Palestine Monetary Authority

Inflation Report
2010

Research and Monetary Policy Department

April 2011

Vision

To be a full-fledged and a modern central bank for an independent and sovereign Palestinian state, capable of conducting sound monetary policy and issuing and managing a national currency. In doing so, the PMA will always aim at achieving both, financial and monetary stability, and thus contribute to sustainable economic growth in Palestine. Furthermore, the PMA seeks to practice the role of economic and financial advisor to the Palestinian government.

Mission

Ensuring monetary stability and keeping inflation under control, as well as contributing to financial stability in a way that leads the further development in the financial sector in Palestine, promote integration into the regional and global economy, and ultimately, foster high rates of sustainable economic growth in Palestine.

Palestine Monetary Authority (PMA)

Ramallah - Al Bireh, P. O. Box 452
Tel.: 02-2409920 - Fax: 02-2409922
Gaza- P. O. Box 4026
Tel.: 08-2825713 - Fax: 08-2844487

E-mail: info@pma.ps
Web page: www.pma.ps

Palestine Monetary Authority

Board of Directors

Dr. Jihad Al Wazir
Governor and Chairman

Dr. Shehadah Hussein
Deputy Governor

Dr. Ismail El Zabri

Dr. Mahmoud El Jafari

Mr. Mohammad Abu Ramadan

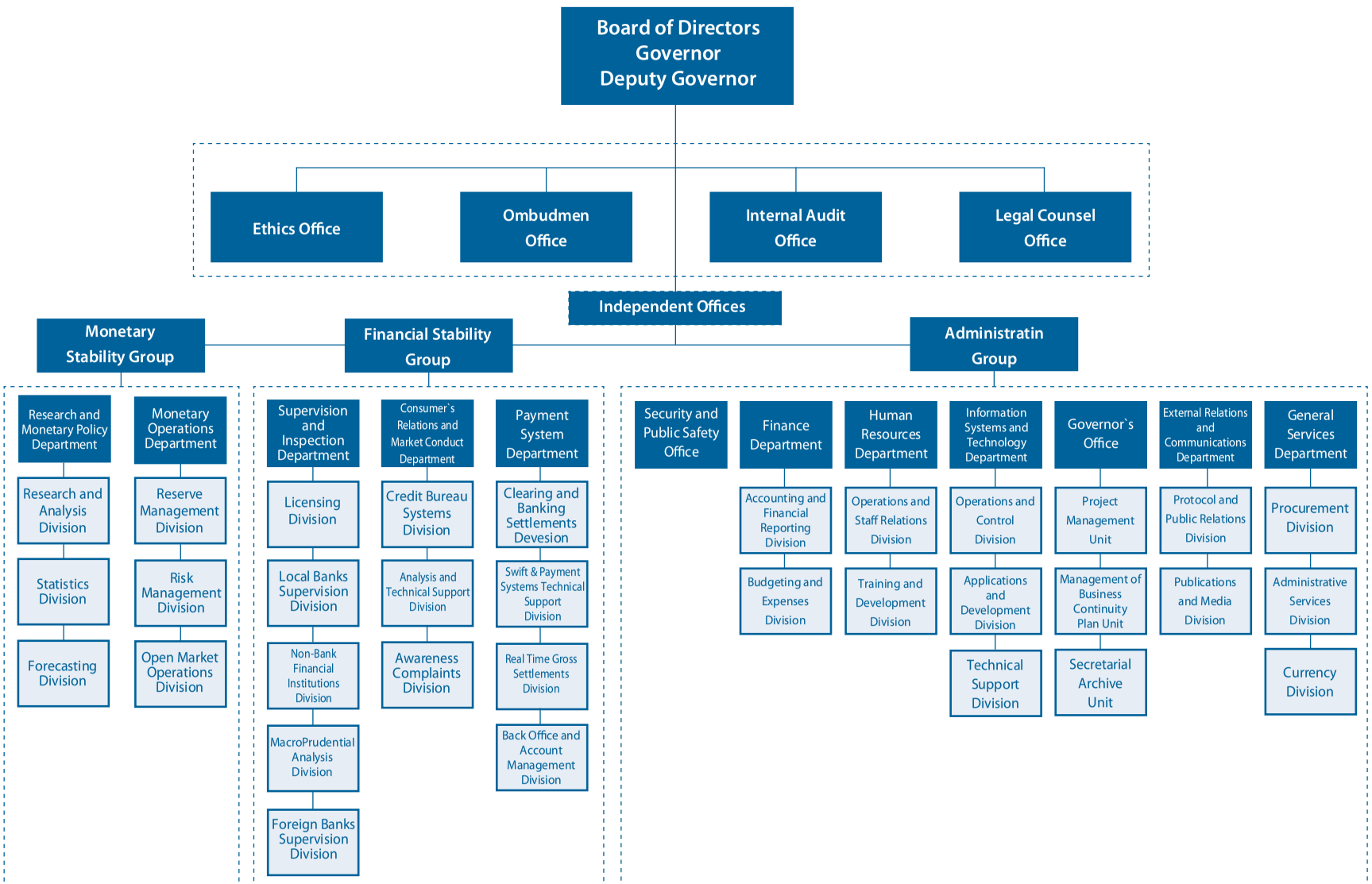
Mrs. Mona al Masri

Dr. Nabeel Kassis

Dr. Said Haifa

Dr. Samir Abdullah

Organization Structure of The PMA



2010 Inflation Report

Executive Summary

This is the first time that the Palestine Monetary Authority (PMA) issues an inflation report. This report represents a modest exercise in the analysis of inflationary pressures in the Occupied Palestinian Territory (OPT) and of contrubuting factors such as monetary and interest rate developments. this exercise is ment to be prepared at least annually and would constitute the major PMA`s effort to monitor and eventually target the inflation rate in the OPT. Presently, such a report necessarily has to take into account the very specific and special current institutional settings. OPT currently has no domestic currency, mainly three foreign currencies are used for transaction, saving, borrowing, pricing and accounting purposes. PMA does not issue a domestic currency and is therefore deprived of the usual instruments of monetary policy and exchange rate policy available in other central banks. It therefore has no real power to influence domestic interest rates or to target and influence the inflation rate. Nevertheless it is important to understand the inflation dynamics of the country because this is an important input in strategic choices to be made whenever PMA would become a real central bank with full monetary policy functionality.

This report is prepared by the staff of PMA's Research and Monetary Policy Department and contains the following ingredients.

First, it contains a descriptive analysis of recent and past inflation developments. This analysis shows that in recent years by far the largest contributing factor to domestic inflation was the item "food and soft drinks". This is due to the strong increase in world food and beverages prices and to the relatively high weight of these products in the consumption basket in OPT.

The second chapter discusses and analyses recent and past monetary developments. This analysis is very much complicated by the absence of a domestic currency and therefore absence of reliable data on the circulation of banknotes. The analysis therefore had to rely on estimates of most of the monetary aggregates (especially currency in circulation) and therefore the results of this analysis have to be interpreted with great care. Given this caveat, the results indicate that the by far most important contributing source of the recently observed growth rate of the money stock has been the rapid expansion of bank credit to the private sector. The analysis also reveals the presence of a stable money demand function, which is a necessary prerequisite for using the money supply as an indicator for future inflationary tendencies. But the absence of a domestic currency deprives PMA from using the money supply as a monetary policy instrument.

Chapter three discusses interest rate developments. Given the absence of a domestic currency, PMA is deprived from an own interest rate instrument that would serve as a reference point

for the commercial banks when setting their own credit and debit rates. Nonetheless, observed interest rate levels and movements may affect economic and financial conditions and therefore it is important to monitor interest rate developments. The analysis shows that the intermediation margin on all three reference currencies used in OPT are substantially higher than those observed in the reference currencies. Furthermore the nominal interest rates charged by banks in OPT on loans and overdrafts in NIS are extremely high. This may be due to the particular liquidity position in NIS of OPT banks for which the NIS is a foreign currency in their accounting. Given the low nominal interest rates on deposits and the observed inflation rate, the real deposit interest rates are all the time significantly negative. This implies that investors in deposits are loosing money in real terms all the time. They are therefore discouraged to save in favor of consumption or investment in real assets. The absence of a domestic currency deprives PMA to steer domestic interest rates to levels that are compatible with the inflation rate.

Finally, chapter four contains a quantitative inflation analysis using modern statistical and econometric methods. On the basis of a survey of recent literature, especially of similar IMF analysis for other countries, alternative models were estimated and used for forecasting the inflation rate in OPT during the last three quarters of 2011. This was supplemented with an analysis of the degree of uncertainty surrounding this forecast. The central forecast, alternative scenarios the degree of uncertainty and the judgmental evaluation of the balance of risks were presented in a fan chart, summarizing all these parameters. The results of this analysis should be interpreted with care due to relatively short sample period during which data are available and the absence of several data series in an environment where statistical output is still under development.

Contents

Tables

Figures

Abbreviations

CC	Cash held by the public
cc	Currency ratio
CIM	Cost of imports
CPI	Consumer price index
DD	Demand deposits
EA	Euro area
EDE	Emerging and developing economies
ER	Excess reserves
er	Excess reserve ratio
GDP	Gross domestic product
GS	Gaza Strip
IFS	International financial statistics
IMF	International Monetary Fund
JD	Jordanian Dinar
M1	Narrow money
M2	Broad money
MB	Monetary base
MENA	Middle East and North Africa
MM	Money multiplier
MM1	M1 multiplier
MM2	M2 multiplier
m-o-m	Month on month
NCG	Net claims on the government
NCP	Net claims on the private sector
NEER	Nominal effective exchange rate
NFA	Net foreign assets
NFA_b	Net foreign assets at banks
NFA_{PMA}	Net foreign assets at PMA
NIAE	Newly industrialized Asian economies
NIS	New Israeli Shekel
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PMA	Palestine Monetary Authority
OPT	Occupied Palestinian Territory
RCC	Ratio of cash held by the public
RR	Required reserves
rr	Required reserve ratio
RWB	Remaining West Bank
TS	Time and saving deposits
ts	Time and saving deposits ratio
USA	United States of America
USD	United States Dollar
V2	M2 Velocity
VAR	Vector autoregressive
VC	Vault cash
vc	Vault cash ratio
VECM	Vector error correction model
WFOBEV	World food and beverages price index
WM	Withdrawn money
y-o-y	Year on year

Variable Names

D(X)	The difference of X (Xt – Xt-1), where X is any variable
D(L(X))	The difference of log X
E	Demand for deposits on currencies other than JD, NIS, and USD
GDPR	Real GDP
JD_b	Jordanian Dinar in Banks
L(X)	Log of X, where X is any variable
NIS_b	New Israel Shekel in Banks
USD_b	US Dollars in Banks
VM2NIS	M2 velocity expressed in NIS
X(-t)	Lag value of X, where t = 1, 2, 3, …
Ξ	Structural dummies (D02 and D06)

2010 Inflation Report

CHAPTER 1
INFLATION DEVELOPMENTS

1.1 Introduction

Inflation is defined as a sustained increase in the general level of the prices of goods and services. In general terms, inflation implies a fall in the internal purchasing power of money within an economy. Currency devaluation on the other hand implies a fall of the external purchasing power of a country's monetary unit.

An increase in the general price level does not necessarily imply that the prices of all goods and services rise. In some circumstances relative prices (i.e. the price of one good in comparison with the prices of other goods) may change even if the average general level of all prices remains unchanged. Therefore even in the absence of inflation, relative prices may and do change. Indeed relative price changes are an essential ingredient of the market mechanism. The comparison between relative and average prices also shows who benefits and who looses when prices adjust. Furthermore, inflation also acts like a tax, taking income or wealth from one group and transferring it to another.

Inflation is measured by taking a "basket "of goods and services in the economy and by comparing the price level of this basket at two time intervals. There are different measures of inflation, depending on the basket of goods selected. The most common measures used are based on the consumer price index, the producer price index and the GDP deflator (strictly speaking the GDP deflator is not based on a fixed basket, but is calculated as the ratio of GDP at current prices to GDP at constant prices. It is therefore considered to be the average unit value of value added created within the country).

In OPT the Consumer Price Index (CPI) is based on a fixed "basket" of goods and services. The Palestine Central Bureau of Statistics (PCBS) calculates the price of this basket each month, expressed with reference to a base year. The base year of the index published up till 2004 was 1996. In 2005 two major changes occurred in the calculation of the OPT CPI. Firstly, the basket was changed and extended to make it more representative of the OPT consumption behavior. Secondly, the base year was changed from 1996 to 2004. The new CPI series is calculated from January 2005 onwards and is henceforth considered to be the official consumer price index. As is always the case when baskets and/or base years are changed, the new CPI series is not strictly comparable anymore with the one in the past. Nevertheless, empirical economic analysis requires the availability of long sample periods, implying long time series. Therefore, the old series, based on an older base year is recalculated by taking the new base year as being equal to 100. This is a simple, straightforward and commonly used procedure especially when the CPI

for at least one common month, expressed in both base years, is available. Fortunately PCBS calculated the conversion factor to convert the CPI from base year 2004 to base year 1996 (the coefficient is 1.4496). In this way a CPI series for OPT can be calculated over the period starting in 1996 in a common base year. But it has to be mentioned that this conversion factor is only known for the aggregate CPI index and not of its components. This implies that no long series for the CPI components can be calculated.

Furthermore, PCBS records CPI not only for the Occupied Palestinian Territory, but also for the three regions separately: Remaining West Bank, Gaza Strip and Jerusalem. All three regions have a slightly different basket composition and the baskets also changed in 2005 and also the base year for the CPI changed from 1996 to 2004. PCBS collects and publishes consumer prices in each region separately and aggregates them to obtain the overall consumer price in OPT.

1.2 CPI basket composition

As explained above, the official CPI published for the period from January 2005 onwards is based on a new basket. Tables 1.1 and 1.2 allow comparison of the composition and weights of the old and new baskets for OPT.

The major weights in the old CPI basket were allocated to food (40.5 percent in OPT) and transport and communication (12.7 percent in OPT). In the new basket several changes have been made:

- Soft drinks were removed from the beverages and tobacco and added to food;
- Transport and communication have been separated into two different broad categories;
- Restaurants and cafes are added as a separate item.

Table 1.1 Composition and weights in the 1996 CPI basket for OPT and the three regions

Major Groups of Expenditure	OPT	RWB*	GS	Jerusalem
Food	40,547	40,163	42,883	37,895
Beverages and Tobacco	6,714	6,957	6,348	6,105
Textiles, clothing and footwear	9,511	9,662	9,395	8,866
Housing	6,942	6,415	7,838	8,115
Furniture, household goods & service	7,418	7,388	7,811	6,782
Transport and communication	12,680	12,786	11,239	15,066
Education	3,959	3,907	3,397	5,417
Medical care	4,793	4,915	4,497	4,712
Recreational, cultural goods & services	1,577	1,526	1,585	1,866
Miscellaneous goods and services	5,859	6,281	5,007	5,176
Total	**100,000**	**100,000**	**100,000**	**100,000**

* West Bank, which includes all of the West Bank except those parts of Jerusalem which were annexed by Israel in 1967

Source: PCBS

In the new basket food and soft drink (37.6 percent in OPT) and transportation and communication taken together (13.7 percent in OPT) still account for the highest weights, but housing has now become the third most important category (10.4 percent in OPT).

Table 1.2 Composition and weights in the 2004 CPI basket for OPT and the three regions

Major Groups of Expenditure	OPT	RWB*	GS	Jerusalem
Food and soft drinks	37,638	38,821	38,893	32,876
Al choholic Beverages and tobacco	4,658	5,065	4,269	4,388
Textiles, clothing and footwear	6,959	6,960	7,156	6,623
Housing	10,384	10,718	8,997	11,943
Furniture, household goods	6,308	6,294	6,406	6,353
Medical care	4,452	5,258	3,677	3,874
Transportation	9,861	9,582	8,751	12,382
Communications	3,793	3,866	3,408	4,274
Recreational, cultural goods & services	4,836	3,910	6,229	4,578
Education	3,563	3,189	4,028	3,636
Restaurants and cafes	2,175	2,144	2,143	2,298
Miscellaneous goods and services	5,373	4,193	6,043	6,775
Total	**100,000**	**100,000**	**100,000**	**100,000**

* West Bank, which includes all of the West Bank except those parts of Jerusalem which were annexed by Israel in 1967
Source: PCBS

Overall the basket compositions in three regions are quite similar with the only exception perhaps for the lower weight in Jerusalem attached to food and soft drinks, which is compensated by a relatively higher weight for transportation, housing and miscellaneous.

1.3 CPI level and inflation

Figure 1.1 shows the long run movements of the level of CPI in OPT and in each of the three regions. For consistency with the analysis some of the other sections of this report, we have re-expressed the CPI levels in index 2005 = 100.

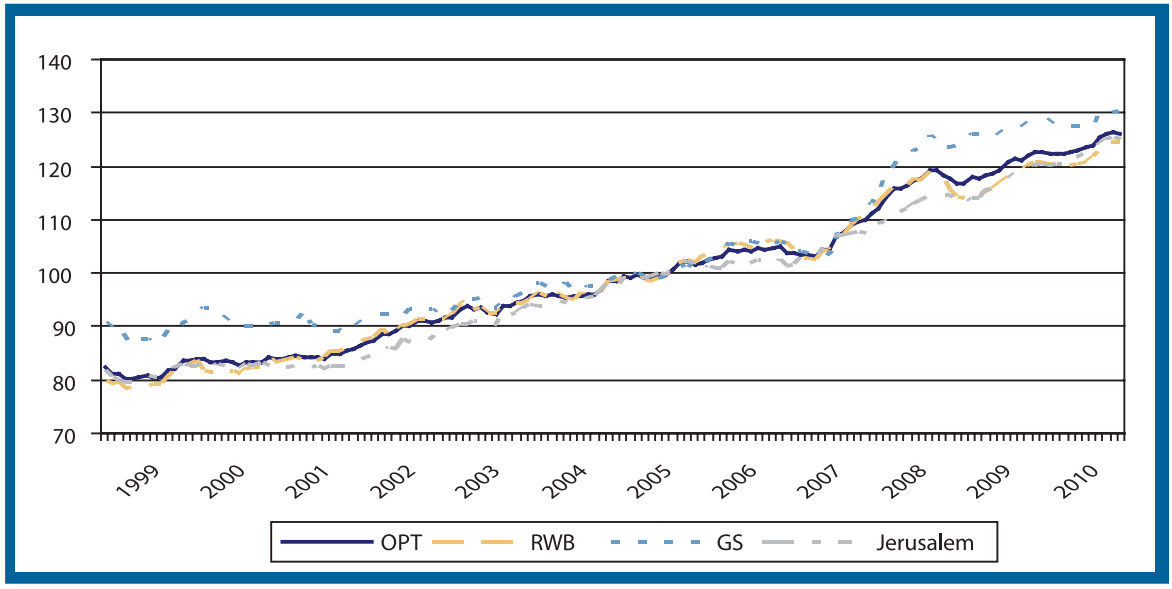
As shown in figure 1.1, CPI has an upward slope for OPT and for the three regions. CPI in RWB, Jerusalem, and OPT are highly correlated and close to each other, while the CPI in GS is less correlated with the CPI in OPT, RWB, and Jerusalem particularly during the periods Jan. 1999 – Jul. 2002 and Jan. 2008 – present.

Figure 1.2 shows the m-o-m inflation rate which is obtained as the percentage change of the CPI level with respect to the previous month. M-o-m inflation rate in OPT shows a volatile but

stationary fluctuation during the examined period. It ranged between around -1.5 percent in January 1999 and around 2.5 percent in February 2008.

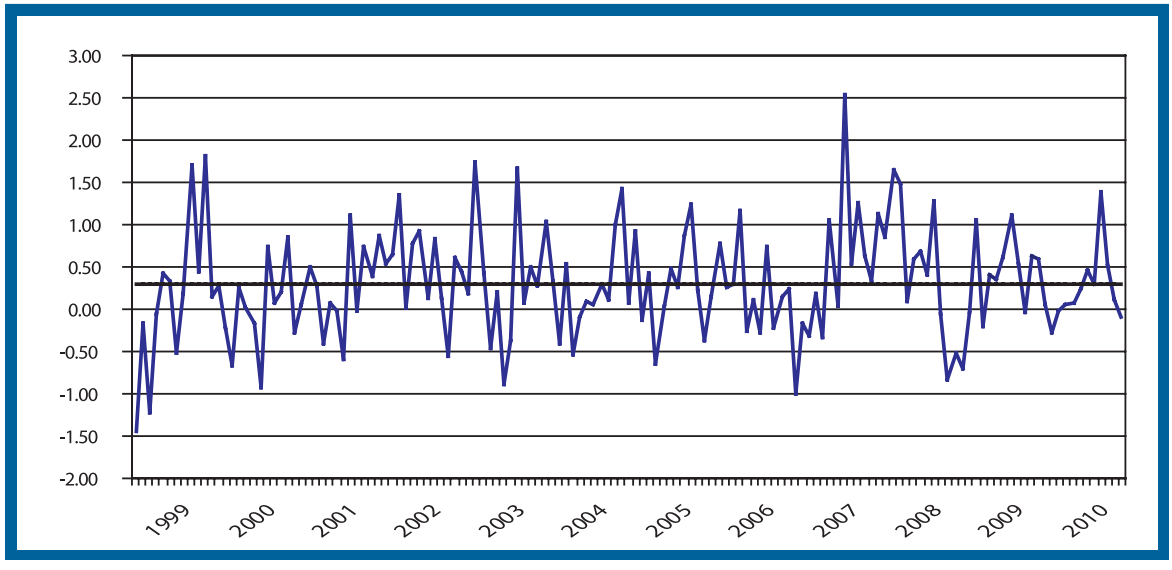
Table 1.3 shows the monthly average inflation rate and standard deviation in OPT, Israel, and Jordan during 1999 - 2010. The table shows that RWB has the highest average monthly inflation rate (0.315 percent) in comparison with GS (0.257 percent) and Jerusalem (0.301 percent), while GS experiences the highest price volatility (0.933). Comparing the CPI in OPT with the CPI in Israel and Jordan, the table shows that inflation in OPT shows a higher monthly average and a higher degree of volatility as compared to Israel. But inflation in OPT is on average lower and less volatile than in Jordan.

Figure 1.1 CPI in OPT, RWB, GS, and Jerusalem (base year = 2005)



Source: PCBS and PMA stuff calculations

Figure 1.2 M-o-m inflation rate in OPT
(Percentage changes)



Source: PCBS and PMA stuff calculations

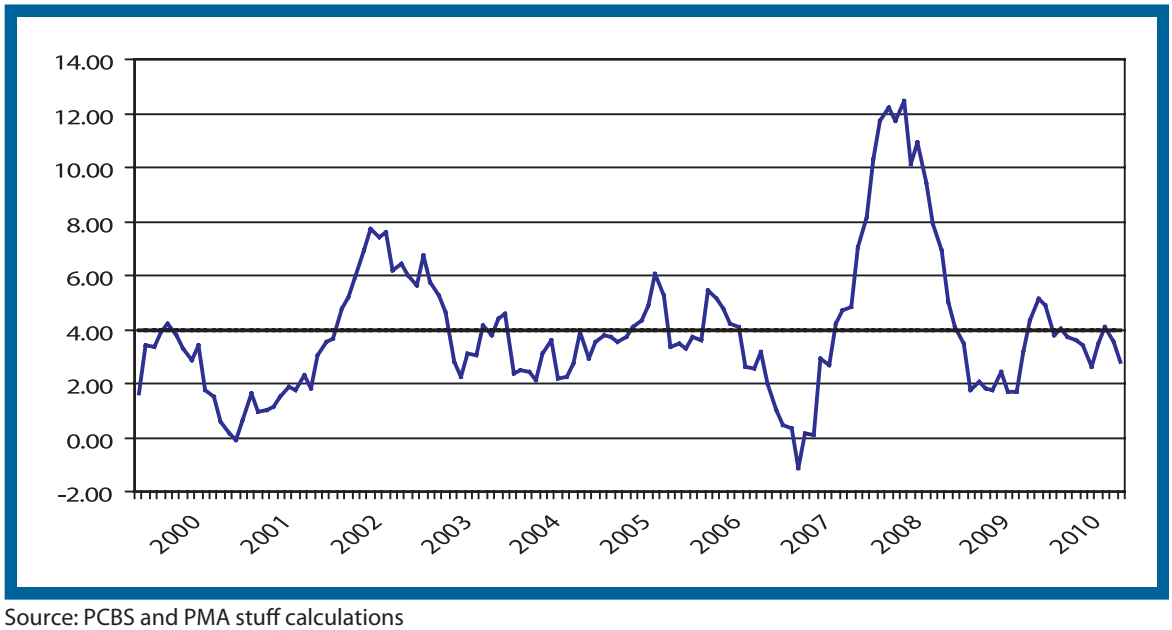
Table 1.3 Monthly average inflation rate and standard deviation in OPT, Israel, and Jordan (Jan. 1999 – Dec. 2010)

	Average (%)	Standard Deviation
Occupied Palestinian Territory	0.300	0.643
RWB	0.315	0.827
GS	0.257	0.933
JER	0.301	0.703
Israel	0.172	0.496
Jordan	0.321	0.969

Testing for seasonality, using census X12 method, shows no evidence of seasonality in both quarterly and monthly inflation in OPT. While the CPI inflation in RWB and GS show evidence for monthly seasonality, they show no evidence for quarterly seasonality. Inflation in Jerusalem shows no evidence of seasonality either monthly or quarterly.

A straightforward way to correct for any potential seasonality is to compare the CPI in each month with its value in the corresponding month one year ago: the so-called y-o-y inflation rate (see figure 1.3).

Figure 1.3 Y-o-y inflation rate in OPT (Percentage changes)



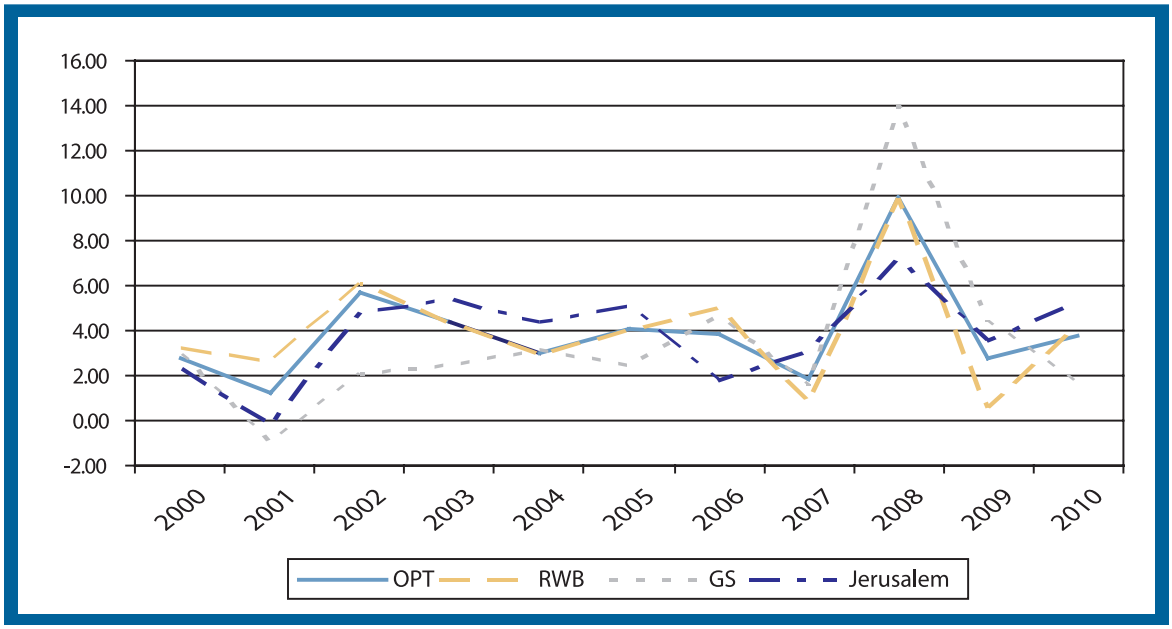
Source: PCBS and PMA stuff calculations

Figure 1.3 shows a less volatile y-o-y inflation rate in OPT compared with m-o-m. While y-o-y inflation in OPT reached a bottom in May 2007 and it reached its peak in July 2008.

The average annual inflation rate is shown in figure 1.4. The figure shows that the inflation rates reached a peak in 2008 for the three regions and OPT. It is obvious from the figure that the

inflation rate in RWB, among all regions, has the highest correlation with the inflation rate in OPT, while the inflation rate in GS has the lowest correlation with the inflation rate in OPT.

Figure 1.4 Average annual inflation rate in OPT, RWB, GS, and Jerusalem
(Percentage changes)



Source: PCBS and PMA stuff calculations

Tables 1.4 and 1.5 contain the contributions of the different broad CPI components to the average annual inflation rate in the period 1997 to 2004 and 2005 to 2010, respectively. Table 1.4 indicates that the group of transport and communication has, on average, the highest contribution in the inflation rate in OPT during 1997 – 2004 followed by food, while the group of recreational, cultural goods and services has the lowest contribution in the inflation rate with a negative contribution in average. Table 1.5 indicates that the group of food and soft drinks has the highest contribution, on average, in overall inflation in OPT during 2005 – 2010. The group of Alcoholic beverages and tobacco comes in the second place, while the group of communications has the lowest contribution in the inflation rate in OPT during the same period.

1.4 Headline and core inflation

Some central banks distinguish headline inflation from core inflation. Headline inflation is measured by the rate of change of the CPI index which was discussed in the previous sections of this report. Core inflation on the other hand is a measure of inflation that excludes certain items from the consumption basket that exhibit relatively high volatile prices. High volatile price items are mostly identified in the energy and food items. Sometimes the measure of core inflation excludes other exogenous factors such as the influence of changes in indirect taxes and products for which prices are administered by the authorities (for example in some countries the government fixes the prices of basic goods such as bread, water, fuel, etc.).

The rationale for some central banks to consider a core inflation measure in their monetary policy decisions is that shocks in the prices of some items or taxes directly feed into headline inflation. Furthermore, these shocks are mostly largely unpredictable. Given the fact that the transmission mechanisms of monetary policy measures (such as interest rate changes) are long and variable, shocks in non-core items in the CPI largely escape the control of monetary policy. For example, in most countries a sudden increase in oil prices feeds very quickly into headline CPI.

Table 1.4 Contribution of CPI components to the average annual inflation rate in OPT in the period 1997 – 2004 (base year = 1996)

	1997		1998		1999		2000		2001		2002		2003		2004	
	Cont.	%	Cont.	%	Cont.	%	Cont.	%	Cont.	%	Cont.	%	Cont.	%	Cont.	%
Food	0.025	32.83	0.029	52.22	0.019	34.56	0.007	23.48	-0.002	-15.31	0.010	17.82	0.018	39.95	0.008	27.39
Beverages and tobacco	0.006	8.47	0.005	8.33	0.006	10.42	0.002	6.75	0.001	7.65	0.007	11.99	0.004	8.52	0.001	3.32
Textiles, clothing and footwear	0.012	15.96	0.008	14.37	0.001	2.01	0.002	7.64	-0.002	-16.00	0.004	6.65	0.000	0.39	-0.001	-2.72
Housing	0.004	4.99	0.003	4.53	0.004	8.08	0.006	20.16	0.004	30.80	0.006	10.52	0.002	3.95	0.002	7.93
Furniture, households goods and services	0.008	10.50	0.004	8.02	0.005	9.60	-0.001	-3.90	-0.003	-24.17	0.001	2.14	0.001	2.16	0.002	5.23
Transport and communications	0.008	11.05	0.001	2.55	0.011	19.56	0.008	28.84	0.012	99.51	0.024	42.42	0.012	27.63	0.010	34.66
Education	0.002	2.54	0.001	1.11	0.001	2.44	0.001	4.92	0.001	8.52	0.002	2.91	0.002	4.31	0.001	4.41
Medical care	0.005	6.57	0.003	4.52	0.003	6.06	0.001	3.68	0.001	6.60	0.001	1.58	0.003	6.19	0.002	7.32
Recreational, cultural goods and services	0.001	1.44	0.001	1.11	-0.001	-1.80	-0.001	-3.99	0.000	-2.16	0.000	-0.04	0.000	0.64	0.000	-0.14
Miscellaneous goods and services	0.004	5.21	0.002	3.81	0.005	9.05	0.003	12.51	0.001	4.46	0.002	4.00	0.003	7.08	0.003	11.43
All Items CPI	**0.076**	**100.00**	**0.056**	**100.00**	**0.055**	**100.00**	**0.028**	**100.00**	**0.012**	**100.00**	**0.057**	**100.00**	**0.044**	**100.00**	**0.030**	**100.00**

Source: PCBS and PMA stuff calculations

Table 1.5 Contribution of CPI components to the average annual inflation rate in OPT in the period 2005 – 2010 (base year = 2004)

	2005		2006		2007		2008		2009		2010	
	Cont.	%	Cont.	%	Cont.	%	Cont.	%	Cont.	%	Cont.	%
Food and Soft Drink	0.015	35.75	0.023	59.63	0.017	91.67	0.068	68.70	0.015	54.86	0.014	38.40
Al Coholic Beverages and tobacco	0.003	7.34	0.001	3.18	0.002	12.58	0.004	3.65	0.005	17.09	0.006	16.40
Textiles, clothing and footwear	0.000	0.46	0.001	1.62	0.000	-1.67	0.000	0.33	0.002	7.96	0.002	6.15
Housing	0.012	28.75	0.005	11.84	-0.003	-13.79	0.008	8.26	-0.001	-2.76	0.005	13.81
Furniture, household goods & services	0.000	-0.09	0.000	-0.98	-0.001	-2.93	0.004	3.70	0.004	14.31	0.002	4.03
Medical care	0.001	2.34	0.000	-0.73	0.002	10.86	0.003	3.16	0.000	-0.53	0.000	0.99
Transport	0.006	15.19	0.006	15.17	-0.001	-3.14	0.008	8.11	-0.003	-9.43	0.002	6.56
Communications	0.001	3.38	0.002	4.12	0.001	2.71	0.000	0.24	0.000	-1.12	-0.001	-1.81
Recreational, cultural goods & services	0.000	-0.75	-0.001	-1.70	0.000	-0.66	0.001	0.60	0.001	3.15	0.001	1.86
Education	0.000	0.52	0.001	1.33	-0.001	-2.99	0.000	-0.19	0.001	4.71	0.002	4.78
Restaurants and cafes	0.001	2.99	0.000	0.84	0.001	5.30	0.003	2.90	0.001	3.91	0.001	2.00
Miscellaneous goods and services	0.002	4.12	0.002	5.69	0.000	1.96	0.001	0.58	0.002	7.86	0.003	6.84
All Items CPI	**0.041**	**100.00**	**0.038**	**100.00**	**0.019**	**100.00**	**0.099**	**100.00**	**0.028**	**100.00**	**0.037**	**100.00**

Source: PCBS and PMA stuff calculations

In that case there is nothing much a central bank can do to avoid these first round effects of such price shocks. On the other hand, monetary policy (also in those central banks that use core inflation) will be concerned and wary about the potential second round effects of such price shocks (for example when the increase in CPI following the oil price increase feeds into nominal wages, which again causes production costs and CPI to increase, leading to a wage/price spiral).

Other central banks would prefer to base their assessments on headline inflation and not on core inflation. The main underlying reason is that this is the best measure of the cost of living of a typical household.

Core inflation is not an official inflation measure in the sense that it is not calculated by the official statistics bureaus. It is a measure that is calculated in some central banks and there is no internationally agreed methodology underlying these calculations.

In OPT, as shown in tables 4 and 5 in the previous section, food, beverages, and tobacco categories have a high contribution in the CPI inflation. Energy prices, particularly fuel, affect the CPI implicitly through the categories of housing and transport and as is shown in tables 4 and 5, these categories have a high contribution in the CPI too. Some of these commodities are administered in OPT. This is the case for such items as bread, tobacco, travel and fuel. But in the case of OPT, some of these prices (such as fuel and tobacco) are adjusted frequently, or are not totally controlled (such as bread and travel). Furthermore, due to agreements between PA and the government of Israel, the PA is required to change the prices or taxes on some commodities whenever they change in Israel. We may conclude from this that in OPT using core inflation in the analysis will not differ significantly from using headline inflation. We will therefore concentrate exclusively on the analysis of headline inflation in this inflation report.

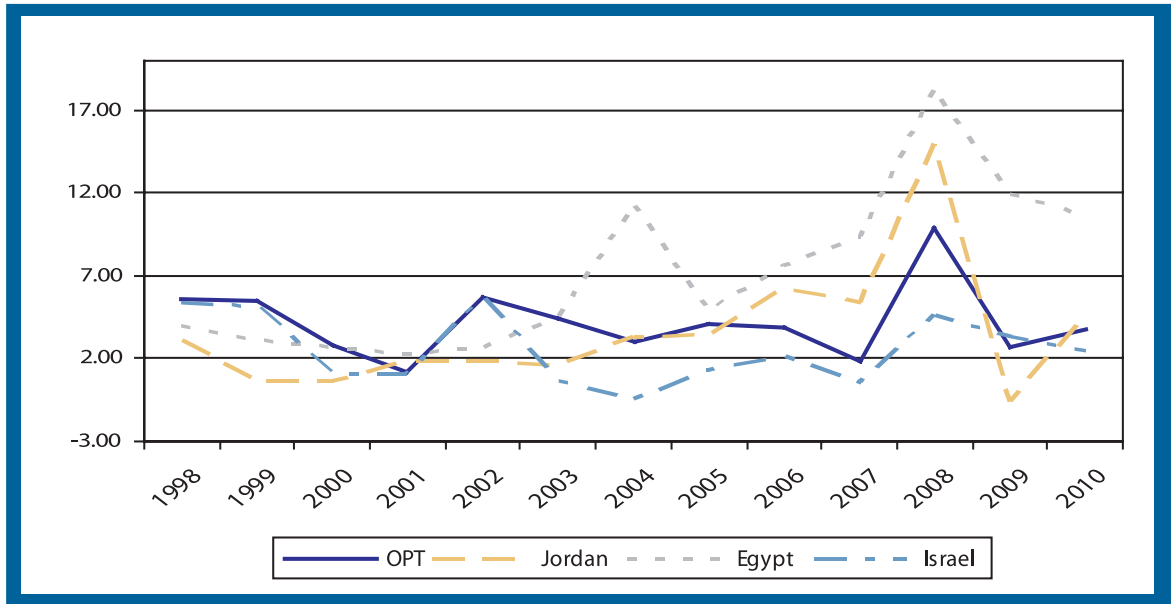
1.5 International environment

This section provides a regional and global comparison of CPI inflation rates during the period 1998 – 2010. Figure 1.5 shows the inflation rates in OPT, Jordan, Egypt, and Israel. As indicated in the figure, inflation rates in these countries were somewhat correlated, but nonetheless differ significantly in their levels and volatility. Up to 2003 they fluctuated between slightly above zero and slightly below 5 percent. After then, divergences further increased.

The figure shows that OPT has higher and more volatile inflation rates compared with Israel but generally lower and less volatile inflation rates compared with Jordan and Egypt. Furthermore, inflation rates in OPT and Israel are mean reverting processes (fluctuate around a long run stationary average) while inflation rates in Jordan and Egypt apparently are generated by non-stationary process (they exhibit an increasing trend).

Figure 1.6 compares inflation rates between OPT and other World economies. The figure shows that inflation rates in OPT are close to the World inflation rate but more volatile. While inflation in OPT has lower rates than in the Middle East and North Africa (MENA) and Emerging and Developing Economies (EDE), it has higher rates than in USA, Euro area (EA), and Newly industrialized Asian economies (NIAE). The figure also shows that inflation rates in USA, EA, and NIAE are more stable than those in OPT, MENA, and EDE. It is also worthwhile to observe that although MENA region is a part of EDE, inflation in MENA follows an upward trend, contrary to EDE where the trend is rather negative.

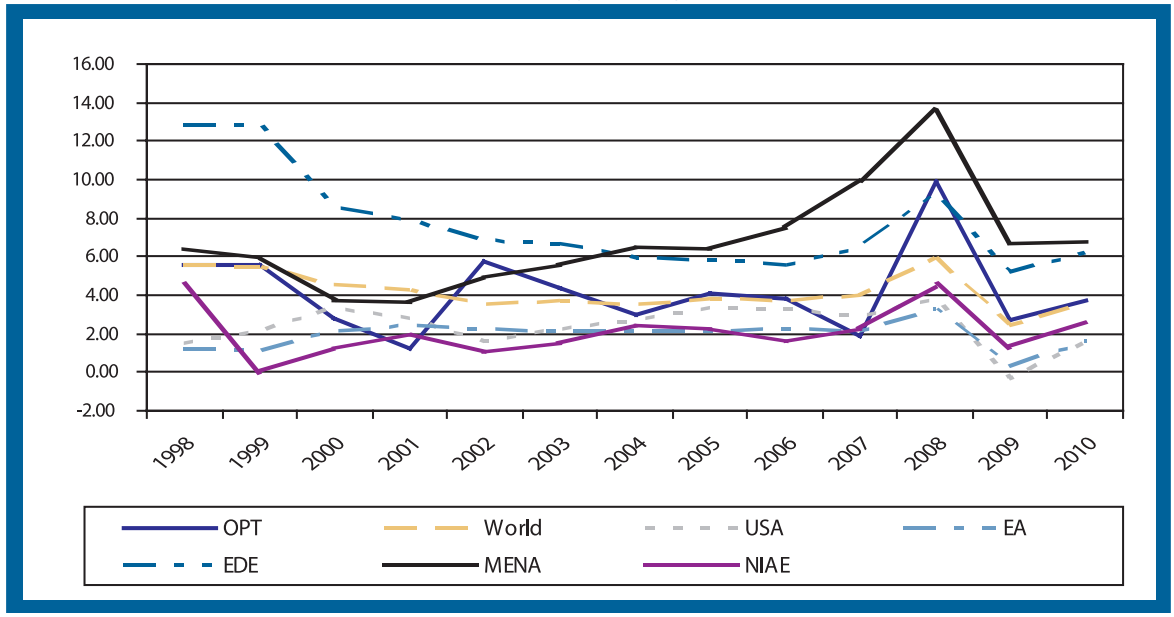
Figure 1. 5 Average annual inflation rates in OPT, Jordan, Egypt, and Israel
(Percentage changes)



Source: IFS, PCBS, and PMA stuff calculations.

Figures 1.5 and 1.6 show that World economies experienced increasing inflation rates in 2008 and afterwards, reverted back to levels observed before. This increase might be explained by the high increase in food and fuel prices. 2010 shows signs for a global increase in consumer prices due mainly to the increase in food and fuel prices, which is expected to continue in 2011.

Figure 1.6 Average annual inflation rates in OPT and other World economies
(Percentage changes)



Source: IFS, PCBS, and PMA stuff calculations.

2010 Inflation Report

CHAPTER 2
MONETARY DEVELOPMENTS

2.1 Money supply and its components

Data scarcity, mainly monetary data, is the main research problem in OPT. Absence of a national currency and the presence of more than one main currency complicate the estimation of money supply (MB, M1, and M2) in OPT[1]. There is only one attempt by Wazir et al (2011) to estimate the money supply in OPT. Wazir et al estimate depends upon the assumption that individuals and financial institutions in OPT have similar behavior regarding the money demand and the money supply process as in Jordan and Israel. This chapter estimates the money supply making use of information provided by two small banks operating in OPT.

Estimating Money Supply in OPT needs to assign some values to the proportion of cash held by the public in each currency (USD, NIS, and JD). To do so, banks in OPT were asked to provide the total amount of withdrawn money (WM) of the three different currencies evaluated in dollars. Data were compiled from two small banks in the OPT and ratios constructed from those two banks were applied to the overall banking sector in OPT[2]. Therefore, this might affect our estimates of money Supply, M1, M2, CC, and MB. Hence data limitations must be borne in mind in the economic interpretation of the statistical results presented below.

In fact, it is essential for a central bank to have precise information concerning the currency in circulation and all monetary aggregates. Due to the absence of a domestic currency, PMA does not have this precise information. It can only be obtained through a monetary reform, where PMA, acting as a central bank, would be able to issue a national currency.

Monetary analysis is an important input in monetary policy decisions in most central banks. The monetary analysis that is presented in this chapter is based on assumptions and estimates concerning the amount of money in circulation and therefore only serves as an illustration, conditional on those estimates.

We received information on the amount of WM of each currency expressed in USD during 1996 – 2008 on yearly bases. The annual ratio of cash held by the public is assumed to be as follows: RCC = WM / (WM + DD)[3]. Annual RCC data have been interpolated on a quarterly frequency using the 'quadratic match average method' in the software package EVIEWS.

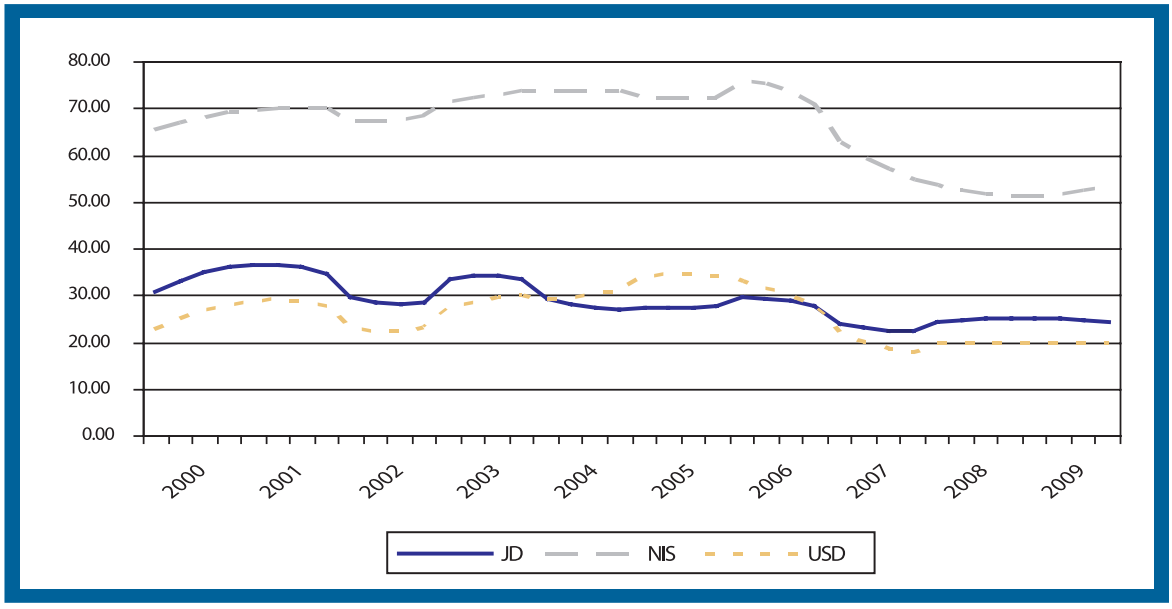
(1) Three main foreign currencies are currently used in OPT: NIS, JD, and USD. Recently, also the EURO is used more often.
(2) Data form 1996 - 2009 where compiled from two banks (Palestinian commercial bank, and Jordanian commercial bank), other banks refused to provide such data.
(3) Demand deposits exclude government demand deposits.

Intuitively, we would expect to see a higher ratio of cash held by the public in NIS as compared to JD and USD because:

- NIS is used for most daily transactions and therefore we expect a relatively high proportion of cash in NIS held by the public;
- JD as well as USD is, usually, used for savings, buying durable goods, and for international settlements particularly USD. Therefore we expect a relatively low proportion of cash in JD and USD held by the public;

RCC in NIS, JD, and USD are shown in figure 2.1, which indicate that RCC in NIS is 67.7 percent on average and this ratio is substantially higher than the RCC in JD (average of 29.5 percent), and RCC in USD (average of 26.8 percent) during 2000 – 2008.

Figure 2.1 Estimated ratios of cash held by the public in NIS, JD, and USD



Having estimated the ratios of cash held by the public in each currency (ε, μ, λ), we used the following equation to estimate money supply M1, and the other monetary variables (CC, M2 and MB)[4].

$$\boldsymbol{M1} = [1/(1-\varepsilon)]^{*}\boldsymbol{JD}_b + [1/(1-\mu)]^{*}\boldsymbol{NIS}_b + [1/(1-\lambda)]^{*}\boldsymbol{USD}_b + e \quad (5) \qquad (2.1)$$

Where JD_b, NIS_b, USD_b represent the amount of JD, NIS and USD held by commercial banks, respectively[6]. While ε, μ and λ are the proportion of the amount of JD, NIS, and USD currency held by the public. Finally, *e* is assumed to equal the demand deposits of currencies other than JD, NIS, and USD.

Monetary variables are estimated on a quarterly base for the period Q1 2000 – Q3 2010[7]. Descriptive statistics of the estimated monetary variables, during Q1 2000 – Q3 2010, are presented in table 2.1.

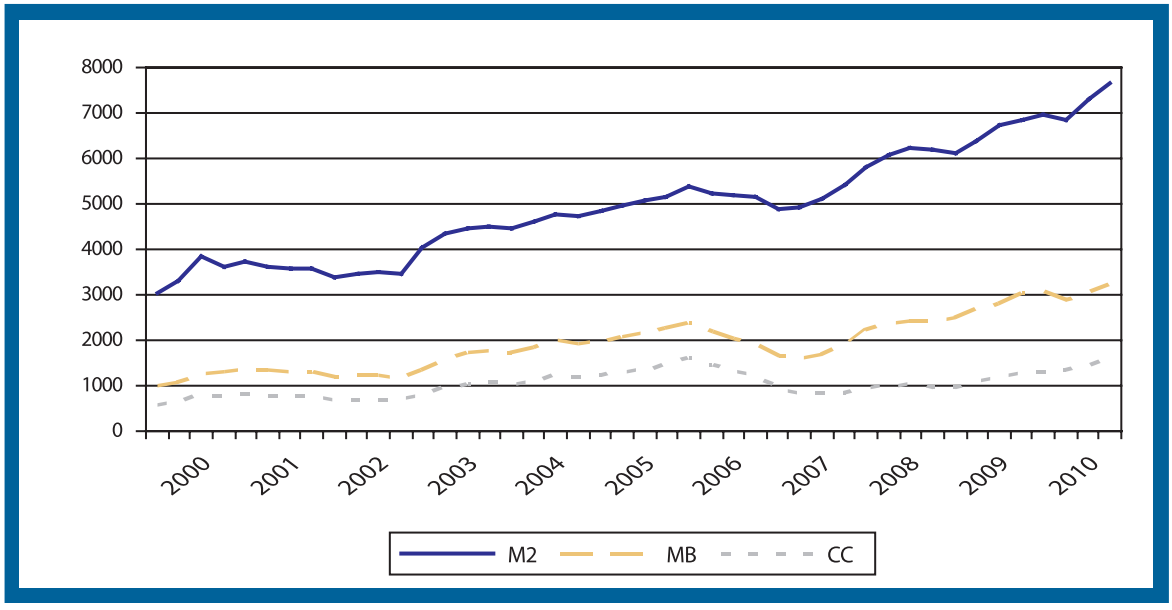
(4) M1=cash held by public + demand deposits excluding government demand deposits
M2 = M1 + time and saving deposits
Monetary Base (MB) = cash held by public + vault cash in banks + banks' required reserves + banks' excess reserves
(5) Sarsour (forthcoming).
(6) All variables are expressed in USD.
(7) Ratios during 2009-2010 are assumed to be equal to those in 2008 on an annual base.

Table 2.1 Descriptive statistics of money supply and its components (2000 – 2010)

Variable	Min.	Max.	Mean	Std
M1	1316.1	3868.8	2348.7	672.1
M2	3036.6	7295.6	4905.0	1161.3
MB	1001.3	3074.9	1908.8	583.8
CC	569.5	1613.9	1030.8	264.4
DD	734.7	2403.6	1318.0	483.4
TS	1720.5	3444.7	2556.2	528.7

Results in table 2.1 indicate that CC, on average accounts for about 44.8 percent of M1 in OPT, which is to be compared to 48.7 percent in Jordan and 43.7 percent in Israel, during the period Q1 2000 – Q3 2010. This result seems to be plausible. We would indeed expect a higher cash ratio in OPT as compared to Israel, where the banking system is highly developed and the use of e-money such as credit cards, visa electron, online transfers, for their daily transactions are more widespread. Moreover, because of the effect of Israeli banking system on the Palestinian counterpart, we expect to have a lower percentage of cash held by public than in Jordan. Figure 2.2 shows the estimated M2, CC, and MB.

Figure 2.2 Estimates of M2, CC, and MB during (2000 - 2010)
(US million Dollar)

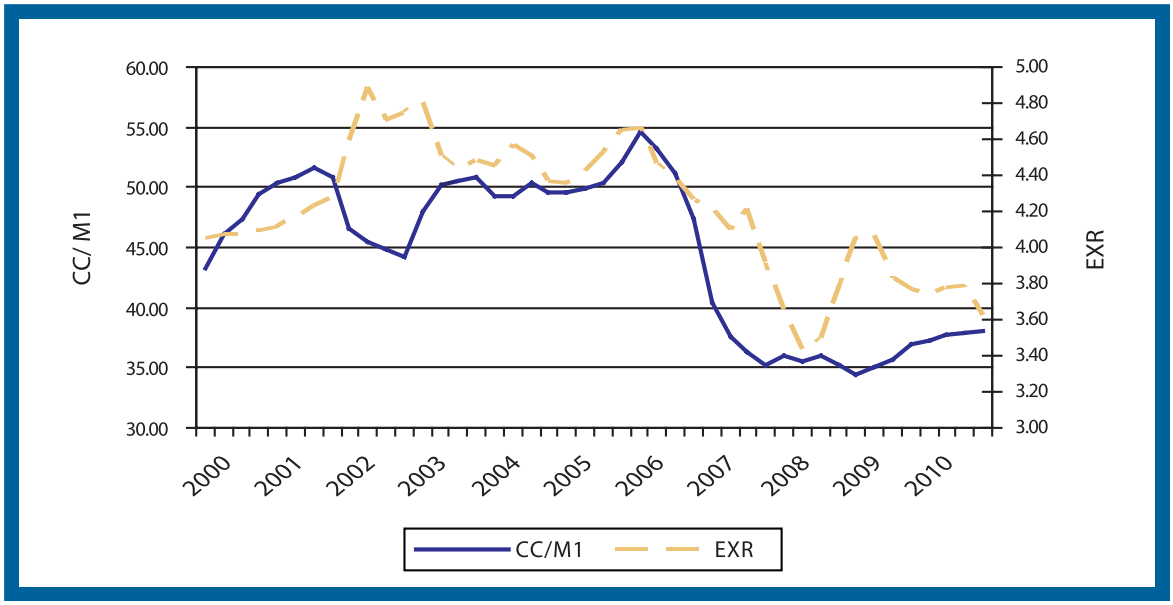


It is worth mentioning that during some periods, when there is a shock in the exchange rate of USD against NIS, the percentage of CC to M1 in Jordan falls lower than that in OPT. Hence the decline of the percentage of CC to M1 after 2005 (as shown in figure 2.3) can be attributed to the following factors: First is the factor of the effect of NIS/USD exchange rate, where a positive relationship between this exchange rate and ratio of CC to M1 is depicted (figure 2.3). A decrease of the percentage of CC to M1 at the end of 2006 may be attributed to the deterioration of the exchange rate of USD against NIS. Moreover, other factors might have affected the behavior of people in OPT, such as the legislative elections in 2006.

The ensuing uncertainty may have caused consumers to reduce their consumption expenditures and therefore the need to hold banknotes. Furthermore, the reduction in the percentage of CC to M1 might

also be attributed to the PMA's adoption of strategic transformation plan, which enhanced public confidence in the Palestinian banking system, increasing the amount of deposits and lowering the percentage of cash held by public. Also, the adoption and introduction of instruments of e-money by most banks in OPT, especially during recent years, reduce the need for cash, lowering the percentage of CC to M1. Figure 2.3 shows the percentage of CC to M1 in OPT and the exchange rate of USD against NIS during Q1 2000 – Q3 2010.

Figure 2.3 Ratio of cash held by the public to M1 Vs NIS/USD exchange rate



The absence of a national currency severely hampers the ability of PMA to control the effectiveness of monetary policy and the usefulness of monetary assessment models. Such assessment is based on different inputs of data and models, such as the ones discussed in the remaining of this chapter. But again the monetary data underlying this analysis are partly estimated and can therefore only be used for illustrative purposes and not necessarily for genuine monetary analysis.

Table 2.2 investigates the uses and sources of M2 in OPT by showing the annual growth rates of M2 during 2001 – 2010 and the respective contribution of each of its uses and sources.

Table 2.2 Contribution of uses and sources of M2

	Uses of M2			Sources of M2						growth of M2
	CC	DD	TS	NFA_{PMA}	NFA_b	NCG	NCP	CC	Other	
2001	0.026	-0.012	0.040	0.009	0.037	0.030	-0.016	0.026	-0.032	0.054
2002	-0.026	0.022	-0.046	-0.003	0.052	-0.046	-0.017	-0.026	-0.010	-0.050
2003	0.082	0.040	0.136	0.022	0.054	-0.029	0.002	0.082	0.127	0.257
2004	0.040	0.044	-0.012	0.019	-0.013	0.018	0.025	0.040	-0.017	0.072
2005	0.041	0.031	0.008	-0.004	0.000	0.016	0.059	0.041	-0.033	0.080
2006	0.014	0.000	0.028	-0.005	0.000	0.018	0.033	0.014	-0.018	0.042
2007	-0.103	0.028	0.049	0.004	0.117	-0.019	-0.003	-0.103	-0.022	-0.027
2008	0.024	0.065	0.105	0.084	0.128	-0.010	-0.014	0.024	-0.018	0.194
2009	0.023	0.043	0.007	0.031	-0.011	0.024	0.017	0.023	-0.012	0.073
Sep. 2010	0.036	0.034	0.009	-0.009	-0.022	0.017	0.069	0.036	-0.012	0.079
Average	**0.016**	**0.029**	**0.032**	**0.015**	**0.034**	**0.002**	**0.016**	**0.016**	**-0.005**	**0.077**

Table 2.2 indicates that M2 grew by about 7.9 percent in 2010 (until September – 2010). Among the uses of M2, CC was a major contributing factor to the growth in M2 by about 3.6 percent points. Demand deposits had 3.4 percent points' contribution to the growth rate of M2, while time and saving deposits had a minor contributing influence with 0.9 percent points.

As for M2 sources, data show that NCP which mainly consists of the expansion of bank credit, was the principal contributing factor to M2 growth in 2010. The contribution of NFA was negative, slowing the money growth. Indeed table 2.2 indicates that the contribution of NCP in M2 increased from 1.7 percent points in 2009 to about 6.9 percent points by the end of September 2010, and that the contribution of NFAb was negative by 2.2 percent points, whereas the negative contribution of NFAPMA accounted for 0.9 percent points. Moreover, the contribution of NCG to M2 growth declined from 2.4 percent points in 2009 to about 1.7 percent points by end of September 2010. The negative contribution of other items to M2 growth remains relatively stable at about 1.2 percent points during 2009 – September 2010.

Table 2.3 compares the results of our new estimates of monetary aggregates, especially of M1, to the previous Wazir et al estimates. Results show that both display a similar trend except for the years 2006 – 2007, which might be related to the specific political situation during that period (in periods of turmoil, estimates are even more uncertain than in normal periods).

Table 2.3 Money supply estimates

	Our estimates				Wazir et al estimate of M1 depending on the ratio of CC/DD	
	M1	M2	MB	CC	Jordan	Israel
2000	1500.6	3445.3	1170.4	700.7	2092.2	1556.6
2001	1548.4	3630.0	1319.8	788.6	1771	1429.7
2002	1534.6	3447.9	1209.5	694.9	1823.7	1582.9
2003	1952.5	4335.7	1608.4	976.0	2199	2005.6
2004	2316.2	4648.5	1874.6	1149.9	2433.4	2521.1
2005	2651.8	5019.0	2124.0	1339.8	2533	2640.9
2006	2721.2	5236.8	2137.5	1408.9	2433.1	2323.7
2007	2258.3	5095.1	1684.9	843.0	3134.1	2913.8
2008	2726.3	6124.4	2334.0	972.9	3852.8	3483.4
2009	3094.5	6702.5	2731.5	1101.5		
Sept. 2010	3534.5	7275.2	2956.0	1329.9		

2.2 Money multiplier and component ratios

The money multiplier, MM, measures the extent at which money supply expands when monetary base increases. Hence our MM is measured as the fraction of M1 or M2 over the MB.

$$MM1 = \frac{1 + cc}{cc + vc + rr + er}$$

$$MM2 = \frac{1 + cc + ts}{cc + vc + rr + er} \qquad (2.2)$$

Where *cc* = *CC/DD*, *vc* = *VC/DD*, *rr* = *RR/DD*[8], *er* = *ER/DD*, and *ts* = *TS/DD*. Estimates of *MM1* and *MM2* and their components, mentioned in formula 2.2, are shown in table 2.4. MM1, in average, equal to 1.235 during the period 2000 – September 2010 implies that a one USD increase in MB increases M1 by 1.235 USD in average. As for MM2, its average value is 2.618 implies that M2 increased by 2.618 USD if MB increased by one USD.

Table 2.4 Money multipliers and their components

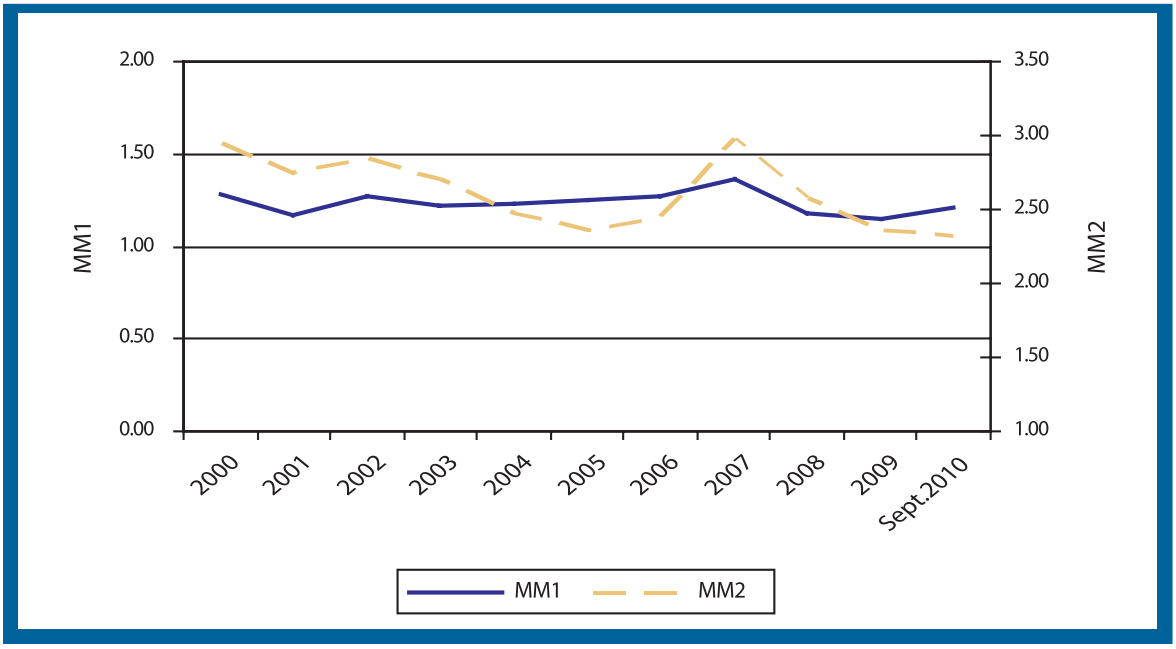
	cc	vc	rr	er	ts	MM1	MM2
2000	0.873	0.136	0.431	0.022	2.431	**1.282**	**2.945**
2001	1.039	0.223	0.442	0.034	2.740	**1.173**	**2.749**
2002	0.829	0.190	0.359	0.066	2.278	**1.267**	**2.847**
2003	0.996	0.213	0.350	0.084	2.441	**1.216**	**2.702**
2004	0.985	0.194	0.320	0.108	2.000	**1.235**	**2.480**
2005	1.020	0.186	0.292	0.120	1.804	**1.249**	**2.364**
2006	1.074	0.163	0.284	0.107	1.908	**1.273**	**2.445**
2007	0.599	0.180	0.278	0.117	1.893	**1.362**	**2.976**
2008	0.555	0.199	0.283	0.279	1.843	**1.182**	**2.583**
2009	0.551	0.224	0.265	0.308	1.629	**1.151**	**2.359**
Sept. 2010	0.603	0.230	0.251	0.238	1.498	**1.213**	**2.346**
Average	**0.829**	**0.194**	**0.323**	**0.135**	**2.042**	1.235	2.618

cc and *rr* have remained relatively stable during 2007 – September 2010. *vc* and *er* trended upward during the same period; *vc* and *er* ratios increased from 0.18 and 0.12 in 2007 to 0.23 and 0.24 by September 2010 respectively. This increment can be explained by the effect of PMA's regulation, instructing banks to decrease the percentage of their placements abroad from 65 percent in 2007 to 55 percent of total deposits in 2010. This regulation increased the amount of both excess reserve and vault cash and has therefore put downward pressure on the money multipliers during the same period i.e. 2007 – September 2010 (see figure 2.4).

A stable money multiplier is a necessary condition for a central bank to affect the money supply. Table 2.4 and figure 2.4 indicate that both money multipliers are relatively stable. This implies that PMA would be potentially in a position to use own instruments of monetary policy, which would require the issuance of a domestic currency, it would potentially be able to exert a predictable influence on the money supply.

(8) This ratio is different from the official one. The official required reserve ratio is equal to required reserves over total deposits.

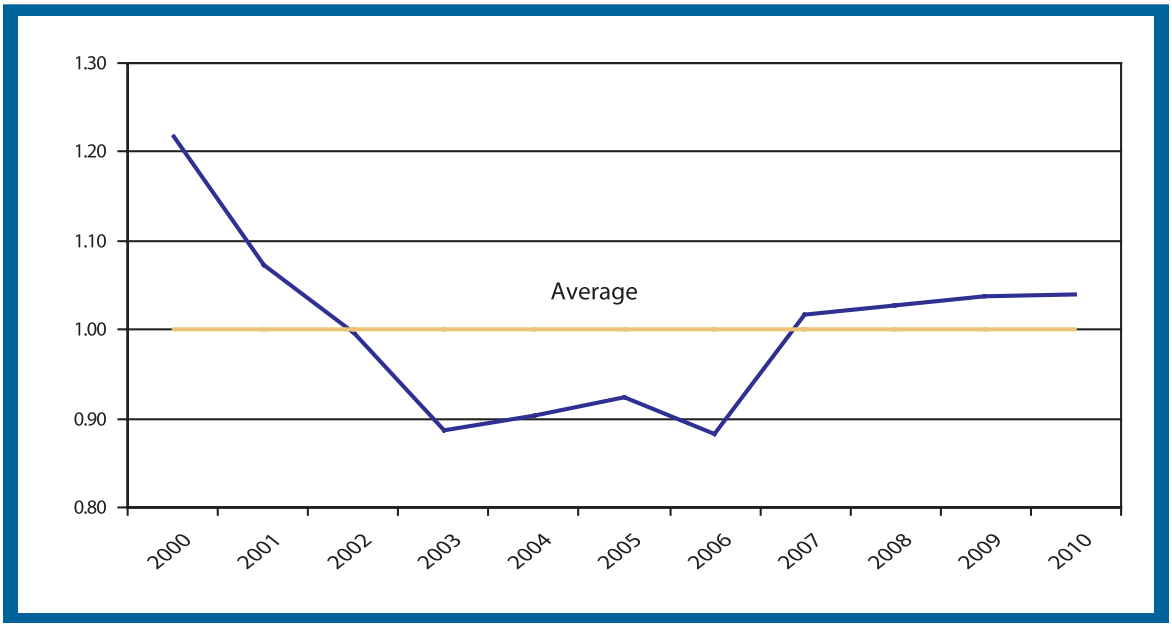
Figure 2.4 MM1 and MM2



2.3 Velocity of money (velocity of circulation)

Monetarists favoring the quantity theory of money believe that velocity of money is a stable or at least predictable parameter in absence of inflationary or deflationary expectations. The velocity of money is expected to increase during both prosperous and high inflation periods. This is because people either feel rich and think they can spend more, or because they fear losing purchasing power on their money holdings because of high inflation. However, during periods of recession the velocity of money is expected to fall as people start precautionary saving.

Figure 2.5 Velocity of M2 in OPT



The velocity of money, V2, measures the average frequency with which a unit of money is spent and it's calculated as the ratio of nominal GDP over money supply (M2)[9]. However, due to data limitations and absence of some necessary data on quarterly basis in OPT, V2 is measured on yearly bases. Data indicate that V2 in OPT followed a downward trending during the period 2000 – 2003, thereafter it was relatively stable till 2006 and then increased again. Hence, V2 has been highly affected by the political conditions in OPT. As it can be seen from figure 2.5 above; the velocity of money declined in recession periods, where people are expected to lower their spending. V2 declined from 1.217 points in 2000 (Second Intifada outbreak by end of September 2000) to about 0.886 in 2003 where the Israeli forces invaded West Bank (i.e. recession period). The decline in V2 in 2006 to 0.883, after an increase during the previous two years (2004 – 2005), occurred when international aid was disrupted after the legislative elections. Furthermore, V2 has increased during the recent years (2008 – 2010), which witnessed stable political and economic conditions. At the end of 2010 it hiked to about 1.04.

2.4 Money demand equation

The money demand function displays the effect of some economic aggregate variables on the aggregate demand for money. A standard simple functional form of money demand is used in this report, where it's assumed that money demand depends upon real GDP and prices, which is known as the transactions demand for money[10]. It is expected that money demand depends positively on the level of real GDP and the price level due to the fact that money is used as a means of payments. A simple function of money demand is depicted by the following functional representation.

$$M^d = f(Y^+ , P^+ , \xi) \tag{2.3}$$

Where M^d is the aggregate money demand, P is the price level represented by CPI, Y is the level of real GDP in Palestine, and ξ represents the structural dummies and the other exogenous variables[11]. The (+) symbols above the GDP and CPI levels means that there is a positive relationship between these variables and money demand. A rise in real GDP level will encourage money holdings in order to finance the transactions necessary to buy the extra GDP. On the other hand, if the average prices of goods and services rise, then even if the economy produces no additional volume of products, people will demand more money to purchase the higher value of goods and services, hence demand for money will increase.

The unit root tests indicate that all variables are I(1). Moreover, the Johansen trace and maximum eigenvalue tests suggest one co-integrating relationship between money, the price level and real GDP at the 5 percent significance level. Hence a vector error correction model can be estimated to explain the Palestinian demand for money.

$$\boldsymbol{LM2} = 0.961\ \boldsymbol{LCPI} + 0.735\ \boldsymbol{LGDPR} - 0.319 \tag{2.4}$$

Equation 2.4 indicates the presence of an almost unitary elasticity of M2 with respect to CPI, meaning that in the long run a one percent increase in CPI leads to almost 1 percent increase in M2, as theory would predict. This implies that inflation in OPT has a significant influence on money supply therefore PMA might partly control the money supply in OPT through controlling

(9) Velocity of money (V2) = Nominal GDP / Money supply M2

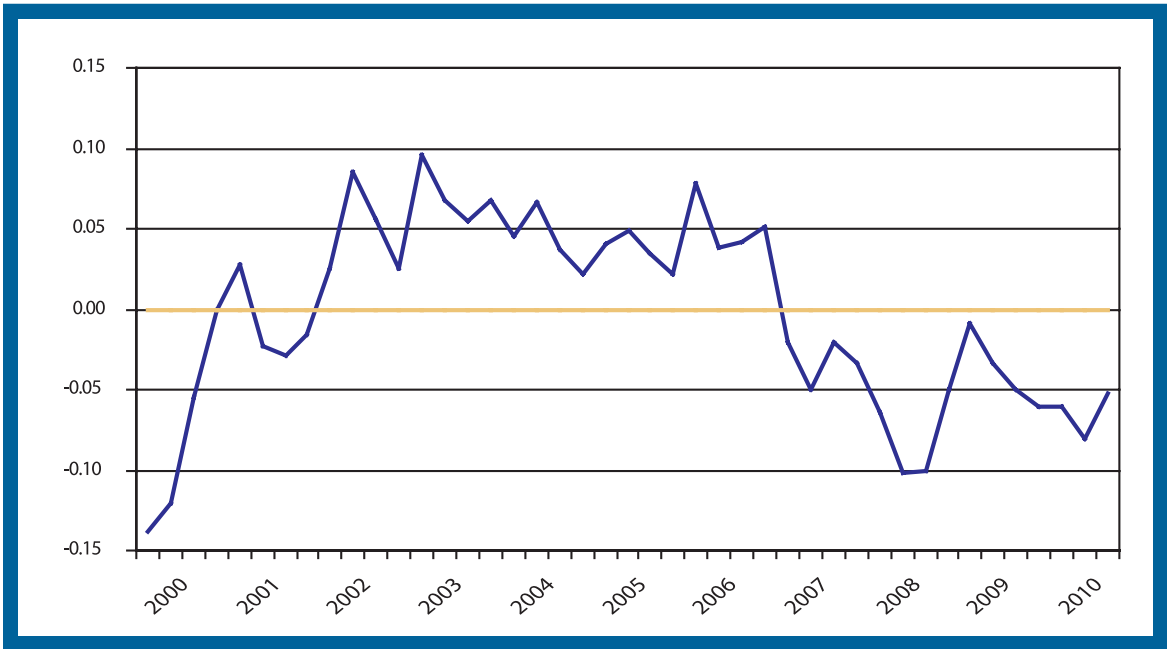
(10) Also it is important to mention the Speculative Demand for Money, which mainly depends on the opportunity cost of holding other assets that pay interest. People demand less money if the cost of holding money rises. Unfortunately, there is no such data available on long term interest rate in Palestine therefore we did not include it in the money demand model.

(11) The exogenous variables used in our model are: the exchange rate of USD against NIS and dummy variables (D02, D06) to measure the influence of conflicts and turmoil on M2 in OPT; where D02 equals one during 2000Q4 – 2002Q3 and zero otherwise, D06 equals one during 2006Q2 – 2007Q1 and zero otherwise.

the inflation rate. On the other hand, real GDP has a lower influence on M2 than CPI. Results indicate that a one percentage change in real GDP increases M2 by about 0.74 percent in the long run, which is in accordance with elasticities found in many other countries.

Investigating the equilibrium of the money market in OPT reveals the presence of a significant influence of the NIS/USD exchange rate on equilibrium M2. Figure 2.6 shows excess supply of money in OPT during the periods of significant depreciation of the NIS (i.e. 2002 – 2007). Moreover, conflict periods and deteriorating political and economic conditions are expected to create an excess money supply. Conversely, there is an excess demand for money during the recent years (i.e. 2007 – 2010) when NIS highly appreciated. Equilibrium, in the Palestinian case, following shocks in real GDP or inflation will be restored in subsequent periods when consumers start to adjust their money holdings.

Figure 2.6 Money market disequilibrium in OPT



Results indicate that about 49 percent of the disequilibrium is adjusted each quarter following shocks in real GDP, inflation and the exchange rate or political conditions (see table 2.5).

The estimation results in table 2.5 also imply that an increase in the exchange rate by one percent increases the demand for money by about 0.61 percent in the short run. This indicates the presence of a high and quick influence of the exchange rate on demand for money in OPT. In addition, the coefficients on the dummy variables are significantly negative, implying that money demand is highly affected by the political and economic conditions even in the short run.

To summarize, our estimates of money supply are close to the previous ones, which gives credit to these estimates. Among the uses of money supply, cash held by public is the major contributing factor to the growth in M2. However, among the sources of money creation, net credit to private sector is the major contributing factor to the growth in M2. Furthermore, reserves, time and saving deposits ratios have the largest and the most significant influence on the money multiplier. Velocity of money has stabilized in recent years following more stable political and economic conditions. Finally, demand for money is highly and quickly influenced by changes in NIS/USD exchange rate and by political and economic conditions.

Table 2.5 VECM of money demand

Co-integrating equation			
L(M2NIS(-1))	1.000000		
L(CPI(-1))	-0.961310		
	[-7.92232]		
L(GDPR(-1))	-0.734701		
	[-7.78930]		
C	-0.319499		
Error correction:	**D(LOG(M2NIS))**	**D(LOG(CPI))**	**D(LOG(GDPR))**
CointEq1	-0.489610	0.004401	0.499665
	[-5.98347]	[0.16488]	[3.23376]
D(L(M2NIS(-1)))	-0.031671	0.009127	-0.203252
	[-0.29924]	[0.26433]	[-1.01697]
D(L(CPI(-1)))	-0.304849	0.324729	-1.883981
	[-0.57546]	[1.87898]	[-1.88337]
D(L(GDPR(-1)))	-0.232925	-0.000415	-0.074556
	[-2.50542]	[-0.01369]	[-0.42469]
C	-0.826757	0.021820	0.795770
	[-5.68965]	[0.46030]	[2.90015]
L(EXR)	0.605031	-0.010044	-0.520253
	[6.00628]	[-0.30565]	[-2.73507]
D02	-0.058990	-0.001210	-0.051420
	[-3.83143]	[-0.24080]	[-1.76863]
D06	-0.068861	-0.005016	-0.088768
	[-3.28843]	[-0.73419]	[-2.24490]

t-statistics in [ ].

As was mentioned, most of the monetary variables are affected by variables on which PMA, in absence of an independent monetary policy, has no influence. Still PMA has its independent monetary instruments and methods to intervene in the money market in OPT. The optimal use of the bank reserve (required and excess) ratios, may allow PMA to play a significant role. Also, PMA in cooperation with other government bodies can partly affect the demand for money through affecting prices and/or real GDP levels. Finally cooperation between PMA and banks working in OPT may provide some margin for PMA to affect money supply or demand through affecting the demand for deposits (demand, time and saving).

CHAPTER 3
INTEREST RATES DEVELOPMENTS

3.1 Introduction

PMA collects data on interest rates on deposits and loans by different types and in different currencies. These interest rates are set by individual commercial banks and communicated to PMA. In normal circumstances, commercial banks would set debit and credit interest rates with reference to the policy rate determined by the central bank. In OPT currently, the situation is markedly different. There is no domestic currency and hence no independent monetary policy, nor independent policy interest rate. It is therefore a priori unclear according to which criteria banks in OPT set their interest rates.

These specific characteristics in OPT imply a serious challenge for the policy makers. Indeed, interest rates are important indicators and variables that may impact on the real and financial sectors of the economy and on the inflation rate in particular. Therefore, even if PMA has no influence on these interest rates, it remains important for PMA to monitor their levels and movements.

3.2 Average interest rates on deposits, loans and intermediation margins in OPT and in the reference countries

Table 3.1 shows the weighted average interest rates on deposits and loans and the margin between the three currencies in circulation in the OPT, compared with interest rates and the margins in the issuing countries of these currencies. Data in this table contain a number of stylized facts as to the interest rate policies of commercial banks in OPT:

- The interest rates on deposits in all three currencies offered by banks in OPT are considerably lower then the corresponding rates in the countries issuing these currencies. The only exception is the difference on USD deposit rates in OPT and in the USA since 2009. But this is due to the fact that the deposit rates on USD in the USA were hovering near the zero level in the aftermath of the financial crises;

- The lending rates charged by banks in OPT are substantially higher then the corresponding debit rates practiced by the banks in the home currency countries, except for rates in JD. Lending rates on JD are actually generally lower in OPT than those in Jordan. On the other hand the lending rates on NIS in OPT are often more than double of those in Israel;

- As a result, the intermediation margin (difference between debit and credit interest rates) is substantially higher in OPT than in the reference countries for USD and NIS. The margin in USD has been about twice as high in OPT as compared to the USA and in

NIS the margin in OPT has been on average about 4 times higher than the margin in Israel. Also the margin on JD is higher in OPT as compared to Jordan, but since 2009 this difference is limited to about 100 basis points;

- The interest rate margin which banks in OPT charge on JD is slightly higher than in Jordan and it seems that the banks in OPT charge a similar margin on USD although the USD margin is considerably smaller in the USA. The margin on NIS in OPT considerably exceeds their margins on both other currencies.

Which factors may contribute to the explanation of these stylized facts?

- The fact that the intermediation margin in OPT on all three currencies is higher than in each of the reference countries may be explained by several factors such as
  - The fact that banks in OPT charge a higher risk premium. Banking in OPT may be perceived to be more risky as compared to the three reference countries. This may be of a concern although the additional margin on JD in OPT as compared to Jordan is relatively limited except in periods of economic and political turmoil. In 2010 this additional margin did not exceed 100 basis points on average;
  - The degree of competition in the banking sector may be less pronounced in OPT. To increase competition among banks in OPT, PMA has taken already several steps:
    - Sent a circular to banks about the rules of "Fair credit" and follow-up compliance by banks and raise public awareness of these rules;
    - Asked all banks to publish the terms, including the interest rates, on deposits and credits in all bank branches;
    - PMA started a public awareness campaign[12]. The objective of the Financial Services Awareness Campaign is to inform the public of the kinds of financial services that are available in OPT, how to benefit from them, how to use, compare, obtain and manage them and what to do when problems occur;
    - PMA plans to compile and publish periodically the interest rates on all types of deposits and loans for each bank in order to facilitate easier comparison for the bank customers and in this way to promote competition, transparency and clarity;
  - The operating expenses of banking operations may be higher in OPT;
  - The absence of a domestic currency and therefore of an independent interest rate in OPT, deprives PMA from effective instruments to influence market interest rates;

The fact that the intermediation margin in NIS exceeds by far the one in both other currencies may be due to the specific liquidity position of the banks in NIS. For banks in OPT, the NIS is a foreign currency and they would therefore avoid a long or short position in that currency. Their deposit base in NIS is the main source of loanable funds. A significant part of these deposits is held in the form of vault cash

(12) As part of the financial sector stakeholders to increase the level of awareness for their financial services industry, the four Partners; Palestine Monetary Authority, Palestine Capital Market Authority, the Association of Banks in Palestine and the Palestinian Insurance Federation decided to launch a Public Awareness Campaign, concentrating on the banking and insurance services available in Palestine as well as the financial regulators, associations and institutions that support the provision of those services.

Table 3.1 Nominal weighted average interest rate

	USD						JD						NIS					
	Palestine			USA			Palestine			Jordan			Palestine			Israel		
	Deposit Rate	Lending Rate	Margin	Deposit Rate	Lending Rate	Margin	Deposit Rate	Lending Rate	Margin	Deposit Rate	Lending Rate	Margin	Deposit Rate	Lending Rate	Margin	Deposit Rate	Lending Rate	Margin
2001	1.5	8.4	6.9	3.7	6.9	3.2	3.6	9.8	6.2	5.8	10.9	5.1	2.8	16.4	13.6	6.2	8.8	2.6
2002	0.9	8.0	7.1	1.7	4.7	3.0	2.7	9.4	6.7	4.4	10.2	5.8	5.6	15.5	9.9	6.0	8.6	2.6
2003	0.7	7.6	6.8	1.2	4.1	3.0	2.5	8.7	6.2	3.1	9.3	6.2	4.3	13.7	9.4	6.7	10.7	4.0
2004	1.1	6.9	5.8	1.6	4.3	2.8	1.6	8.5	6.9	2.5	8.3	5.8	2.6	13.5	10.9	3.6	7.4	3.8
2005	2.2	7.3	5.1	3.5	6.2	2.7	1.8	8.9	7.1	2.9	7.6	4.7	2.0	13.5	11.5	3.2	6.4	3.2
2006	3.0	7.7	4.8	5.2	8.0	2.8	2.7	9.1	6.4	4.6	8.2	3.6	2.5	13.2	10.8	4.3	7.4	3.1
2007	3.0	8.0	5.0	5.3	8.1	2.8	3.5	9.2	5.7	5.5	8.7	3.2	2.5	12.7	10.2	3.5	6.3	2.8
2008	0.8	7.2	6.4	3.0	5.1	2.1	2.0	9.0	7.1	5.5	9.0	3.6	1.0	12.0	11.0	3.3	6.1	2.8
2009	0.3	5.8	5.4	0.6	3.3	2.7	2.0	7.7	5.8	4.9	9.3	4.3	0.2	11.3	11.0	1.1	3.7	2.6
2010	0.3	6.3	6.0	0.3	3.3	2.9	1.1	7.5	6.4	3.5	9.0	5.5	0.3	10.9	10.6	1.5	4.4	2.9
2010Q1	0.3	6.0	5.7	0.2	3.3	3.0	1.2	7.5	6.3	3.9	9.2	5.3	0.3	10.8	10.5	1.2	4.2	3.0
2010Q2	0.3	6.1	5.8	0.4	3.3	2.8	1.2	7.4	6.2	3.4	9.0	5.5	0.3	11.0	10.7	1.5	4.4	2.9
2010Q3	0.3	6.3	6.0	0.3	3.3	2.9	1.1	7.6	6.5	3.4	9.1	5.6	0.3	10.9	10.6	1.7	4.5	2.9
2010Q4	0.3	6.7	6.4	0.3	3.3	3.0	1.1	7.6	6.6	3.4	8.9	5.5	0.3	11.0	10.7	na	na	na

Source: IFS and PMA

because the consumers predominantly use NIS banknotes for daily transactions. Another significant part has to be allocated to their required reserve account at PMA. Yet another part is used to provide loans in NIS to the public sector. The relatively small residual can be used to satisfy the demand for loans in NIS by the private sector. Given this specific setting, banks in OPT apparently tend to discourage the public's demand for NIS loans by either rationing or by setting interest rates on NIS loans at exorbitantly high levels.

3.3 Interest rates from a policy perspective

The way central banks decide on their policy interest rates is a much debated issue in the literature and also in central banks themselves. In this respect frequent reference is made to the so called Taylor rule (Taylor 1993). Taylor proposed that a central bank should fix and adjust its short term real interest rate in response to three variables: an estimate of the equilibrium real interest rate, the deviation of the current inflation rate (measured as a four-quarter rate of increase) from its inflation target and the current output gap (which measures the deviation of current output from potential output). In this rule inflation gap and output gap are given equal weights set at 0.5.

This rule has interesting implications, but for our current purposes it is sufficient to mention that this rule highlights the importance of the real interest rates as opposed to the nominal interest rate as the main indicator for the stance of monetary policy. It also implies that the monetary authorities should have an understanding of the appropriate (or call it natural or equilibrium level of the country's real interest rate). If inflation is on its target level and economic growth is on its steady state growth path, then the rule implies that the real short term interest rate should be at its equilibrium level. The equilibrium real short term interest rate in OPT may be the subject of a separate analysis, but for the moment we may gain some insight by the mere calculation of the real interest rates on deposits and loans, implied by the nominal rates set by the banks and the observed inflation rates.

The real interest rate on deposits is an important indicator for the consumer when deciding on his optimal consumption path. High (low) real deposit interest rates may incite consumers to postpone (speed up) real consumption expenditures and therefore save more (less). The real interest rate on loans is, through the so called user cost of capital, an important determinant of investment expenditures. High (low) real loans rates may discourage (encourage) investment expenditures by firms in fixed capital and by households in housing. In general and from the point of view of monetary policy, real interest rates have an effect on inflation.

In OPT because of the absence of a domestic currency and an independent monetary policy or exchange rate policy, there is a disconnection between inflation and nominal interest rates and therefore the real rates which are important variables affecting economic growth and inflation, are completely exogenous. In fact the determining variables like interest rates, exchange rates and inflation are out of control of the monetary authorities and completely exogenous to the country. Therefore, it might be the case that the level of these rates is not in the best economic and financial interests of the country, whilst the country is unable to bring them in line with the general interest. Only a monetary reform may solve this question.

Table 3.2 provides the weighted average real interest rates on deposits for the three currencies circulating in OPT. As shown in the table, real deposit interest rates in OPT are lower than the real deposit rates in countries issuing these currencies. Real loan interest rates on NIS are substantially higher than in Israel, but this is far less clear cut for USD and JD.

The real deposit rates are most of the time negative. This actually means that investors are loosing money in real terms. They therefore are not stimulated to save, but rather to consume or to invest in real assets which yield a nominal return that is expected to provide a suitable compensation for future erosion of the value of money on top of a positive real return.

Table 3.2 Real weighted average interest rate

	USD				JD				NIS			
	Palestine		USA		Palestine		Jordan		Palestine		Israel	
	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate
2001	0.2	7.1	0.9	4.1	2.4	8.6	4.0	9.1	1.5	15.1	5.1	7.7
2002	-4.8	2.3	0.1	3.1	-2.9	3.7	2.6	8.4	-0.1	9.8	0.3	2.9
2003	-3.7	3.2	-1.1	1.8	-1.9	4.3	1.5	7.7	-0.2	9.3	6.0	10.0
2004	-1.9	3.9	-1.1	1.7	-1.4	5.5	-0.9	4.9	-0.4	10.5	4.0	7.9
2005	-1.8	3.3	0.1	2.8	-2.2	4.9	-0.6	4.1	-2.0	9.5	1.9	5.1
2006	-1.0	3.8	1.9	4.7	-1.2	5.1	-1.6	1.9	-1.5	9.3	2.2	5.3
2007	1.2	6.1	2.4	5.2	1.7	7.3	0.1	3.3	0.7	10.9	3.0	5.8
2008	-9.1	-2.7	-0.9	1.3	-7.9	-0.9	-9.5	-5.9	-8.9	2.1	-1.3	1.5
2009	-2.4	3.0	0.9	3.6	-0.8	5.0	5.6	9.9	-2.5	8.5	-2.2	0.4
2010	-3.5	2.5	-1.3	1.6	-2.6	3.8	-1.5	4.0	-3.5	7.2	-1.2	1.7
2010Q1	-4.3	1.4	-2.2	0.9	-3.4	2.9	-0.7	4.6	-4.3	6.2	-2.3	0.7
2010Q2	-3.5	2.3	-1.3	1.5	-2.6	3.7	-2.0	3.6	-3.5	7.3	-1.3	1.6
2010Q3	-2.9	3.1	-0.8	2.1	-2.1	4.4	-0.7	5.0	-2.9	7.7	-0.4	2.5
2010Q4	-3.2	3.2	-1.0	2.0	-2.4	4.2	-2.6	3.0	-3.1	7.6	na	na

- Real interest rate in OPT = nominal interest rate – inflation rate in OPT.
- Real interest rate in reference country = nominal interest rate in this country – inflation rate in that country

Source: IFS, PMA and PMA stuff calculations.

Table 3.3 Real weighted average interest rate adjusted to exchange rate in USD and JD currency

	USD				JD			
	Palestine		USA		Palestine		Jordan	
	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate	Deposit Rate	Lending Rate
2001	3.4	10.3	0.9	4.1	4.1	10.3	4.0	9.1
2002	7.1	14.2	0.1	3.1	8.9	15.6	2.6	8.4
2003	-8.0	-1.1	-1.1	1.8	-5.8	0.4	1.5	7.7
2004	-3.5	2.3	-1.1	1.7	-3.1	3.8	-0.9	4.9
2005	-1.7	3.4	0.1	2.8	-2.0	5.1	-0.6	4.1
2006	-1.6	3.2	1.9	4.7	-1.7	4.7	-1.6	1.9
2007	-7.4	-2.4	2.4	5.2	-6.9	-1.2	0.1	3.3
2008	-24.9	-18.5	-0.9	1.3	-23.9	-16.8	-9.5	-5.9
2009	6.6	12.1	0.9	3.6	8.4	14.1	5.6	9.9
2010	-8.8	-2.8	-1.3	1.6	-8.1	-1.7	-1.5	4.0
2010Q1	-12.8	-7.1	-2.2	0.9	-12.2	-5.9	-0.7	4.6
2010Q2	-11.5	-5.7	-1.3	1.5	-13.3	-7.0	-2.0	3.6
2010Q3	-3.8	2.2	-0.8	2.1	-2.7	3.7	-0.7	5.0
2010Q4	-7.1	-0.6	-1.0	2.0	-4.2	2.4	-2.6	3.0

- Real interest rate in USD in OPT = nominal interest rate in OPT – percentage change (CPI in OPT divided by EXG-USD/ILS)
- Real interest rate in JD in OPT = nominal interest rate in OPT – percentage change (CPI in OPT divided by EXG-JD/ILS)

Source: IFS, PMA and PMA stuff calculations.

It might be the case that some residents depositing or borrowing in USD or JD may translate domestic CPI inflation which is recorded by the PCBS in NIS, into domestic inflation measured in USD or JD (they would then evaluate the real return/cost on their USD or JD assets/liabilities with reference to OPT inflation but measured in USD or JD). Table 3.3 shows that measured in this way the real returns and the real funding costs become extremely volatile both on deposits and lending rates in USD and JD. High volatility means high uncertainty and it is generally accepted that high uncertainty hampers economic growth and may allocate resources inefficiently. Once again this problem can be avoided by introducing a reference currency, inciting residents to invest and borrow primarily in that currency. They would then evaluate the real return and the real borrowing costs with reference to the inflation expressed in that currency.

3.4 Interest rates on different types of deposits and credit per currency

Table 3.4 shows the nominal weighted average interest rate on deposits and loans, according to the type and currency. As can be expected, the interest rates on overdraft exceed in general those on loans. This is because the cash flows related to loans are much more predictable for banks such that they need a lower liquidity buffer. Also and for the same reason, the interest rates on time deposits are generally higher compared to those on savings deposits.

Table 3.4 Nominal weighted average interest rate on credit facilities and on deposits by type and currency
(in percentages)

		USD				JD				NIS			
		Credit		Deposit		Credit		Deposit		Credit		Deposit	
		Loans	Over Draft	Saving Account	time Deposit	Loans	Over Draft	Saving Account	time Deposit	Loans	Over Draft	Saving Account	time Deposit
2006	Q4	8.04	8.21	0.44	3.35	9.04	8.96	0.59	2.81	11.24	13.36	0.46	2.81
2007	Q1	8.02	7.91	0.29	3.38	9.01	8.92	0.42	3.54	11.38	13.60	0.32	2.48
	Q2	8.01	7.99	0.30	3.34	9.00	8.99	0.42	3.56	11.26	13.57	0.31	1.96
	Q3	8.27	7.79	0.29	3.13	9.01	8.93	0.43	3.46	11.23	13.29	0.31	2.13
	Q4	8.15	7.92	0.28	2.83	8.89	8.84	0.43	3.48	11.41	13.21	0.39	2.21
2008	Q1	7.91	7.04	0.23	1.38	8.98	8.93	0.44	3.17	10.41	13.40	0.40	1.60
	Q2	7.25	7.05	0.19	1.32	8.81	8.87	0.41	3.10	11.68	13.00	0.37	1.59
	Q3	7.26	7.31	0.20	1.25	8.73	8.82	0.41	2.94	11.04	12.91	0.36	1.67
	Q4	7.46	7.46	0.13	0.59	8.75	8.78	0.36	2.28	10.90	12.85	0.25	0.92
2009	Q1	6.36	5.92	0.04	0.54	8.63	8.96	0.33	2.04	9.99	13.19	0.16	0.21
	Q2	6.26	6.69	0.02	0.38	8.09	8.11	0.10	2.04	10.40	13.36	0.03	0.24
	Q3	4.79	6.44	0.02	0.36	6.40	7.32	0.08	1.86	8.71	12.11	0.02	0.27
	Q4	5.05	6.50	0.02	0.34	5.29	7.91	0.07	1.69	7.98	12.31	0.01	0.23
2010	Q1	6.04	6.56	0.02	0.29	6.68	8.37	0.05	1.22	8.73	12.84	0.01	0.25
	Q2	5.51	6.58	0.01	0.30	6.34	8.49	0.04	1.19	9.08	12.95	0.01	0.29
	Q3	5.69	6.88	0.01	0.30	6.84	8.33	0.04	1.13	9.04	12.72	0.01	0.30
	Q4	5.95	7.46	0.01	0.27	6.79	8.48	0.04	1.05	9.09	12.96	0.01	0.34

2010 Inflation Report

CHAPTER 4
INFLATION ANALYSIS AND OUTLOOK

4.1 Introduction

In view of the real losses inflation imposes on the purchasing power of economic agents, it is not surprising that price stability is in most countries a major goal of economic policy and why the final objective of monetary policy is defined in terms of an inflation objective. But in order to target an inflation objective, the central bank should act proactively and adopt a forward looking strategy. Given the time lag between monetary policy decisions and future inflation, the central bank should base its monetary policy decisions on an internally produced forecast of inflation. Such an inflation forecast should be based on all relevant information about shocks that hit the economy and anticipated structural changes. It should be based on both judgment and models. The models should reflect the transmission mechanisms of monetary policy and the time lags between monetary policy decisions and inflation. Both these transmission mechanisms and their time lags can be inferred from theoretical and empirical analysis.

From a theoretical point of view, inflation can be analyzed either by the monetary paradigm or by the real economy paradigm.

4.2 Inflation and money growth

The monetary analysis of inflation is based on the quantity theory of money and focuses on the relationship between inflation and money growth. In fact this proposition is especially valid for purely floating exchange rate countries where the central bank has full control over its monetary policy and therefore where the money supply is exogenous. Whether this is a useful approach in the case of OPT can be tested empirically in a number of ways.

At first we conducted a Granger causality tests between inflation (expressed in NIS) and nominal money growth (expressed in NIS). As can be seen from the results (reported in table 4.1), the null hypothesis that M1 growth does not Granger-cause inflation can be rejected at the 5 percent level, whereas the hypothesis that inflation Granger-causes M1 growth is rejected by the test. This means that it appears that Granger causality runs from M1 growth to inflation and not the other way. The results for M2 confirm those found for M1. These results imply that in OPT there may be a causal relationship between money growth and inflation.

Table 4.1 Granger causality tests between inflation and money growth M1, M2
(Variables are expressed in logarithms)

Hypothesis	Period	Lags	F-Statistic	Prob.
M1 growth does not Granger Cause Inflation	2000Q1 – 2010Q3	4	4.8007	0.0043
Inflation does not Granger Cause M1 growth	2000Q1 – 2010Q3	4	0.8690	0.4943
M2 growth does not Granger Cause Inflation	2000Q1 – 2010Q3	4	4.1473	0.0089
Inflation does not Granger Cause M2 growth	2000Q1 – 2010Q3	4	1.1963	0.3335

Number of observations = 38.

The relationship between money growth and inflation can be further developed using the quantity theory of money approach M.V = P.T, which can be rewritten as P = V.(M/T), where:

M = nominal money stock

P = the price level

V = money velocity

T = transactions (real GDP)

This theory implies that V should be a stationary process or containing a predictable trend. In OPT we need to take into consideration that the public holds money in different currencies (mainly NIS, USD and JD). But to calculate the total money stock all money components should be expressed in a single currency, for example in USD or in NIS. This implies that changes in the NIS/USD exchange rate can cause capital gains or losses on money holdings expressed in a certain currency. Therefore money holdings expressed in whatever currency, as well as velocity need, to be correlated with the exchange rate. This is illustrated in Figure 4.1 that compares the velocity of M2 expressed in NIS with the NIS/USD exchange rate and shows a negative correlation between velocity and the exchange rate.

As is already apparent from the figure, both the velocity of money and the exchange rate are non-stationary. This is confirmed by stationarity tests reported in table 4.2. We only need tot take account of the NIS/USD exchange rate because the other main currency in which OPT residents hold money is JD which has itself a fixed exchange rate to the USD.

A formal co-integration test confirms that taking into account the conversion effect of exchange rate movements on money velocity, the latter can be considered to be stationary. The results reported in table 4.3 show that according to the Johansen approach, both the trace test and the maximum eigenvalue test confirm the existence of one co-integrating vector between these variables at the 5 percent level. This implies that the quantity of money has a long run effect on the CPI in OPT.

Figure 4.1 M2 velocity and the NIS/USD exchange rate

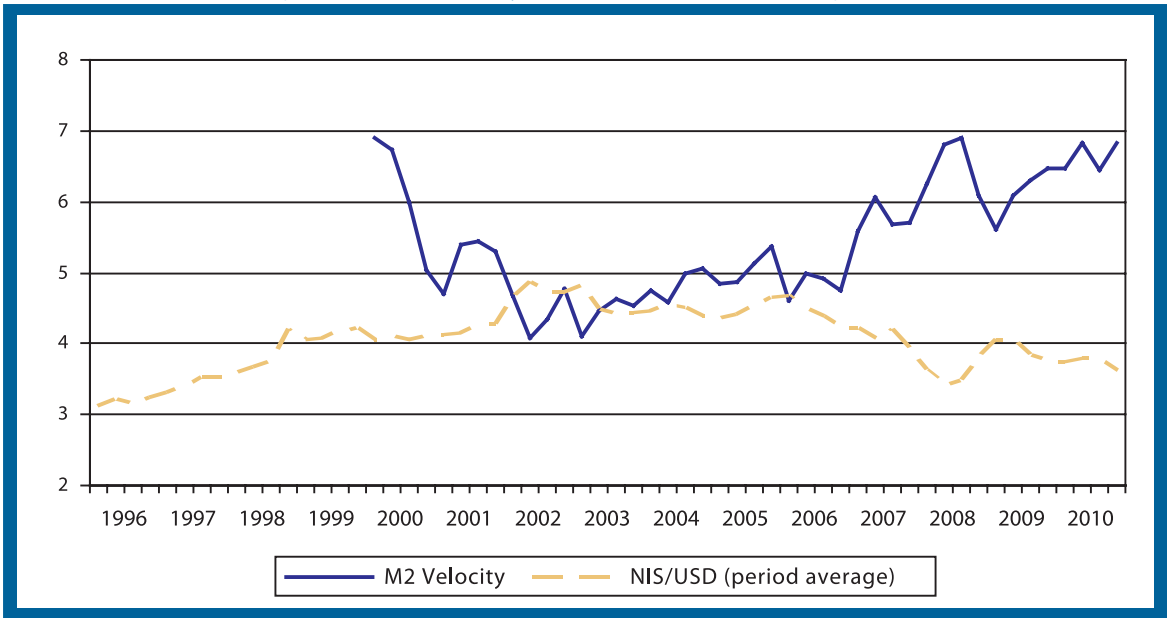


Table 4.2 Stationarity test on M2 velocity and the NIS/USD exchange rate

	p-value	
	ADF TEST	PP TEST
VM2NIS	0.3698	0.3683
D(VM2NIS)	0.0000	0.0000
EXR	0.2772	0.2572
D(EXR)	0.0000	0.0000

Table 4.3 Co-integration tests between M2 velocity and the NIS/USD exchange rate (Variables expressed in logarithms)

Unrestricted Co-integration Rank Test (Trace) Lags interval (in first difference): 1 to 1			Sample: 2000Q3 – 2010Q3	
Hypothesized no. of Co-integration relation(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.5055	31.8409	15.4947	0.0001
At most 1	0.0525	2.2641	3.8415	0.1324
Unrestricted Co-integration Rank Test (Max. Eigenvalue) Lags interval (in first difference): 1 to 1			Sample: 2000Q3 – 2010Q3	
Hypothesized no. of Co-integration relation(s)	Eigenvalue	Max-Eigen. Statistic	0.05 Critical Value	Prob.**
None*	0.5055	29.5768	14.2646	0.0001
At most 1	0.0525	2.2641	3.8415	0.1324

* denotes rejection of the hypothesis at the 0.05 level.
** MacKinnon-Haug-Michelis (1999) p-values.

4.3 The real sector economy approach

The real economy paradigm of price behavior distinguishes two categories of causes of inflation: demand pull and cost push factors. This approach is especially valid for countries with a fixed exchange rate, where the money supply is out of control of the central bank.

Excessive pressure on the demand side of the economy is often the cause of inflation at times when the economy is producing at full capacity but consumers are willing and able to buy even more goods and services. With accumulated savings or easy access to credit, consumers could end up trying to buy more output than the economy is actually producing. This is a classic case of "too much money chasing too few goods". The end result is a demand-driven rise in average prices, or demand-pull inflation.

Cost-push inflation originates in the supply side of the economy. Any increase in production costs, such as commodity prices (among which oil prices), prices of other intermediate inputs, capital costs and wage costs rising faster than labor productivity, puts upward pressure on prices of domestically produced goods and services. Consumer prices are also affected by the local currency prices of imported goods and services. The latter follow the course of international prices and the domestic exchange rates.

To test the real economy paradigm of inflation, we need to find a stable empirical relationship between the CPI and data that are representative of cost push and possibly also demand pull forces. In terms of such relationship we need to distinguish between the long run and short run determinants of CPI.

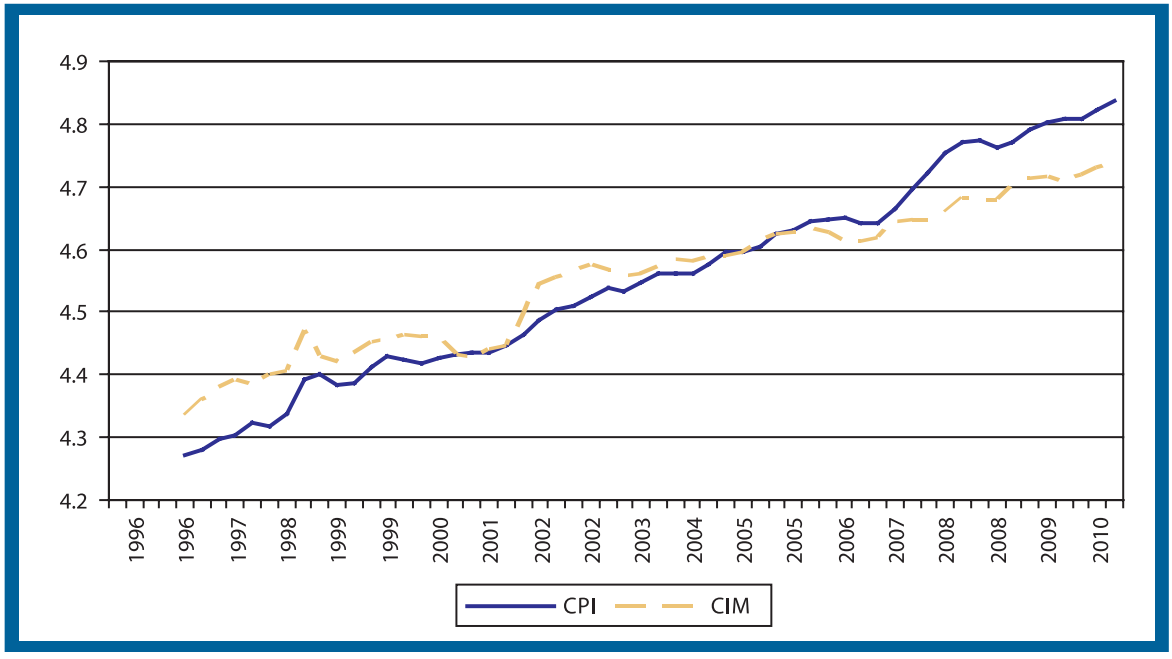
In the long run, CPI is mainly driven by structural cost push factors. Among them, unit wage cost, capital costs, international prices and the exchange rate are the more prominent ones. Here arises the problem of endogeneity. For example wage costs are themselves not exogenous to the inflation process. Employees will defend their purchasing power and might demand higher nominal wages when CPI rises. Therefore, and in order to avoid to estimate a structural model of inflation, most of the recent analysis of inflation conducted by for example the IMF for a large number of other countries is based on reduced form model approaches (see next section for an overview).

In the short run, product and labor markets are characterized by rigidities. Prices therefore do not respond immediately to changes in cost push factors. Prices are not all the time on their long run equilibrium path. Disequilibria, defined as deviations of prices from their long run equilibrium path, need time to be corrected in the markets. To account for this, the analysis will not only have to identify the long run driving forces of prices, but also their short run dynamics describing the forces that drive prices back to their equilibrium levels. These dynamics describe changes in prices and therefore explain inflation in terms of both long run structural determinants and short run reversals of observed prices to their equilibrium values. Demand pull forces describe the influence of deviations between short run and long run demand and supply (the so called output gap) on short run price dynamics and therefore are identified as influencing inflation only in the short run.

In a reduced form approach in a fixed exchange rate regime, the long run equilibrium path of CPI is mainly driven by foreign costs and prices. In fact, the choice of a fixed exchange rate regime is meant to allow the country to let its inflation rate converge to the inflation rate observed in its main trading partner countries. More specifically, in a fixed exchange rate regime, on the steady state growth path, domestic CPI depends on the weighted cost of imports expressed in domestic currency, where the weights depend on the relative importance of each foreign trading partner in the country's total imports. Such an indicator for OPT was calculated in PMA (2011).

Figure 4.2 shows the long run relationship between the CPI in OPT and the calculated Cost of Imports using total import weights (CIM) in OPT, both expressed in logarithms. The graph shows clearly a long run positive dependence of CPI in OPT (which is expressed in NIS) and the weighted cost of imports in OPT also expressed in NIS. In some periods both variables tend to drift apart. The main reason for this is to be found in the specific structure of the CPI in OPT.

Figure 4.2 CPI and import costs in OPT
(In logarithms)



As was shown in chapter 1 of this report, the food and beverage items in the CPI basket have been the most important contributors to inflation in OPT. This is both due to their relative importance in the CPI basket and to their high volatility, especially in recent years. Figure 4.3 shows the relationship between CPI in OPT and the world price index for food and beverages (WOFOBEV), both expressed in logarithms.

It is very likely that the deviation, observed since 2008, between CPI in OPT and the calculated CIM (which is based on consumer prices in OPT's main trading partners converted into NIS), is due to the more pronounced influence of world food and beverage prices in OPT as compared to its main trading partners. These observations suggest that a long run equilibrium relationship should be found between CPI in OPT and the CIM-indicator and that the world price index for food and beverages may play an exogenous role in the inflation dynamics in OPT. Before investigating these relationships in more detail, we need to be sure that all data involved are integrated of order one. This proposition is confirmed by the tests reported in table 4.4.

The most efficient way to quantify the relationship between these variables is to estimate a VECM. This model encompasses the long run equilibrium relationship between CPI in OPT and the cost of imports indicator. But simultaneously it also incorporates the short term dynamics that drive the CPI back to its long run equilibrium path after shocks have temporarily driven CPI apart from its long run equilibrium. That a long run co-integrated relationship between CPI and the cost of imports exists is confirmed by the formal Johansen co-integration test reported in table 4.5.

Figure 4.3 CPI and world price index of food and beverages
(In logarithms)

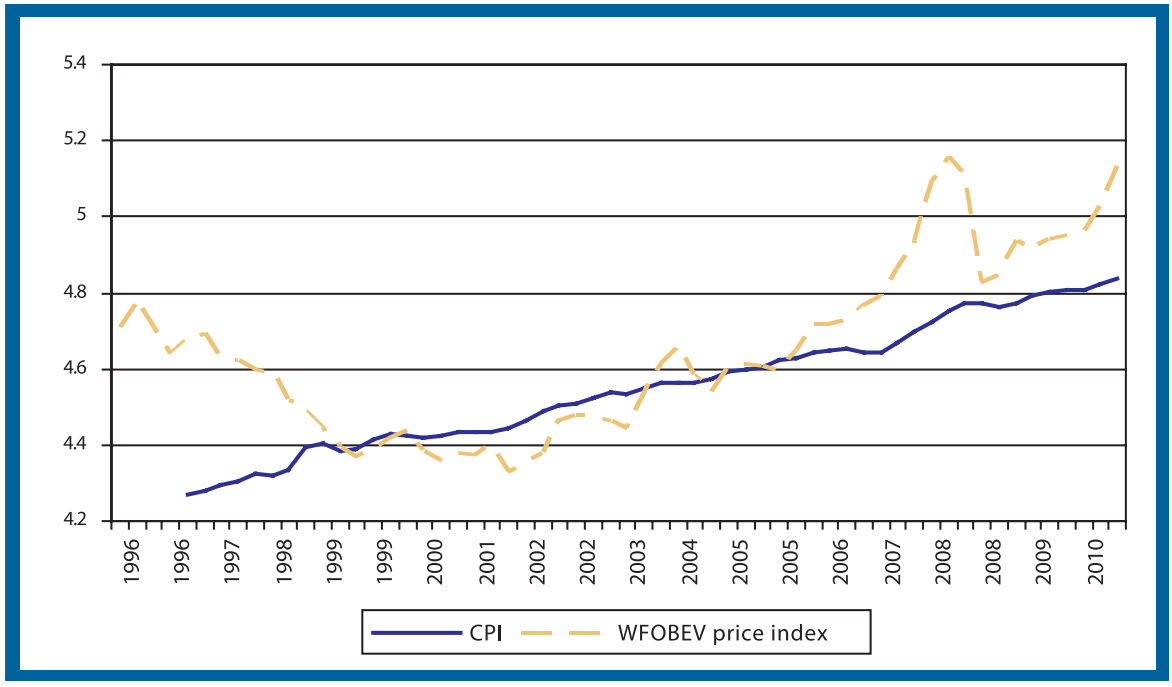


Table 4.4 Stationarity tests on CPI, CIM in OPT, and WFOBEV
(In logarithms)

	p-value	
	ADF TEST	PP TEST
L(CPI)	0.9451	0.9443
D(L(CPI))	0.0000	0.0000
L(CIM)	0.8050	0.7011
D(L(CIM))	0.0000	0.0000
L(WFOBEV)	0.9635	0.9499
D(L(WFOBEV))	0.0000	0.0000

Besides the long run relationship between CPI and CIM, the estimated VECM also contains the world food and beverage price index and delayed reactions of CPI to shocks in the cost of imports (the long run effect of a change in the cost of imports is not attained in one single quarter, but may take more time to realize).

Beside the cost push factors mentioned above, which affect the long run value of CPI, demand pull factors may have temporary effects on inflation. A useful cyclical indicator in this respect is the so called output gap. It represents the gap between currently observed real GDP and potential real GDP. The latter can be interpreted as the long run trend of potential output which is driven by the growth of productivity and labor input. This potential output is frequently estimated by a applying a Hodrick-Prescot filter on the observed real GDP series. The output gap is then calculated as the percentage difference between observed real GDP and its calculated trend value. Figure 4.4 compares the observed real GDP with the estimated trend, which is taken as an indicator of potential output. Figure 4.5 shows the output gap and the inflation rate in OPT.

Table 4.5 Co-integration tests between CPI and CIM in OPT
(Variables expressed in logarithms)

Unrestricted Co-integration Rank Test (Trace) Lags interval (in first difference): 1 to 2			Sample: 1997Q4 – 2010Q3	
Hypothesized no. of Co-integration relation(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.3415	29.8201	20.2618	0.0018
At most 1	0.1442	8.0958	9.1645	0.0795
Unrestricted Co-integration Rank Test (Max. Eigenvalue) Lags interval (in first difference): 1 to 2			Sample: 1997Q4 – 2010Q3	
Hypothesized no. of Co-integration relation(s)	Eigenvalue	Max-Eigen. Statistic	0.05 Critical Value	Prob.**
None*	0.3415	21.7244	15.8921	0.0054
At most 1	0.1442	8.0958	9.1645	0.0795

* denotes rejection of the hypothesis at the 0.05 level.

** MacKinnon-Haug-Michelis (1999) p-values.

Compared to CPI inflation, real GDP cycles seem to be very pronounced, mainly due to the extreme shocks that have hit real GDP in the past. The calculated output gap is therefore mostly influenced by exogenous shocks and only to a lesser degree by the real business cycle.

Figure 4.4 Observed and trend real GDP in OPT
(In logarithms)

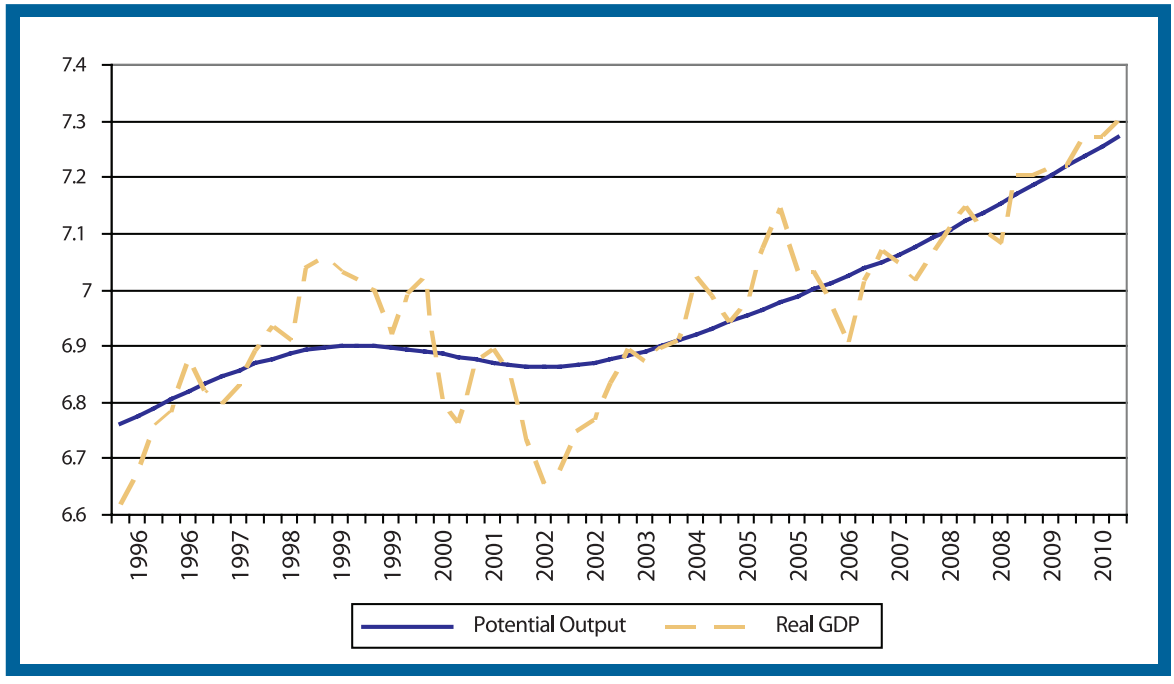
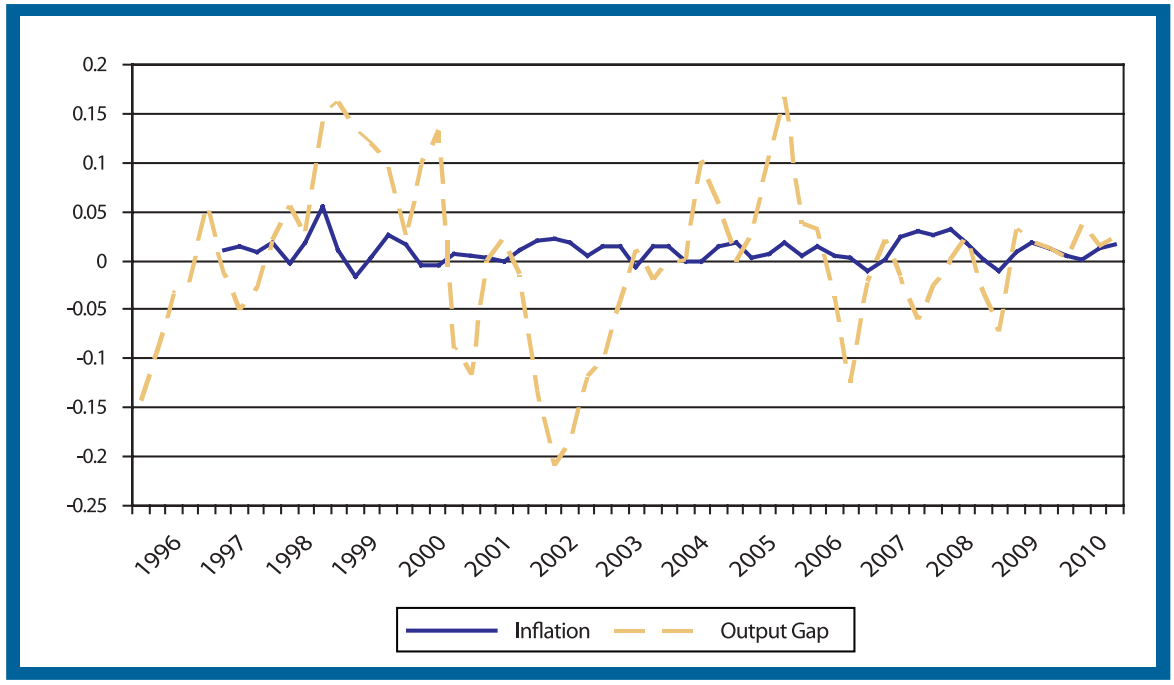


Figure 4.5 Inflation and output gap in OPT
(In logarithms)



From the figure it is also obvious that this indicator is not correlated with inflation. This was confirmed by the estimated VECM model which showed no relation between inflation and the calculated output gap. Therefore the output gap was not used in the inflation analysis. CPI in OPT, as shown in equation 4.1, depends upon cost of imports, and World food and beverages price index. To estimate equation 4.1 EVCM is used and the results are in table 4.6.

$$\boldsymbol{CPI} = f(\boldsymbol{CIM}, \boldsymbol{WFOBEV}) \qquad (4.1)$$

The following conclusions can be derived from this model:

- There is a long run relationship between CPI in OPT and the cost of imports in OPT. The long run coefficient in this relationship is significant and close to unity, implying that a one percent increase (decrease) in import cost will lead over time to a one percent increase (decrease) in the level of CPI;
- As the cost of imports contains the effects of changes in CPI in the main trading partners of OPT and the movements of the exchange rate of the NIS with respect to trading partners outside Israel, the results illustrate the crucial dependence of CPI in OPT on the exchange rates. This is a result found in many small open economies and represents a solid argument for using the exchange rate as an intermediate target of monetary policy (which is in OPT, given the absence of a domestic currency, not a an available option).
- Apart from the cost of imports, the CPI is also affected by the movements of the world market prices of food and beverages. This influence is relatively small, but can exert a pronounced influence on CPI in times when these world prices are very volatile, as has been recently the case since 2007;

Table 4.6 VECM of CPI in OPT

Co-integrating equation:		
L(CPI(-1))	1.000000	
L(CIM(-1))	-0.943755	
	[-6.44812]	
C	-0.258350	
Error Correction:	**D(LCPI_OPT)**	**D(LCIM_TIM)**
CointEq1	-0.146179 [-3.00081]	-0.002094 [-0.02567]
D(L(CPI(-1)))	0.167121 [1.02049]	-0.084960 [-0.30984]
D(L(CPI(-2)))	-0.426956 [-2.72004]	-0.405207 [-1.54174]
D(L(CPI(-3)))	0.184123 [1.24410]	0.451229 [1.82089]
D(L(CIM(-1)))	0.161541 [1.55170]	0.136974 [0.78578]
D(L(CIM(-2)))	0.031682 [0.29856]	0.134090 [0.75466]
D(L(CIM(-3)))	-0.121141 [-1.13412]	-0.182369 [-1.01967]
C	-0.168473 [-3.15134]	-0.008273 [-0.09242]
L(WFOBEV)	0.038573 [3.32316]	0.003164 [0.16280]

t-statistics in [ ].

- In the short term, inflation in OPT absorbs the shocks in import costs and world prices mentioned above. Imported inflation shocks take time before the CPI level has fully reacted and this drives inflation in the short run. The coefficient on the error correcting term is negative, statistically significant and smaller than one and these conditions are an additional confirmation of the existence of a long run equilibrium condition between CPI and imported cost shocks;
- This estimated inflation model represents a parsimonious theory of inflation in OPT and can easily be used for inflation forecasting.

Most countries cannot be classified as in either of both extremes: purely flexible to purely fixed exchange rate systems. Therefore most inflation analysis is based on an eclectic approach, explaining inflation in terms of both monetary and real sector indicators. In the next section we will present a short survey of recent inflation analysis in a number of countries.

4.4 Short overview of recent literature and an eclectic inflation model for OPT

The literature review will focus here on a policy oriented approach and useful for a central bank. Therefore we limit ourselves to an overview of inflation analysis for OPT and to a short summary of recent analysis for other countries conducted by the IMF and published recently in the IMF's Working Paper series. Almonsour (2010) explains the inflation dynamics in Yemen using as explanatory

variables: the NEER, foreign prices, the money supply and real GDP. Alturki et al (2010) explains inflation in Tajikistan in terms of broad money, real GDP, NEER and foreign prices. Crowley (2010) adds to these global factors such as non-fuel prices and energy prices for countries in the Middle East, North Africa and Central Asia. Gottschalk et al (2008) consider international oil prices, reserve money and the USD exchange rate in Sierra Leone. Kandil et al (2009) analyze the determinants of inflation in the oil-rich Gulf Cooperation Council Countries in function of two demand pressure variables (government spending and the money supply) complemented with external variables (NEER and foreign prices). Moriya (2008) uses NEER foreign prices, real GDP and money supply as independent variables in Sudan. These papers use co-integration and error correction methods to estimate long run equilibrium relationships and short run dynamics. Tsangarides (2010) applies VAR analysis on a vector of variables composed of real GDP, CPI, Money stock, repo rate and NEER.

Daoud et al (2008) apply co-integration techniques, error correction and VAR models on four variables: CPI in West Bank (CPIWB), CPI in Gaza (CPIG), CPI in Israel (CPII) and M2 in Israel. Their results indicate long and short run interactions between CPI in Occupied Palestinian territories and the CPII.

From this short survey it is clear that a number of common variables appear to be important to explain the CPI and inflation in a number of countries. We might add to these as additional potential candidates in OPT the Cost of Imports (CIM) which is a combination of the NEER and foreign prices into one variable, Credit variables, administered or identified exogenous prices and the output gap.

As shown in table 4.6 a co-integrating vector can be found between CPI and M2, cost of imports, world food and beverage index and the NIS/USD exchange rate.

Table 4.7 Co-integration tests between CPI, M2, CIM, WFOBEV, and the NIS/USD exchange rate (Variables expressed in logarithms)

Unrestricted Co-integration Rank Test (Trace) Lags interval (in first difference): 1 to 1			Sample: 2000Q3 – 2010Q3	
Hypothesized no. of Co-integration relation(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.7088	93.3455	69.8189	0.0002
At most 1	0.3787	41.5316	47.8561	0.1723
At most 2	0.2824	21.5418	29.7971	0.3247
At most 3	0.1639	7.6057	15.4947	0.5085
At most 4	0.0020	0.0855	3.8415	0.7700
Unrestricted Co-integration Rank Test (Max. Eigenvalue) Lags interval (in first difference): 1 to 1			Sample: 2000Q3 – 2010Q3	
Hypothesized no. of Co-integration relation(s)	Eigenvalue	Max-Eigen. Statistic	0.05 Critical Value	Prob.**
None*	0.7088	51.8139	33.8769	0.0002
At most 1	0.3787	19.9897	27.5843	0.3418
At most 2	0.2824	13.9361	21.1316	0.3703
At most 3	0.1639	7.5202	14.2646	0.4296
At most 4	0.0020	0.0855	3.8415	0.7700

* denotes rejection of the hypothesis at the 0.05 level.

** MacKinnon-Haug-Michelis (1999) p-values.

The following equation, 4.2, shows the monetary and real sectors approach to estimate CPI in OPT. This equation is estimated using VECM and results are in table 4.8.

$$\boldsymbol{CPI} = f(\boldsymbol{M2}, \boldsymbol{CIM}, \boldsymbol{WFOBEV}, \boldsymbol{EXR}) \qquad (4.2)$$

Table 4.8 VECM of CPI in OPT

Co-integrating equation:			
L(CPI_OPT(-1))	1.000000		
L(M2NIS(-1))	-0.318870		
	[-6.00258]		
L(CIM(-1))	-0.350890		
	[-2.42835]		
C	0.163829		
Error correction:	**D(LCPI_OPT)**	**D(LM2NIS)**	**D(LCIM_TIM)**
CointEq1	-0.148305 [-2.29728]	1.224697 [4.14427]	0.224259 [2.20076]
D(L(CPI(-1)))	0.250164 [1.31536]	0.871057 [1.00052]	0.237189 [0.79009]
D(L(CPI(-2)))	-0.378093 [-2.11354]	0.577540 [0.70527]	-0.182358 [-0.64580]
D(L(CPI(-3)))	0.083988 [0.49255]	-0.280383 [-0.35921]	0.050840 [0.18889]
D(L(M2NIS(-1)))	-0.011412 [-0.34188]	0.144253 [0.94402]	-0.016397 [-0.31118]
D(L(M2NIS(-2)))	-0.048679 [-1.61025]	0.152418 [1.10142]	-0.009997 [-0.20949]
D(L(M2NIS(-3)))	0.025736 [0.84123]	0.175751 [1.25497]	-0.011925 [-0.24695]
D(L(CIM(-1)))	0.424923 [3.15042]	0.260519 [0.42195]	0.275158 [1.29242]
D(L(CIM(-2)))	-0.002962 [-0.02125]	-1.699554 [-2.66381]	-0.271299 [-1.23316]
D(L(CIM(-3)))	0.193046 [1.38511]	0.112543 [0.17640]	-0.083703 [-0.38048]
C	0.090620 [0.90407]	-0.862063 [-1.87879]	-0.227678 [-1.43901]
L(WFOBEV)	0.009058 [0.81621]	-0.026821 [-0.52797]	0.003297 [0.18822]
L(EXR)	-0.087749 [-1.97056]	0.690146 [3.38570]	0.152405 [2.16826]

t-statistics in [ ].

The following conclusions can be derived from this eclectic model:

- There is a long run relationship between CPI in OPT, the cost of imports in OPT and money supply, measured by M2;
- Apart from the cost of imports and the money supply, the CPI is also affected by the move-

ments of the world market prices of food and beverages and the NIS/USD exchange rate. The latter captures the effects of converting different components of M2 into a single currency;

- In the short term, inflation in OPT absorbs the shocks in import costs, money supply and world prices. These shocks take time before the CPI level has fully reacted and this drives inflation in the short run. The coefficient on the error correcting term is negative, statistically significant and smaller than one and these conditions are an additional confirmation of the existence of a long run equilibrium condition between CPI and the above mentioned variables;

- In comparison with the estimated inflation model based on the real sector paradigm only, the current one encompasses both real-sector and monetary variables to play a role in the explanation of inflation.

4.5 Inflation forecasting

The transmission mechanisms of monetary policy can be long and variable. A monetary policy action today may only affect inflation in the future with a considerable time lag. Therefore central banks need to adopt a forward looking approach. Their evaluation of the monetary policy stance and adoption of monetary policy actions are typically based not only on the observation of recent inflation trends, but also on their inflation outlook. This inflation forecast is typically the result of a combination of quantitative inflation models, such as the ones estimated in this chapter and of more qualitative judgmental analysis that incorporates additional information that is not necessarily captured by the models.

In this first inflation report and for illustrative purposes an inflation forecast will be produced for 2011. A forecast based on the monetary model is basically a forecast for money velocity. This forecast can in principle be used in two alternative ways:

- As an instrument for an inflation forecast. In this procedure, we would need as additional inputs: the central bank's forecast for money growth and its scenario for the quarterly growth profile of real GDP. The outlook for M2 growth can be based on the central bank's monetary analysis. The real GDP scenario can be taken from the central bank's structural model or financial programming model or from any other real GDP forecast;

- Alternatively, the velocity forecast can be used for deriving the central banks' preferred future time path for M2, given the central bank's inflation target. This would be especially valid in countries with flexible exchange rates where the central bank has some control over the money supply. It would require that the central bank defines a medium term inflation target, and uses as in the previous approach a forecast for real GDP.

The inflation forecast based on the real sector economy model (Model A) has only one exogenous variable and therefore requires an out-of model scenario for world food and beverage prices, equation 4.1. These can be explicitly or implicitly obtained from the world outlook scenarios published by international organizations such as the IMF, or can be based on futures prices or on a no-change assumption, or on any other assumption.

The use of the eclectic model (Model B) for the inflation forecast requires scenarios for two exogenous variables: the NIS/USD exchange rate and the world food and beverage price index, equation 4.2. Traditionally exchange rate scenarios are typically based on a no-change assumption.

In this first inflation report we will produce an inflation forecast for 2011 based on model A only. The baseline forecast needs an assumption as to the future course of the world food and beverage prices during the following quarters. At the time of writing this report, this price index for 2011Q1 is available. For the next three quarters, we made an out-of-model forecast for WFOBEV index on the assumption that this index is generated by a random walk with drift process. World prices are influenced by all possible global shocks. The random walk assumption implies that all available information is duly reflected in the prices as of today. The prices will only change in the future when new information relevant for this market becomes available. We assumed therefore that the data generating process driving the WFOBEV index is random walk with drift. We used this model to obtain an out-of-sample forecast for the remaining three quarters of 2011.

Of course this forecast is conditional on the assumption regarding the future course of WFOBEV. Therefore it is useful to explore alternative scenarios for this exogenous variable and evaluate their implications for the inflation forecast.

In its most recent World Economic Outlook (IMF April 2011) the IMF considers world food prices to converge to their peak levels in 2008. We have implemented this assumption as our scenario 1. Another alternative scenario (scenario 2) is the no-change assumption. In this case we assume WFOBEV to remain on their level reached in 2011Q1.

It is now possible to make a baseline and alternative forecasts for CPI. Since at the time of writing, the CPI of 2011Q1 was published by PCBS, model A will be used to produce a forecast for CPI for the next three quarters, i.e. for the period 2011Q2 to 2011Q4.

Table 4.9 displays the exogenous assumptions on the WFOBEV for the baseline and the alternative scenarios and the y-o-y CPI forecasts for 2011 in quarterly based on equation 4.1.

Table 4.9 Assumptions on WFOBEV and the forecast results of CPI in OPT for the period 2011Q2 – 2011Q4

	WFOBEV (baseyear = 2005)			CPI in OPT (baseyear = 2005)		
	Baseline	Scenario 1	Scenario 2	Baseline	Scenario 1	Scenario 2
2009	135.995	135.995	135.995	119.436	119.436	119.436
2010	151.943	151.943	151.943	123.913	123.913	123.913
2010 Q1	141.627	141.627	141.627	122.550	122.550	122.550
2010 Q2	143.033	143.033	143.033	122.628	122.628	122.628
2010 Q3	153.357	153.357	153.357	124.252	124.252	124.252
2010 Q4	169.757	169.757	169.757	126.223	126.223	126.223
2011	*195.805*	*177.138*	*188.630*	*130.051*	*129.155*	*129.750*
2011 Q1	188.630	188.630	188.630	126.674	126.674	126.674
2011 Q2	*193.335*	*173.307*	*188.630*	*128.448*	*127.907*	*128.326*
2011 Q3	*198.156*	*173.307*	*188.630*	*131.342*	*130.090*	*130.963*
2011 Q4	*203.098*	*173.307*	*188.630*	*133.740*	*131.949*	*133.036*

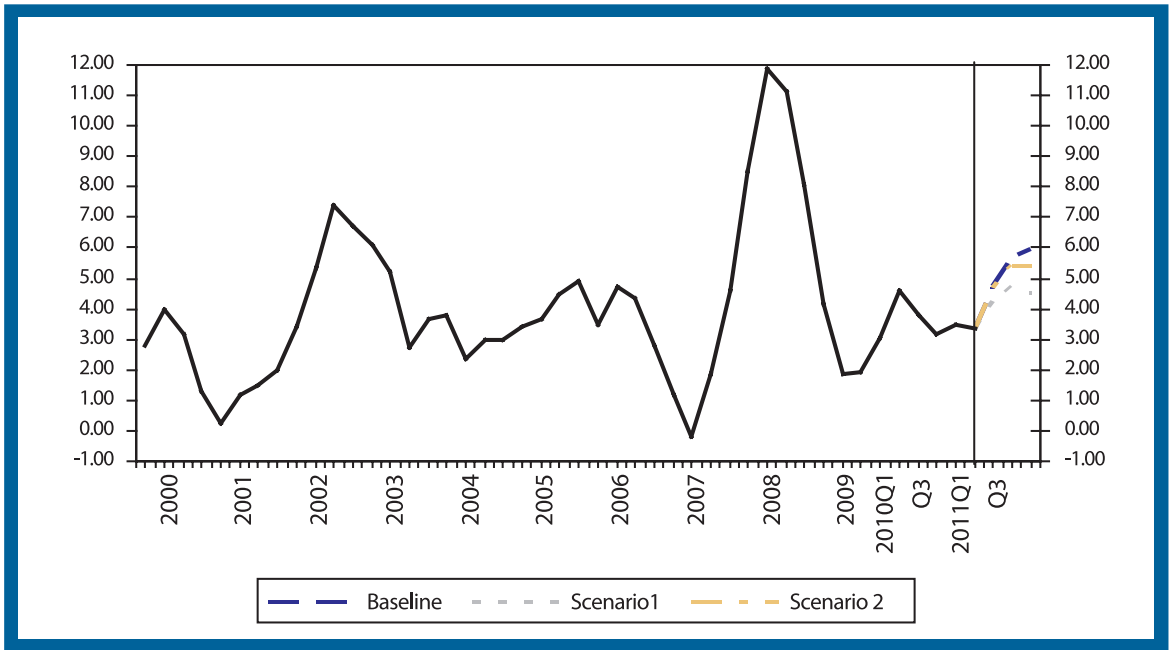
Baseline scenario predicts that the y-o-y inflation rate in OPT would increase on average by 4.95 percent in 2011 compared with 2010. In 2011, the first quarter y-o-y inflation rate in OPT reached 3.36 percent. According to the forecast y-o-y inflation would rise in the following quarters, fol-

lowing the expected further rise in world food and beverages prices, by 4.75, 5.71, and 5.96 percent in the last three quarters of 2011 respectively.

The first scenario predicts that inflation would increase on average by 4.23 percent in 2011 compared with 2010. Inflation rate in the second quarter is expected to reach 4.31 percent compared with the second quarter of 2010 and it would reach 4.70 and 4.54 percent in the third and fourth quarters of 2011 respectively compared with their respective quarters in 2010.

The second scenario expects inflation would reach in average 4.71 percent in 2011 compared with 2010. Y-o-y inflation in the second, third, and fourth quarters of 2011 would reach 4.65, 5.4, and 5.4 percent respectively. Figure 4.6 shows the y-o-y inflation forecasts in OPT in the last three quarters of 2011.

Figure 4.6 Y-o-y inflation rate forecasts in OPT



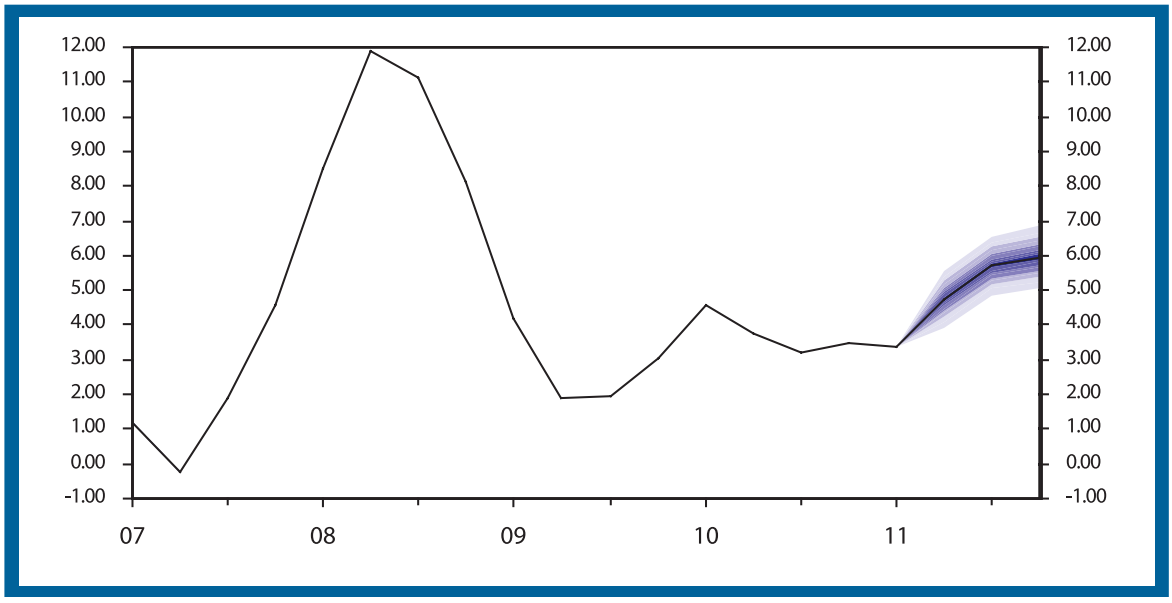
The inflation forecasts based on the alternative assumptions according to the WFOBEV ranges between 4.23 percent and 4.95 percent on average in 2011.

An alternative strategy to illustrate the uncertainty concerning the forecast is to produce a so called fan chart. Fan charts originated in the inflation forecasts in the Bank of England (Bank of England, 1998). These charts are based on discussions in the Monetary Policy Committee and reflect the different opinions of the Committee members. These discussions permit to set the parameters of the probability distributions surrounding the central inflation forecast. One of the essential parameters is the standard deviation, measuring the degree of uncertainty surrounding the forecast which typically increases with the time horizon of the forecast. Mostly this parameter is based on the inflation forecast errors over the past ten years. But it may also reflect the judgmental estimate of the forecast as discussed in the Committee. Other essential parameters are the mode and the expected value of the probability distribution. The mode reflects the central baseline scenario forecast. When the risk analysis is symmetrically distributed around the central forecast, the mode and the expected value are equal and the complete risk analysis is reflected in the confidence band around the central forecast which is determined by the standard deviation

parameter. But when the discussions in the Committee reveal that the risk is rather on the upside or downside, then the distribution will be skewed, such that the expected value of the forecast, which reflects the weighted average forecast of all scenarios) diverges from the mode, which still is the central most likely outcome (the scenario with the highest single probability).

In this report and for illustrative purposes we have produced fan chart in figure 4.7. As was mentioned before, the average forecast for the whole year 2011 is an increase of CPI in OPT by 4.9 percent. This implies a gradual creeping up profile of the y-o-y inflation in each of the following three quarters. The uncertainty surrounding this central baseline forecast (based on model A and on the random walk forecast for WFOBEV prices) is reflected in the standard deviation which starts at 0.50 for the first quarter forecast and gradually increases for the following two quarters in the future. We assumed in this example that the risks are symmetrically distributed up and down the central forecast, implying a normal distribution.

Figure 4.7 Fan chart of inflation in OPT



REFERENCES

Almonsour, A., Inflation Dynamics in Yemen: An Empirical Analysis, IMF WP/10/144

Alturki, F., Vtyurina, S., Inflation in Tajikistan: Forecasting Ananlysis and Monetary Policy Challenges, IMF WP/10/17

Bank of England, The Inflation Report Projections: Understanding the Fan Chart, Bank of England Quarterly Bulletin, February 1988.

Crowly, J., Commodity Prices and Inflation in the Middle East, North Africa and Central Asia, IMF WP/10/135

Daoud, Y., Sarsour, S., Shanti, R., Forecasting Inflation Rate Behavior in Palestine: A Time Series Analysis, PMA, 2008

Gottschalk, J., Kalonji, K., Miyajima, K., Analyzing Determinants of Inflation When There Are Data Limitations:The Case of Sierra Leone, IMF, WP/08/271

IMF, World Economic Outlook: Tensions from the Two-Speed Recovery Unemployment, Commodities, and Capital Flows, April 2011

Kandil, M., Morsy, H., Determinants of Inflation in GCC, IMF WP/09/82

Moriyama, K., Investigating Inflation Dynamics in Sudan, IMF WP/08/189

PMA, Effective exchange rate indices for Palestine, 2011

Sarsour, S., Estimating Money Demand in OPT, PMA (Forthcoming)

Taylor, J., Discretion Versus Policy Rules in Practice, Carnegie – Rochester conference series on Public Policies 39, 1993, 195 – 214

Tsangarides, C., Monetary Policy Transmission in Mauritsius Using a VAR Analysis, IMF WP/10/36

Wazir, J., Attallah, M., and Sarsour S., From Occupation to an Independent Monetary Policy: Achievements and Aspirations in Palestine, in Cobham D. and Dibeh G. (eds), *Money in the Middle East and North Africa: Monetary Policy Frameworks and Stratigies*, (New York, USA: Routledge), 2011, 106 – 123