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The Relative Importance of Monetary and Fiscal Policies in Economic Activity: A Comparison between Jordan and Tunisia by Using an Error Correction Mechanism (ECM)

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ABSTRACT

The purpose of this paper is to investigate the relative importance of monetary and fiscal policies for Jordan and Tunisia. Unlike previous studies, a vector error correction model is applied on St. Louis-type reduced form equation. Analysis of the unit roots tests, Johansen cointegration test, and the Granger causality results based on the joint F-tests are utilized. The analysis is undertaken with annual data spanning over thirty three years in logarithms form from 1972 until 2004. It turns out, in general, that fiscal policy has stronger effect than monetary policy has on economic activity, whence fiscal policy can be utilized as a stabilization policy in both countries.

Keywords: Monetary Policy, Fiscal Policy, Jordanian Economy, Tunisian Economy, Error-Correction Mechanism.

1. INTRODUCTION

Most of the developing countries suffer from economic distortions, such as huge deficits in their balances of payments and public budgets, high employment and inflation rates, and external debt. The theoretical developments have enlarged the number of independent forces that are regarded as causing economic distortions (Malawi, 2005). Fiscal and monetary policies can be utilized as tools for economic stabilization. Money policy affects real and nominal variables in the short run through a number of channels- together referred to as the transmission mechanism of monetary policy. In the long run, monetary policy can only control nominal variables such as inflation and the exchange rate, and this policy cannot increase the average level or the growth rate of real variables such as real GDP and employment (Svensson, 2002). Fiscal policy actions appear capable of responding in a countercyclical manner to fluctuations in output and its components. The fiscal policy actions may take many forms such as legislation, announcements, and inferences based on previous actions. This implies that fiscal policy can be active and responsive to economic conditions. The direct effects of fiscal policy on consumption, investment, and government spending as well as the overall effects on output, suggest that this policy can have a large, rapid impact on economic activity (Auerbach, 2005). Each policy has its own supporters.

Central banks have the responsibility for monetary management, while the government units are involved in fiscal actions. The most effective policy for eliminating these distortions is not obvious. Most countries confusedly count on monetary policy, fiscal policy, or a mix of both policies (Malawi, 2005).

Over the last twenty years, Jordan has experienced some, if not all, of the mentioned distortions. So, Jordan sought the help of the International Monetary Fund (IMF) in order to attain economic stabilization and solve its economic problems, but it seems that the IMF's recipe does not have the appropriate ingredients to overcome such chronic problems (Malawi, 2005).

Over the period of this study (1972-2004), the Jordanian national income grew at an average rate of (4.9%) per annum in real terms, with an accumulative external public debt for about (7) billion Dollars, unemployment rates hover around (15%), annual inflation rate at an average of (7.4%). For a small open economy, like the Jordanian one, that is vulnerable to external

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shocks, it is not easy to select the appropriate policy in order to reduce the severity degree of its economic problems. Therefore, some empirical research concerning the relative efficacy of different economic policies might be helpful; hence this study acquires its importance. So the main purpose of this paper is to investigate the effects of both policies, monetary and fiscal, for Jordan over the period (1972-2004) by utilizing some time series techniques. For the purpose of comparison, the researcher has chosen Tunisia, as a small open economy, which is similar in its economic characteristics to the Jordanian ones; both of them are open economies, their per capita incomes are quite similar (in year 2004, per capita income for Jordan was $2140, and for Tunisia was $2630). Also in year 2004, both countries had exactly the same human development index (HDI= 0.76). The same tests that have been done for Jordan are implemented for Tunisia over the same period (1972-2004).

The rest of the paper is organized as follows. Section II is concerned with some economic literature that related to monetary and fiscal policies. Section III describes the model. Section IV discusses the results of unit root tests, Johansen cointegration test, and the error correction estimates for both countries; Jordan and Tunisia. Finally, section V concludes.

2. ECONOMIC LITERATURE

The relative importance of monetary and fiscal policies has been one of the most debated issues in economics. Monetarists and Keynesians have different points of view regarding the relative importance of both policies. The Monetarists claim that money supply is exogenous and money demand is interest-inelastic, therefore, the monetary policy is a very powerful tool for affecting the real sector (i.e. GNP) preferring an expansion in the growth rate of money (Quraan, 1998). In contrast, Keynesians, who believe the opposite, prefer fiscal measures such as tax cut or an increase in government expenditures to expand the economy (Thomas, 1997). The point of Keynesians' view is based on the idea that money supply is an endogenous variable and money demand is interest-elastic, so fiscal policy is the only effective weapon for affecting the real sector (Quraan, 1998).

The IS-LM model has been used in different studies to examine how the output effects of given changes in money supply and government spending (or taxes) depend on the model's parameters and on the slopes of the IS (Investment-Saving) and LM (Liquidity Preference-Money Supply) curves. In theses studies, one often finds the following "slope rules": (1) monetary policy is more effective the flatter the IS curve, (2) fiscal policy is more effective the flatter the LM curve, (3) monetary policy is more effective the steeper the LM curve, and (4) fiscal policy is more effective the steeper the IS curve (Findlay, 1999). This implies that the slopes of the IS and LM curves can determine the extent of output responsiveness to fiscal policy or monetary policy.

Paul Samuelson (Skousen, 1996), had ever convinced for the efficacy of deficit spending and the importance of monetary policy for about fifty years, but in his latest writings, admitting defeat for his long-cherished belief that fiscal policy is an effective countercyclical tool. The results of empirical studies in developed countries support the monetarists' point of view (for example: Arestis and Sawyer, 2000, Bruneau and De Bandt, 2003). On the other hand, the situation in developing countries is different. In some of these monetary policy dominates fiscal policy, but in most of them fiscal policy dominates monetary policy. The contrary conclusions for developing economies might be a result of two reasons; firstly, the lack of accurate monthly, quarterly or even yearly data. Secondly, the existence of imperfect or under-developed financial markets in developing economies comparing to the developed ones, where the existence of perfect financial markets is necessary to successful monetary policy (for example: Ansari, 1996, Ubogu, 1985, Al-Refai and Al-Wazani, 1997, Shotar and Barghothi, 2000). This paper explores these differing viewpoints.

To the knowledge of the researcher, several studies have discussed the relative importance of monetary and fiscal policies about Jordan. Anani (1975), in his study, has found that the response of economic activity to fiscal action is larger than to monetary policy. Naser (1991) has reached to the conclusion that the impact of monetary policy is larger than that of fiscal policy on the real GNP. Awad (1995) concluded that monetary policy is more effective than fiscal policy for affecting the Jordanian economic activity. Al-Refai and Al-Wazani (1997) have found that fiscal policy is more effective than monetary policy for affecting the Jordanian economy. Quraan's findings (1998) have concluded that monetary policy is relatively more effective and faster than fiscal policy in its impact on GNP. Malawi and Dayyat (2004), in their study have found that monetary policy is more effective

than fiscal policy for affecting economic activity. Unfortunately, the researcher could not find any previous work (in Arabic or English) about this topic for Tunisia.

The findings of the available empirical research about Jordan have reached to mixed results regarding which macroeconomic policy; fiscal or monetary, is more effective. The contradicted findings may be due to two reasons. First reason, all of them used different econometric techniques. And second reason, all of them have covered different periods of time. Unfortunately, none of the above studies has used an error correction model as an econometric technique to test the relative importance of monetary and fiscal policies for the Jordanian economy. This kind of models can capture both; the short run and long run effects in the same equation, which differentiates this study over the previous ones. Using the error correction model in this study is justified by the results of enough diagnostic tests for data.

3. MODEL

The St. Louis equation was developed in 1968 by Anderson and Jordan. This equation is an estimated relationship (using the Almon procedure) between changes in GNP and changes in the money supply and high-employment Federal expenditures. The focus of the Anderson-Jordan article was the relative impact of monetary and fiscal actions (Carlson, 1978). Statistical constraints are imposed upon the equation for the purpose of estimation. These constraints include: 1) the independent variables has the same lag length, 2) the distributed lag weights are estimated by a fourth degree polynomial by the Almon technique with both endpoints constrained to zero. The estimation results show that only money matters (Koot, 1977).

When the statistical constraints were removed by Schmidt and Waud (1973), the estimation results of the St. Louis equation have shown that both fiscal and monetary policies matter.

Lombra and Torto (1974) find that, if the monetary variable is adjusted to account for "reverse-causation", the estimation results of the St. Louis equation show that both monetary and fiscal policies still matter. In spite of these criticisms, the St. Louis equation continues to be used in its original form (Koot, 1977 and Carison, 1975).

Following the Saint Louis equation model and the other common practice for gauging the relative impact of monetary and fiscal policies, the most frequently used measures of economic activity, monetary actions and fiscal actions are selected. The real gross domestic product (Y) is used in this paper as the measure of economic activity. The monetary variable is represented by (M1); the narrow definition of money supply, for two reasons; first: the Monetarists and Keynesians consider M1 as a strategic money variable (Anderson and Jordan, 1968, Quraan, 1998), and second: by following previous work (Naser, 1991, Al-Refai and Al-Wazani, 1997, and Malawi and Dayyat, 2004). And the influence of fiscal actions on economic activity is measured by the government spending (G); which has been used in previous studies (See Anderson and Jordan, 1968; Awad, 1995, Al-Refai and Al-Wazani, 1997; Quraan, 1998, and Malawi and Dayyat, 2004). Then, the output level to be estimated has the following log-linear form:

$$y_t = \alpha_0 + \alpha_1 m1_t + \alpha_2 g_t + \varepsilon \qquad (1)$$

where α_0 is a constant, y is ln(Y), m1 is ln(M1), g is ln(G), and ε is a random error term.

According to Engle and Granger (1987), to implement an error correction model on the variables in equation (1), it is important to guarantee that these variables have the same order of integration (higher than zero) and are cointegrated. Cointegration enables variables in the system to be used in an error correction model (ECM) (Huang, 1994).

The data of this study have been taken from the publications of the Central Bank of Jordan and the International Monetary Fund.

4. EMPIRICAL RESULTS

Without imposing any specific econometric model on the data, the empirical part of this study starts by subjecting the data to some diagnostic tests; such as unit root test and Johansen cointegration test. The main purpose of implementing these tests is to let the data express themselves, and to search for the model that best fits the data set.

The empirical results reported in this paper for Jordan and Tunisia are based on annual observations for the (1972-2004) period. All the data are expressed in logarithms (lowercase letters denote logarithms of the variables). These results are:

First) For Jordan:

The three variables of equation (1) and their first

differences were subjected to the Augmented Dickey-Fuller (ADF) tests for unit roots. The integration results reported in table (1) along with their 5 percent significance levels. It is very clear that all the variables are integrated of order 1, i.e. I(1), which implies that their levels are nonstationary, while their first differences are stationary.

Since the variables are all I(1), they may also be cointegrated if there exists one or more linear combinations among them which is stationary. If these variables are cointegrated, then there is a stable long-run equilibrium linear relationship among them. The Johansen (1988) maximum likelihood method can be utilized to check if these variables are cointegrated. The results of the Johansen cointegration test are shown in table (2).

The results of the likelihood ratio indicate that there exists one cointegrating equation at 5% significance level. This cointegrating vector, normalized on y, is: [y, m1, g] = [-1.000, 1.4189, -1.9381]. The results of both the unit root test and cointegration test indicate that there is some long-run relationship between the variables in the system, which allow us to utilize an error correction model (ECM). There is a very close relationship between cointegration and error correction models. Engle and Granger (1987) defined error correction as "a proportion of the disequilibrium from one period that is corrected in the next period". An error correction model relates the change in one variable to past equilibrium errors. In fact, error correction models provide a way of combining both the dynamics of the short-run (changes) and long-run (levels) adjustment processes simultaneously (Lim and Mcaleer, 2001). The ECM estimates are given in table (3).

Table 1. Results of ADF unit root tests

Variables	Lags	D-W	Calculated ADF value	5% Critical value
Y	1	2.34	- 1.31	- 2.956
M1	1	2.21	- 1.96	- 2.956
G	1	1.98	- 1.89	- 2.956
Δy	1	1.92	- 3.28	- 2.959
Δm1	1	1.92	- 3.31	- 2.959
Δg	1	2.11	- 4.71	- 2.959

Notes: Lags stands for the number of lagged first differences of the variable used in the ADF equation to get white noise residuals. D-W is the Durbin-Watson values for the residuals in the ADF equation. All the variables on log forms. The Akaike Information Criterion (AIC) and the Schwarts Bayesian Criterion (SBC) yield smaller values for the first lag length.

Table 2. Johansen Cointegration test

Eigenvalue	Likelihood Ratio	5% critical value	1% critical value	Number of cointegrating equations
0.4723	33.836	29.68	35.65	None
0.2742	13.447	15.41	20.04	At most 1
0.0939	3.263	3.76	6.65	At most 2

Table 3. Error Correction Estimates for Jordan (1972-2004) Dependent Variable Δy

Independent Variable	Estimated Coefficient	Std. Error	t- statistic	Probability
Constant	0.0597	0.0130	4.5923	0.0001
Δm1	0.2992	0.1455	2.0563	0.0487
Δg	0.4977	0.1268	3.9251	0.0005
ECM_{t-1}	- 0.1624	0.0913	- 1.7787	0.0856

R^2 = 0.5542, Adjusted R^2 = 0.5542, D-w= 1.7670, S.E. of regression= 0.0475, F-statistic= 12.001, Prob(F-statistic) = 0.00003

The results indicate that fiscal policy dominates monetary policy in the Jordanian economy. The coefficient of the growth rate of government expenditures (0.4977) is almost twice as the coefficient of the growth rate of money supply (0.2992) and both of them are positive and statistically significant. The growth rate in

this context is defined to be the first difference of the logarithm; in other words, the growth rate of variable x equals log(x)-log(x(1)), where x(1) is the first lag of x). Even that the results of this study are in line with the results of Friedman (1977), Anani (1975), and Al-Refai and Al-Wazani (1997), these results are not consistent with the results of other studies (Malawi and Dayyat, 2004, Quraan, 1998, Naser, 1991, Awad, 1995, and Anderson and Jordan, 1968). The coefficient of the ECM term shows that the system corrects its last period disequilibrium (the speed of adjustment to restore equilibrium in the dynamic model) by 16% a year, but it is not highly statistically significant. R^2 is not high enough since differencing may result in a loss of information about the long-run relationship among variables (Pindyck and Rubinfeld, 1991). The Jarque-Bera (JB) test for normality of residuals was performed; the JB value of (0.902353) with probability (0.636882) indicates that we can't reject the normality assumption of the OLS residuals. The ARCH LM test for autocorrelation in the error variance was conducted and showed that χ^2_5 = 8.593371 with p-value (0.126432), which suggests that the error variance is serially uncorrelated; i.e. the residuals don't contain significant ARCH effects. The results of other tests, such as CUSUM statistic and CUSUM of Squares (CUSUMQ statistic), gave impressive results, where the residuals inside plus and minus two standard errors bands suggest stability in the parameters of the equation, which implies that we accept the null hypothesis of constant parameters. Stability, in this context, means that the behavior of the data set does not show any structural break or change over time, which ensures parameter constancy. Also the results of the Ramsey RESET test (regression specification error test) for functional form misspecification, showed that the computed F is (2.3587721), which is insignificant at 5% level, and that implies that we cannot accept the hypothesis that the model is misspecified.

To support the choice of the policy variables in the St. Louis equation model, pairwise Granger Causality test was implemented for both independent variables, and it is found that both variables Granger-cause the output level in Jordan, the results are reported in table (4).

The results show that each of both independent variables, the money supply (m1) and government expenditures (g), with levels and log forms, Granger-causes the output level (y). Replacing the narrow definition of money supply (M1) by the broad definition (M2) did not change the results too much.

Second) For Tunisia:

The unit root test has found that all of the variables with logarithms; y, m1, and g are nonstationary in levels, but all of them are found to be I(2), where the computed ADF values for the second differences were found to be (-5.47), (-5.37), and (-4.63); respectively. Also, the Likelihood ratio in the Johansen Cointegration test indicates that all the variables are cointegrated, and there is one cointegrating equation at 5% significance level. Thus the error correction model could be applied. The results of the error correction estimation are reported in table (5).

Table 4. Granger Causality test for Jordan (1972-2004)

Null Hypothesis: H_0	F-statistic	Probability	Decision
m1 does not Granger cause y	14.1253	0.00073	Reject H_0
Log(m1) does not Granger cause log(y)	4.82545	0.03592	Reject H_0
g does not Granger cause y	6.04697	0.01992	Reject H_0
Log(g) does not Granger cause log(y)	3.50799	0.07084	Reject H_0

Table 5. Error Correction Estimates for Tunisia (1972-2004) Dependent Variable Δy

Independent Variable	Estimated Coefficient	Std. Error	t- statistic	Probability
Constant	0.0481	0.0137	3.5197	0.0015
Δm1	0.2836	0.1337	2.1206	0.0429
Δg	0.2829	0.0952	3.0399	0.0051
ECM_{t-1}	- 0.0001	0.0001	- 1.2028	0.2391

R^2 = 0.5315, Adjusted R^2 = 0.4813, D-w= 2.5493, S.E. of regression= 0.03624, F-statistic= 10.58653, Prob(F-statistic) = 0.000080

It is very surprising to notice that none of the two policies for Tunisia dominates the other, where the coefficients of the monetary and fiscal variables are almost the same and highly significant, but the significance level of the fiscal variable is higher than for the monetary variable. On the other hand, the coefficient of the error term is not significant.

The results of the Granger Causality test for Tunisia are reported in table (6).

Table 6. Granger Causality test for Tunisia (1972-2004)

Null Hypothesis: H_0	**F-statistic**	**Probability**	**Decision**
m1 does not Granger cause (y)	2.0818	0.14501	Accept H_0
Log(m1) does not Granger cause log(y)	0.5076	0.60780	Accept H_0
g does not Granger cause (y)	3.39359	0.04903	Reject H_0
Log(g) does not Granger cause log(y)	0.98062	0.38852	Accept H_0

These results show that only the fiscal policy Granger causes the output level in Tunisia. It seems that this result support the Jordanian case, where it is found that the fiscal policy dominates the monetary policy in its impact on the Jordanian economic activity.

5. CONCLUSION

The analysis addresses the output effects of monetary and fiscal policies using time series techniques, in particular; unit root tests, Johansen cointegration test, and an error correction model for two countries; Jordan and Tunisia. The findings of the study are that fiscal policy proxied by government expenditures has much stronger effects on output than monetary policy. This implies that over the foreseeable future stabilization policy could be carried out by fiscal policy in both countries. It seems that, fiscal policies might be more effective in developing countries comparing to developed ones in affecting economic activity. These results may be due to the fact that developing economies usually operate with under-developed financial markets, and that the importance of Centrals banks in these countries is confined to finance government deficits. It can be also concluded that a particular economic treatment should not be generalized for developing and developed countries, or even for developing countries themselves.

It is worthy to mention that if the same economic circumstances stay the same in both countries, and in light of the results of this study, these two countries should focus on fiscal policy to enhance their economic activity.

Finally, the results and recommendations presented above should be interpreted with some caution for several reasons. First, the expansion in the government expenditures, as a fiscal policy, may increase the extent of some other economic problems such as external debt and budget deficit. Second, the effects of monetary policy are usually rapid compared with the effects of fiscal policy since monetary policy doesn't need legislative procedures as fiscal policy does. Third, these results do not question the importance of monetary actions; such actions do have economic impact over certain periods. Fourth, there are some other policies, such as trade policies, might have effects on economic activity, but for simplicity the researcher ignored them. And fifth, the results of this study, as an econometric study, may not be conclusive since there are some other social variables must be taken into consideration, and there is a need for further deep research about this topic.

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الأهمية النسبية للسياسة النقدية والسياسة المالية في النشاط الاقتصادي: مقارنة بين الأردن وتونس باستخدام نموذج تصحيح الخطأ

*أحمد إبراهيم ملاوي**

ملخـص

تهدف هذه الدراسة بشكل أساسي إلى استقصاء الأهمية النسبية لكل من السياستين النقدية والمالية في كل من الأردن وتونس. حيث تم تطبيق نموذج تصحيح الخطأ على معادلة سانت لويس بالشكل المختزل، كما تم استخدام الاختبارات التالية: اختبار جذر الوحدة للاستقرارية، اختبار جوها نسن للتكامل المشترك، واختبار جرينجر للسببية على بيانات سنوية تغطي الفترة (1972-2004). وتوصلت نتائج الدراسة، بشكل عام، إلى أن السياسة المالية لها تأثير أكبر من السياسة النقدية على النشاط الاقتصادي، ولذلك يمكن لكل من الحكومة الأردنية والحكومة التونسية الاستفادة من السياسة المالية كسياسة اقتصادية فعالة للمحافظة على استقرار الاقتصاد.

الكلمـات الدالـة: السياسة النقدية، السياسة المالية، الاقتصاد الأردني، الاقتصاد التونسي، نموذج تصحيح الخطأ.

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