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## Empirical Investigation of Economic Reform Program in Jordan

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### Abstract

During the eighties, Jordan witnessed a severe economic condition, a low rate of economic growth, a high rate of inflation, and balance of payments problem. Consequently, the real per capita income was falling by more than 1.5% annually during the 1983-1988. In the light of these dramatic changes, the government was unable to fulfill its financial obligations concerning foreign debt as it ran out of foreign exchange deposits. In 1989, Jordan adopted an economic reform program by the blessing of the International Monetary Fund (IMF).

The main objective of this study is to evaluate the economic reform program by examining the performance of the Jordanian economy during the period between 1979 and 1999 with special emphasis on fiscal and monetary policies. The researchers conducted an empirical analysis of the IMF policy model to determine the potential effectiveness of reform program in stabilizing the economy. For the years examined, we have found that the monetary policy has the potential to be effective in stabilizing the aggregate demand, while fiscal policy was ineffective in controlling the foreign reserves, or had an influence in lowering the inflation rate.

### ملخص

عانى الأردن خلال الثمانينيات من ظروف اقتصادية خانقة تمثلت بانخفاض معدل النمو الحقيقي، وارتفاع معدل التضخم، وتفاقم العجز المالي علاوة على العجز في ميزان المدفوعات. ونتيجة لذلك انخفض مستوى الدخل الفردي الحقيقي إلى أكثر من 1.5% سنوياً بين عامي 1983-1988. وفي ضوء هذه التغيرات كانت الحكومة غير قادرة على الإيفاء بخدمة الديون الخارجية نتيجة لشح الاحتياطات الأجنبية، ونتيجة لذلك تبني الأردن في عام 1989 برنامج التصحيح الاقتصادي بمباركة صندوق النقد الدولي.

ويهدف البحث أساساً إلى تناول تجربة التصحيح الهيكلي في الأردن من خلال تقييم أداء الاقتصاد الأردني خلال الفترة 1979-1999 مع التأكيد على دور كل من السياسة المالية والنقدية. وبيان مدى فعالية برنامج التصحيح في تحقيق الاستقرار الاقتصادي تم اعتماد نموذج الـ (IMF). وتبين من خلال سنوات الدراسة أن السياسة النقدية كانت مؤثرة في تحديد حجم الطلب الكلي، في حين أن السياسة المالية لم تكن مؤثرة في السيطرة على الاحتياجات الأجنبية أو تخفيض مستوى التضخم.

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## 1. Introduction

The Jordanian economy is well characterized by being a small open and price-taker. This situation has reinforced the linkage of Jordan with its regional and international surrounding. Accordingly, the structure of Jordan economy has become a mirror reflecting all fluctuations that took place in the regional and international markets, which influenced the development process and growth rates.

There were negative impacts of the global economic recession in the beginning of the 1980s on the economy of Jordan and neighboring countries. Falling crude oil prices in 1983 negatively affected the economics of oil-producing Arab countries. Subsequently, financial aid and foreign remittance witnessed a sharp decline, which was negatively reflected on the rate of growth in the economy. The distortions could be summarized in actual and continuous decline in economic growth since the mid Eighties; excessive balance of payments deficit which accounted for 24% of the Gross Domestic Product (GDP) and heavy burdens of foreign indebtedness; an existing debt rate amounting to 232% of the GDP by the end of 1989. If we consider the heavy decline of the central bank reserves, the flow of capitals abroad, and the drop in the volume of exports, we can predict the crisis in the Jordanian balance of payments. Furthermore, the general price rates ascended and, as a result, the inflation rate reached 26% in 1989.

In the light of these dramatic changes, the government was unable to fulfill its financial obligations concerning foreign debt, as it had ran out of foreign exchange deposits. Consequently, in 1989, the Jordanian Dinar lost more than half of its value of 1987. Therefore, Jordan adopted an economic reform program with the blessing of the (IMF) in 1989. The IMF's basic prescription for overcoming a crisis is to encourage squeezed aggregate demand by controlling domestic credit, budget deficits (internal gap); and the balance of payments deficit as well as the price level. Little empirical research that addresses the validity of the IMF model has been reported. Consequently, it seems important to evaluate the economic reform program by examining the performance of the Jordanian economy during the period of 1979-1999 with special emphasis on fiscal and monetary policies. The researchers will conduct an empirical analysis of the IMF policy model to determine the potential effectiveness of the reform program in stabilizing the economy. The research reported here will help ameliorate this condition.

The research is presented in four parts. Part one is an introduction about the Jordanian economy. Part two covers the literature review of the reform programs. Part three conducts an empirical analysis of the policy model to determine the potential effectiveness of reform program in stabilizing the

economy. Part four examines the conclusions and policy implications of reform program.

## **2. Literature Review.**

This part presents a brief review of empirical research reported in the literature. Cuddington (1996), analyzing the Sustainability of Fiscal Deficits in Developing Countries, surveyed the recent literature concerning fiscal deficit sustainability on the U.S.A. and other industrial countries in an attempt to assess its potential usefulness in the developing countries. Two approaches have been considered: the Present Value Constraint (PVC) approach and the accounting approach. The starting point for both is the financing constraint of the government or consolidated public sector. The accounting approach is sometimes viewed as an approach to fiscal sustainability whereas the PVC tests the sustainability of the current fiscal policy stance. The main finding of the study was that the fiscal sustainability tests were less appropriate in developing countries.

Sato (1998) examined the stabilization policy program with reference to the Japanese economy. It was a critical review of both fiscal and monetary policies over the last four decades. In addition, credit and discount policies were also considered. His main concluding remark was that the changeovers of Japan's macroeconomic and fiscal policies were ineffective in the rapid-growth period where monetary policy was in charge of macroeconomic management. In the slow growth period, monetary policy was more destabilizing. In the early 1990s, fiscal policy, however, was activated. Generally speaking, the policy authorities had no clear idea of how the macroeconomic of Japan worked.

Mendoza (2000) took part in the study of stabilization policy by examining two potential benefits that emerging economies may derive from dollarization. The elimination of credibility distortions and the possibility of weakening credit frictions are the potential benefits of dollarization. The analysis was also based on numerical simulations of a two-sector dynamic, with a stochastic general equilibrium model calibrated to Mexican data. His main conclusion was that the credible managed-rate regime introduced distortions of its own.

Cecchetti et al. (2000) carried out another study of macroeconomic stability and monetary policy. They drew attention to the possibility that the world has become a more stable place due to the improvement of macroeconomic performance. This stability has been accompanied by dramatic changes in financial structure, changes investigated elsewhere. They pointed out that monetary policy during the 1990s may have become

Empirical Investigation of ... Abdullah A-Hassan, Khaled Al-Zu'bi, Nadera Mryan  
more effective than it was in the 1980s. However, reducing inflation and output volatility will depend on giving policymakers the necessary tools for carrying out the above stabilization objectives. They also showed that simultaneous improvement in the efficiency of both fiscal and monetary policies could be achieved through a reduction in direct state ownership of banking system assets, and by the introduction of explicit insurance.

It is important to consider some of the Jordanian related literature. Al-Nabulsi (1997) describes the fiscal and monetary distortions in the 1980s. His view of economic reforms is based on the instructions of IMF and World Bank. The study has been presented in a descriptive manner. AL-Wazani and AL-Shar'a (1997) proposed a study about the economic reform program in Jordan covering the period between 1992 and 1996. The main recommendation of the study was that Jordan adopted the structural change programs in order to put the economy back on the right track because only these programs would lead to sustained economic growth. The short-comings, however, is the limited time period covered by the empirical study (1992-1996). In addition, the study lacked a data properties analysis, (specifically a unit root test for stationary), a variable co-integration test, and a structural change test. The latter is so important that it would permit us to evaluate the performance of the Jordanian economy before and after the program.

Al-Nabulsi (1998) also, proposed another response study: "the foreign debt and the structural changes in Jordan 1989-1992". He shed the light on the foreign debt crisis and its impact on economic activities in Jordan. The main conclusion was that the foreign debt crisis should be alleviated gradually in the light of the structural changes.

### **3. Empirical Strategy**

The objective of this part is to empirically analyze the IMF policy model to determine the potential effectiveness of the reform program in stabilizing the Jordanian economy, and to investigate the data properties. Standard regression diagnostics will be performed using generalized least squares.

#### **3.1 Policy model**

The adoption of macroeconomic model is used to examine the impact of fiscal and monetary policies on some Macroeconomic Pinch Marks as follows. We implement our regression estimation in the following form:

A) The demand side

$$GDP = F (INF, BOP, DC, GDC)..... (1)$$

B) The supply side

$$INF = F (M_1, BOP_1, DC_1, GDP_1, GDC_1)..... (2)$$

$$FRV = F (BOP, GDP, GDC) ..... (3)$$

Where:

GDP = aggregate demand level (the money value of all goods and services produced in an economy during one year)

INF = inflation rate (an increases in the over all prices level)

BOP = balance of payments settlement (is a measurement of all transactions between domestic and foreign resident over a specific period of time)

DC = domestic credit (it includes net claims on public sector, claims on private sector, and claims on financial institutions)

GDC = budget deficit (A shortfall of receipts from expenditure)

M<sub>1</sub> = change in money supply (M<sub>1</sub>=currency with public + demand deposit)

BOP<sub>1</sub> = change in the balance of payments settlement

DC<sub>1</sub> = change in domestic credit

GDP<sub>1</sub> = change in the gross domestic product as a proxy aggregate demand level

FRV = demand for foreign reserves

### 3.2 Data Properties Analysis:

An econometric precedent to modeling the economic reform program equations is to view the data properties. Specifically, we consider a unit root test for stationary, a variable co-integration test, and a structural change test. All three tests are completed before an empirical estimation of the model is conducted

#### 3-2-1: Unit Root Test

The unit root test will allow us to conclude if the variables are stationary or non-stationary values. The principal unit root test is the Dickey-Fuller and the augmented Dickey-Fuller. For each considered time series we estimate the model

$$x_t = \beta_0 + \beta_1 t + \beta_2 x_{t-1} + \mu_t .....(4)$$

We test the null hypothesis that  $\beta_1 = 0$  and  $\beta_2 = 1$ . This test will allow us to know if the unit root is present and to measure the importance of the time trend term. Equation (4) is of an AR (1) process where the  $\beta_1$ 's are

Empirical Investigation of ... Abdullah A-Hassan, Khaled Al-Zu'bi, Nadera Mryan parameters and  $\mu_t$  is considered white noise. The variable  $x_t$  represents any of the independent variables or the dependent variable from equation (1,2,3). Variable  $x_t$  is a stationary series if  $-1 < \beta_2 < 1$ . A non-stationary series indicates this process follows a random walk with drift.

If the Dickey-Fuller (DF) test does not provide enough confidence to reject the null hypothesis in levels, but does lend confidence to reject in first and/or second differences, then we conclude that the series is integrated of order one  $I(1)$  in levels and integrated of order zero  $I(0)$  in first differences. A finding of this sort indicates that the variables are non-stationary in levels but are stationary in first differences. On this basis of  $I(1)$  in levels and  $I(0)$  in first differences, we can investigate the possible existence of variable co-integration. The long-run relationship between variables can be partially viewed via co-integration tests.

Table 1 presents the results for the Augmented Dickey-Fuller Test for stationary at levels and first differences of the variables used in our analysis.

**Table 1**  
Unit Root Tests: Augmented Dickey-Fuller (ADF)

Variables used	ADF Test Statistic		
	Level	1 <sup>st</sup> Difference	2 <sup>nd</sup> Difference
M1	-1.042	-1.842	-2.991
DC	0.1643	-2.445	-3.913
FRV	1.279	-3.463	-7.889
INF	-2.487	-2.894	-3.628
BOP	-1.362	-3.513	-6.838
GDC	-2.102	-3.682	-4.281
GDP	0.105	-1.788	-3.829
MacKinnon critical values for rejection of hypothesis of a unit root			
1% Critical Value	-3.8304		
5% Critical Value	-3.0294		
10% Critical Value	-2.6552		

Using the MacKinnon critical values, we can see there is no clear evidence against the existence of the unit root in the level of each of the considered variables: the variables are non-stationary in levels but are stationary in first differences and in second differences. Level values that are, in absolute terms, less than MacKinnon critical values, indicate non-stationary, while first differences and second differences values greater than

MacKinnon critical values indicate variable stationary. These results are reported in Appendix 1.

### **3-2-2 : Co-integration Tests**

A necessary condition for co-integration is for all of the time series data to be all integrated of the same order. The co-integration test is a two-step procedure (described in Engel and Granger (1987) and Yoo (1987)).

In the first step we run the OLS regression of equation (1, 2, and 3). Then we test the regression residuals for stationary using the DFtest. If the residuals turn out to be stationary, then we conclude that a valid co-integration relationship among the considered variables exists.

Since all variables are  $I(1)$  in levels and  $I(0)$  in first differences and second differences, we further investigate the relationship between variables. When testing for co-integration we find that we can reject the null hypothesis of a unit root (i.e. residual and stationary in the levels). These results are reported in Appendix 2. The results imply that there exists a relationship among the studied variables. We conclude that the considered time series are co-integrated and, in their linear combination, produce stationary errors. There is enough support for the assumption that, with a flow of time, these variables move in a similar manner.

### **3-2-3 : Structural Change Investigation**

To further study the effect of the reform programs on the variables' relationships, we look for clear structural breaks in the data series. We use Chow's breakpoint test on sub-samples of data to discern significant differences in regression estimates. A significant difference, as reported from Chow's breakpoint test, indicates a structural change in variable relationships.

In order to investigate the effect of economic reform program on the Jordanian economy, we look for clear structural breaks in the data series. Then we use the above structural change test on the sub-samples of observations to discern significant differences in regression estimates. To carry out the Chow's breakpoint test, we divide the overall sample into two sub-samples. The Chow's breakpoint test is based on a comparison between "A" and "B". "A" is the sum of squared residuals resulting from a single regression on the overall sample. "B" is the sum of squared residuals resulting when separate regressions are fit to each sub-sample of the data. We calculate an F-statistic for a number of potential breakpoints between 1979- 1989 and 1990-1999. The F-Statistic calculated is:



$$F = \frac{(\tilde{u}'\tilde{u} - u_1'u_1 - u_2'u_2) / k}{(u_1'u_1 + u_2'u_2) / (T - 2k)}$$

Where  $\tilde{u}'\tilde{u}$  is the restricted sum of squared residuals  $u_i'u_i$ , is the sum of squared residuals from sub-sample i, T is the total number of observations, and k is the number of parameters in the equation. We expect the actual breakpoint to take place in the month corresponding to the 'peak' value of the F-statistic. The results of this estimation are a strong indicator that structural changes have already been taken place in the economy, especially in equations (1), (2) and (3) when compared with previous stage. However, the Chow - test will be vital in this aspect:

$H_0 = U = 0$ , There are no structural changes in GDP,

$H \neq u \neq 0$ , there are structural changes in GDP.

Chow Test:

$$FC = \frac{(4402860 - 704633.2 - 2117279)/6}{(704633.2 + 211727.9)/(20 - 10)}$$

$$FC = \frac{697299.8}{91636.1}$$

$$FC = 76$$

So long as (FC) is greater than the tabulated F (Ft3.45), we reject the null hypothesis of no structural changes in the aggregate demand and accept the alternative that fiscal policy was effective in controlling aggregate demand.

$$FC = \frac{(282.0629 - 38.07 - 23.51)L6}{(38.07 + 23.51)/(20 - 12)}$$

$$FC = \frac{36.74}{7.64}$$

$$FC = 4.71$$

Since (FC) is greater than tabulated F (Ft3.69), we reject the null hypothesis of no structural changes in inflation and accept the alternative that inflation has been reduced. In addition, the money supply is also insignificant which means that inflation is not a monetary phenomenon. The

falling of the world general price level has mainly contributed to low levels of inflation in Jordan.

$$FC = \frac{(1522717 - 26557.62 - 174957.4) / 4}{(26557.6 + 174959.4) / (20 - 8)}$$

$$FC = 19.669$$

So long as FC is greater than the tabulated F (Ft3.49) we reject the null hypothesis of no structural changes in the demand for foreign reserves and accept the alternative that structural changes have already taken place.

The results also show that (GDP) is the main determinant of foreign reserve.

### 3.3 Estimation Results

The results of the estimation for equation (1) are reported in Table 2.

**Table 2**  
GLS Results for the Estimated Variables

Dependent Variable	GDP		
	1	2	3
Regression Number			
Explanatory Variable	Coefficient Estimates		
Constant	1846.5 (8.65)*	1892.9 (5.99)*	3426.7 (14.2)*
BOP	-0.991 (-1.74)***	-5.683 (-2.71)**	0.177 (0.683)
Inf	16.516 (0.587)	-17.232 (0.677)	-50.29 (-1.95)***
GDC	1.004 (0.981)	1.020 (0.265)	-0.732 (-1.517)
R-squared	0.842	0.662	0.96
Adjusted R-squared	0.80	0.436	0.92
Durbin-Watson stat	1.04	1.44	1.85
Years	1979-1999	1979-1989	1990-1999

**Notes:**

- 1- T-Statistic is given in parentheses.
- 2- \*, \*\*, \*\*\* Indicates statistical significance at the 1%, 5%, and 10% levels, respectively.

In addition the result of estimation for equation (2) and (3) (the supply side) are reported in Tables 3 and 4.

**Table 3**  
GLS Results for the Estimated Variables

Dependent Variable	FRV		
	1	2	3
Regression Number			
Explanatory Variable	Coefficient Estimates		
Constant	-1495.9 (-8.66)*	-170.9 (-1.26)	-3441.3 (-7.09)*
BOP	0.6214 (1.9)***	-0.326 (-0.707)	0.076 (0.221)
GDP	0.992 (16.46)*	0.249 (3.56)*	1.49 (12.01)*
GDC	0.248 (0.450)	-0.363 (-0.732)	1.407 (3.194)*
R-squared	0.94	0.87	0.98
Adjusted R-squared	0.93	0.82	0.97
Durbin-Watson stat	0.699	1.69	1.9
Years	1979-1999	1979-1989	1990-1999

**Notes:**

1- T-Statistic is given in parentheses.

2- \*, \*\*, \*\*\* Indicates statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 4**  
GLS Results for the Estimated Variables

Dependent Variable Regression Number	IN		
	1	2	3
Explanatory Variable	Coefficient Estimates		
Constant	2.704 (0.606)	-7.235 (-0.932)	32.498 (3.068)**
BOP(-1)	0.002 (0.298)	0.027 (0.825)	0.0003 (0.080)
M1(-1)	0.017 (1.731)***	-0.011 (-0.415)	-0003 (-0.427)
GDC(-1)	-0.018 (-1.82)***	-0.036 (-0.932)	-0.005 (-0.843)
DC(-1)	0.0001 (0.095)	0.057 (1.731)	0.0013 (1.266)
R-squared	0.28	0.86	0.76
Adjusted R-squared	0.02	0.70	0.47
Durbin-Watson stat	1.04	2.1	2.7
Years	1979-1999	1979-1989	1990-1999

**Notes:**

- 1- T-Statistic is given in parentheses.
- 2- \*, \*\*, \*\*\* Indicates statistical significance at the 1%, 5%, and 10% levels, respectively.

**The Demand Side**

The estimated results in table (2) for 1979-1999 indicate that the domestic credit is the main determinant of aggregate demand while other variables in equation (1) are statistically insignificant, which means that the fiscal policy is ineffective.

**The Supply Side:**

The estimated results in table (2) for 1979-1999 indicate that none of the fiscal or monetary variables contribute significantly to the inflation rate

Empirical Investigation of ... Abdullah A-Hassan, Khaled Al-Zu'bi, Nadera Mryan during the period of the study. The results, however, defuse the belief of (IMF) that budget deficit is the main cause of inflation. The results of estimation from table (3) clarify that the main determinant of foreign reserves is the (GDP) which complies with the economic theory. The actual breakpoint is 1989; therefore, the overall sample (1979-1999) will be divided into two equal sub-samples, as follows:

**Stage One (1979-1989):**

$$\text{GDP} = 1892.97 - 17.23\text{IN} - 5.68 \text{POB} + 0.55\text{DC} + 1.02 \text{GDFCT} \dots\dots\dots (4)$$

$$\text{INF} = -7.23 - 0.01 M_1 + 0.05 \text{DC} + 0.004 \text{GDP} - 0.03 \text{GDFCT} + 0.02 \text{POB} \dots\dots\dots (5)$$

$$\text{FRV} = -170.93 - 0.32 \text{POB} + 0.23 \text{GDP} - 0.39 \text{GDFCT} \dots\dots\dots (6)$$

The estimated results of the above equations show that most of the variables are statistically insignificant, which reflects the fact that the kingdom suffers from a severe economic condition during this decade. The results also indicate that neither fiscal policy nor monetary policy would be effective.

**Stage Two 1990-1999:**

$$\text{GDP} = 3426.72 - 50.29 \text{IN} + 0.17 \text{POB} - 0.73 \text{GDFCT} + 0.21 \text{DC} \dots\dots\dots (7)$$

$$\text{INF} = 32.49 - 0.00M_1 + 0.00\text{DC} - 0.00\text{GDP} - 0.00 \text{GDFCT} + 0.00 \text{BOP} \dots\dots\dots (8)$$

$$\text{FRV} = -3441.32 + 0.07 \text{POB} + 1.49 \text{GDP} + 1.40 \text{GDFCT} \dots\dots\dots (9)$$

The results of estimation for equation (7) show that there is a positive and statistically significant relationship between domestic credit and aggregate demand (GDP), indicating that such a policy would be a useful tool to control aggregate demand. However, following a contraction, domestic credit policy would contradict the goal of stimulating the private sector to participate effectively in the development process. On the other hand, the remaining variables in equation (7) are statistically insignificant, which means that the fiscal policy to reduce budget deficit; balance of payments settlement, or to control inflation is ineffective. What has been achieved so far could be well attributed to foreign and domestic factors such as foreign aid, deleting debts or rescheduling debt in addition to controlling the level of aggregate demand. Equation (8) indicates that none of the fiscal or monetary variables contribute significantly to the inflation rate during this period. The results, however, defuse the belief of the (IMF) that budget deficit is the main cause of inflation. In addition, ( $m_1$ ) is also insignificant which means that inflation is not a monetary phenomenon. Therefore, inflation in Jordan has a structural root, which complies with the thought of structural list

school. The fall of the world general price level has mainly contributed to low levels of inflation in Jordan.

The results of estimation for equation (9) clarify that the main determinants of foreign reserves are (GDP) and (GDFCT), which comply with economic theory.

#### **4. The Conclusions and Policy Implications of the Economic Reform Program:**

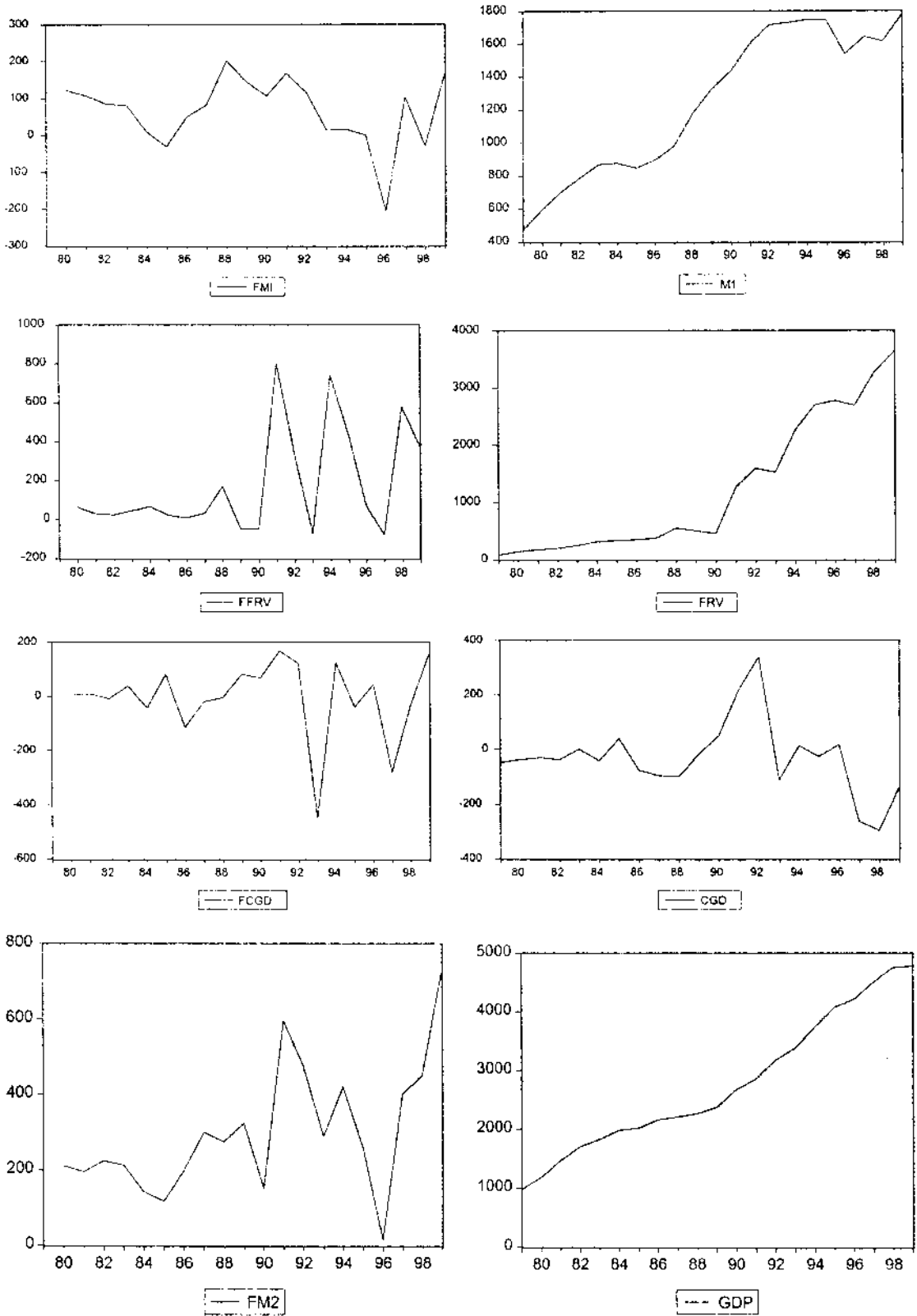
This paper is concerned with analyzing the effectiveness of the economic reform program in stabilizing the economy after the crisis of 1989. We discussed the impact of monetary and fiscal policies using an empirical analysis of the IMF's general policy model. We believe in the necessity for the economic reform program to correct the distortion in the economy and putting it on the right track, which will lead to constant growth by moving Jordan to a new century at a steady and stable pace.

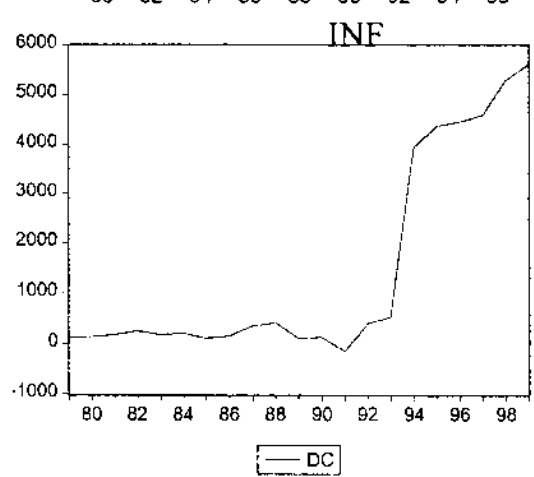
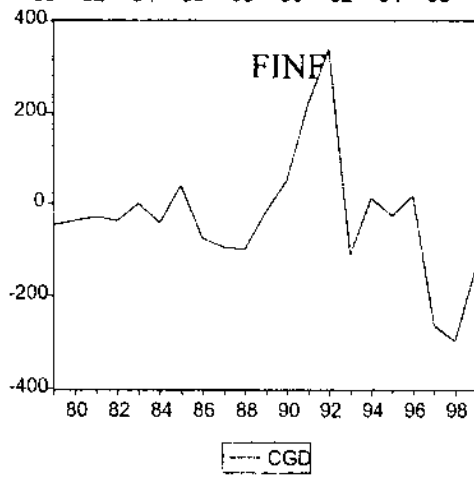
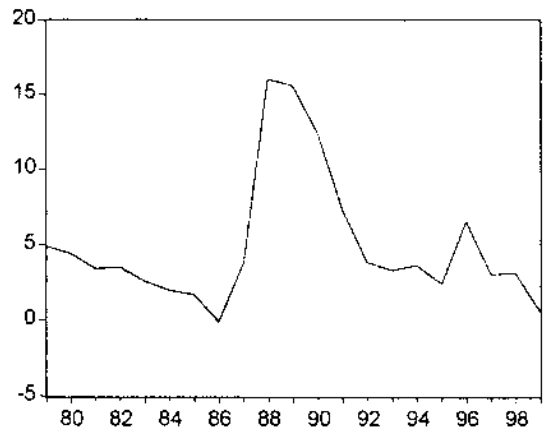
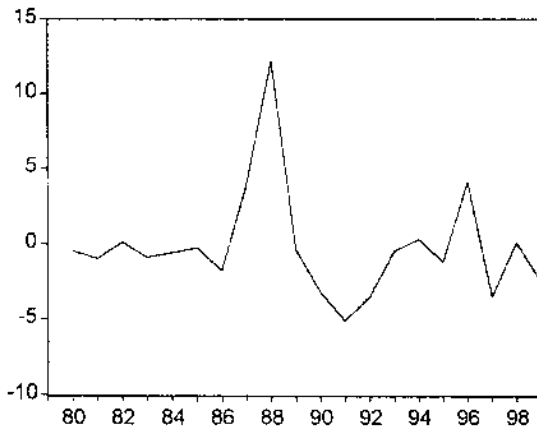
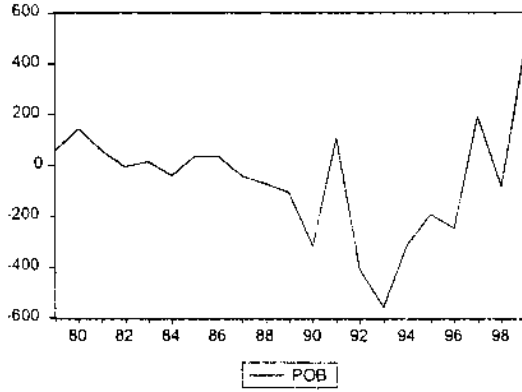
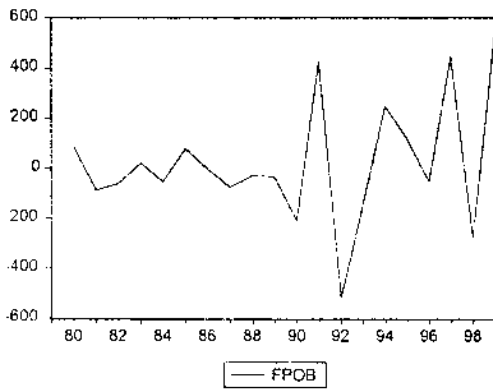
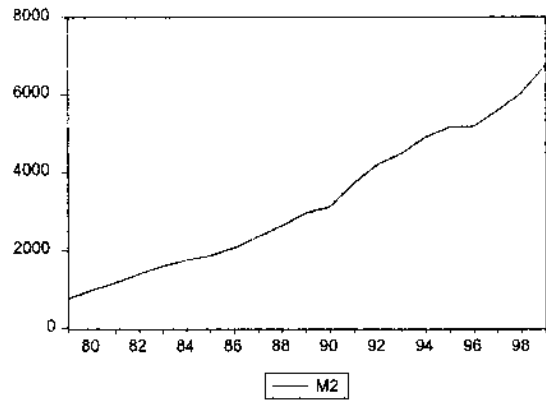
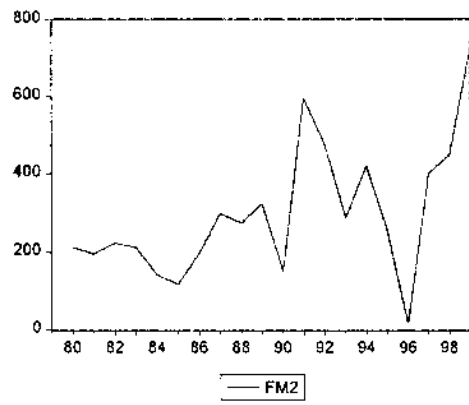
After the implementation of the economic reform program, we found that fiscal policy was effective in controlling the level of aggregate demand while none of the fiscal or monetary variables contributed significantly to the inflation rate during the same period. In addition, the money supply was also insignificant which meant that inflation was not a monetary phenomenon. The results also suggest that there is a positive and statistically significant relationship between foreign reserves and GDP, which complies with economic theory and (IMF) recommendations.

There is a need for the definition and limitation of the monetary instruments that enhance the process of economic growth and not only dominating the overall demand level, as well as inflation. In this respect, credit policies could be followed the facilities of which should be directed towards the export-led growth industries.

Concerning interest rates, although they were floated by the end of the 1980s, they were restricted with limits under the control of the Central Bank. Further, the persistence of the Central Bank in maintaining a high interest margin between the deposits in JD and those in the U.S. Dollar did not change the dollarization phenomenon. Some, however, explicitly indicated that there is a currency substitution phenomenon. As for the fiscal policy, the basic requirements are optimal allocation of resources and avoidance of the waste. It seems that a policy for supporting the low-income class is much better than the programs of the social security package, whose finance would entail additional burdens.

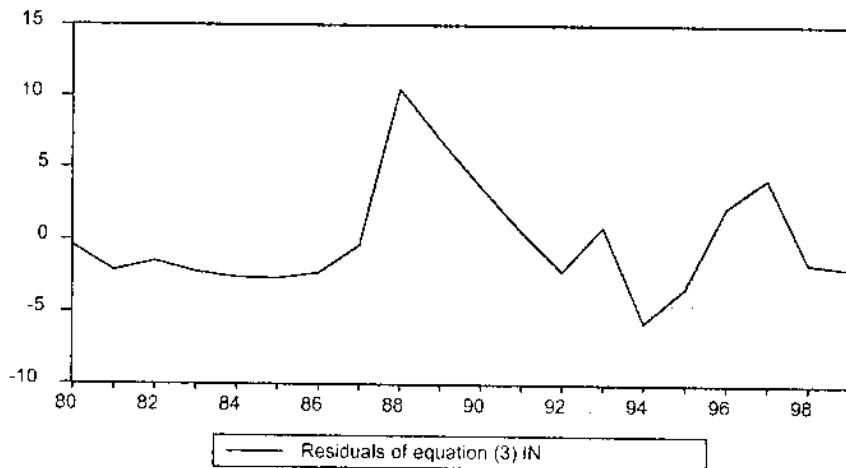
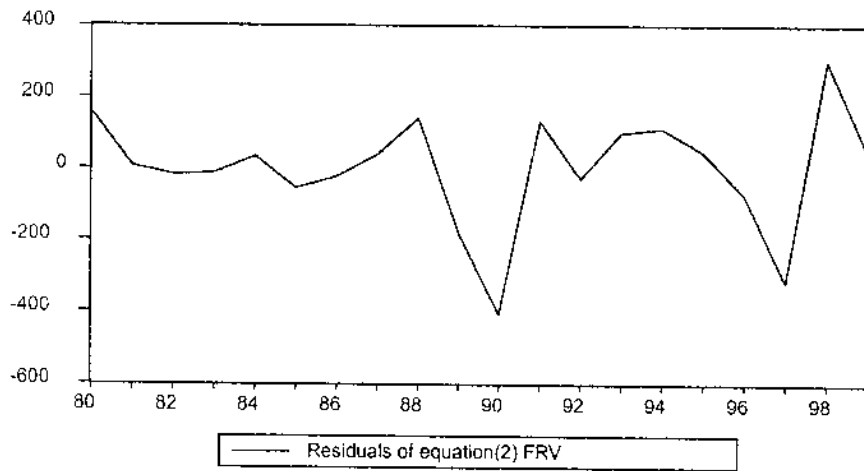
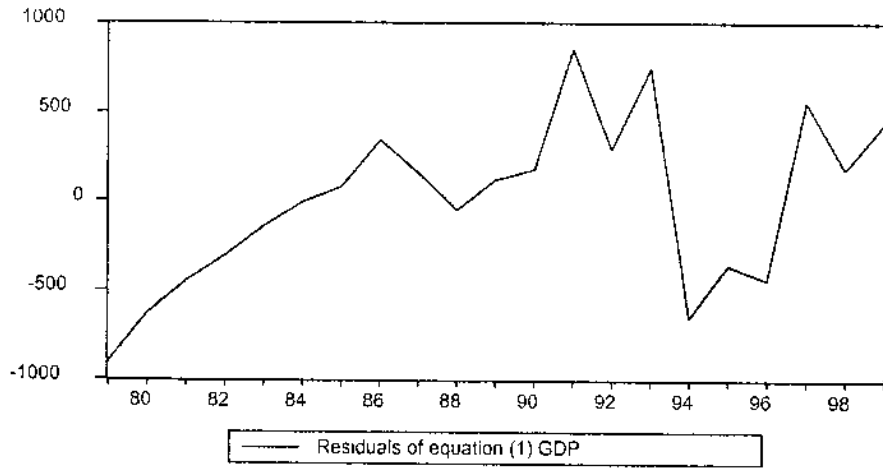
*Appendix 1: Variable levels and first differences*  
First Difference level







### Appendix2: The Residuals tests (Graphics)



Residuals tests (Graphics)

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