misalignment) reflect the appreciation (overvaluation) of actual REER relative to ERER, while negative deviations indicate the depreciation (undervaluation) of actual REER relative ERER. Exchange rate misalignment ranged between -4.94 percent in 1998 and 4.40 in 1999 with zero mean reversion during the period, which reflects the long-run convergence tendency of actual REER towards ERER in OPT.

Exchange rate misalignment is estimated at about 4 percent in 2010, which implies that the current REER is higher than the ERER. This may be due to the fact that 2010 data are preliminary and subject to change, particularly the explanatory variables (PDIF, PINV, and REMIT). Several empirical studies find that high levels of misalignment between the real exchange rate and the ERER are associated with periods of macroeconomic instability, while lower levels of misalignment correspond to better economic performance (see for example Ghura and Grennes, 1993; Elbadawy, 1994; and Haussman et al., 2005).
IV. CONCLUSION

This paper estimated the equilibrium real effective exchange rate (ERER) for OPT. We used two alternative methods to estimate the ERER for OPT, the two-step Engle-Granger (EG) and the Phillips and Hansen (1990) FMOLS estimator. The outcomes are of both methods very similar. Data availability and the limited number of observations were crucial in the choice of the method of estimation and in the choice of the explanatory variables.

The main result of this paper is that there is a long-run relation between REER on one hand and productivity differentials (PDIF), private investment as a share of GDP (PINV), and received remittances as a share of GDP (REMIT) on the other hand. Results tend to indicate that the share of private investment in total economic activity has been the most important driving force of the REER appreciation over the sample period, followed by the productivity differential, which has a more modest effect on the REER. Remittances as a share of GDP only played a minor role. These results indicate that stimulating and expanding the private sector requires a more stable REER.

Exchange rate misalignment show high fluctuations in the first two years of the sample period, followed by low fluctuations in the following years. The year 2010 shows a relatively high overvalued REER relative to ERER. This may be due to the fact that
2010 data are preliminary and subject to change. The fluctuations in the exchange rate misalignment are associated with the macroeconomic instability in the past decade.

REFERENCES


------, 1989, Real Exchange Rates, Devaluation and Adjustment: Exchange Rate Policies in Developing Countries Cambridge, Massachusetts: MIT Press.


