Effects of Macroeconomic Shocks on the Jordanian Banking System

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Abstract: This research is an investigation into the effects of macroeconomic shocks on the Jordanian banking system. It uses the Vector Error Correction Mechanism (*VECM*) on quarterly data for the period 1997-2012. Major findings of this study are: (a) shocks of real GDP (*RGDP*) positively impact the performance of the banking system (b) there is little effect from other macroeconomic shocks like, shocks related to the Consumer Price Index (*CPI*) and Terms of Trade (*TOT*).

INTRODUCTION

Macroeconomic factors can affect the performance of banking system. A number of empirical and theoretical researches have questioned the effects of such shocks on the banking industry. Lehmann and Manz (2006) studied the impact of such macroeconomic shocks on the banking system and learned that recessions and reductions in stock prices take the banking industry into losses. Somoye *et al*. (2009) found that there is a long-run equilibrium relationship between microeconomic stability and bank lending. However, when Blank and Dovern (2009) examined the impacts of real estate price shocks, monetary policy and fiscal policy on the banking system, their research revealed that there is a strong impact of such shocks on the probability of banks. Results found by Dovern *et al*. (2008) were similar. According to the researchers, losses on loans result when the banking system is exposed to macroeconomic shocks of an adverse nature.

Jordan has experienced numerous political, fiscal, monetary and demographic shocks. This raises the question of whether these shocks affected the performance of the banking sector. This research will review the cumulative effects of macroeconomic shocks on the banking system through an evaluation of changes in the banking system and changes that impacted the entire economy. This study also investigates the effects of macroeconomic shocks on the banking sector using Total Reserves (*RS*) as an indicator for the banking system; and Consumer Price Index (*CPI*), Real Gross Domestic Product (*RGDP*) and Terms of Trade (*TOT*) as indicators for the macroeconomic real sector. An econometric method will be employed to examine the effects. This shall be accomplished for the quarterly period 1997 – 2012.

The remainder of this research is organized as follows: section (b) represents theoretical analysis, section (c) demonstrates empirical work, and finally section (d) presents the conclusions.

Theoretical Analysis:

It is important to note that the banking system in Jordan has experienced increasing growth through the past three decades. This growth is manifested by the operation of 26 Islamic and commercial banks by 2011, with total assets of more than JOD37.6 billion, representing 184% of Jordan *GDP*. Moreover, it is noted that by the end of 2011, the amount deposited in these banks totaled to about JOD24.3 billion, or 119% of Jordan *GDP* (The Central Bank of Jordan report, 2012).

Jordan economy is classified as a developing economy characterized by being open to the outside market- which makes it vulnerable to economical and political changes and upheavals at local and regional levels. During the 1970s and the early part of 1980s, Jordan was said to have had exceptional economic growth patterns enhanced by grants and loans from abroad. The decline in oil prices in the early 1980s instigated a major economic bust in the region. Toward the end of 1989, Jordan's external debt was as high as US$7.1 billion, compelling the country to implement its first structural adjustment program in order to revive the economy. Economic performance was disturbed by the Gulf war. Jordan was forced to lose a major trading partner, Iraq, and there was an influx of hundreds of thousands of Jordanians who had been deported from the Gulf. There was a huge reduction in foreign workers' remittances at the same time.

Jordan managed to overcome the regional crises caused by the Gulf war. Once again, the outcome was positive, as an extraordinary real economic growth rate of 14.2% was seen in 1992, mainly prompted by the growth in consumption and household demand, but also by construction activity subsequent to the return of Jordanians from the Gulf area. This injected around US$1.4 billion at least into the real-estate sector (The Central Bank of Jordan, report, 2003). The economy started to grow again until 1995, and then decreased in

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1996. The high unemployment rate and the conclusion of the post war construction boom were chiefly responsible for the economic slowdown. In 1996, the U.S. Congress approved Qualifying Industrial Zones (QIZ) to support the peace process. QIZ goods, which enter the United States tariff- and quota-free, have also driven economic growth.

From 2000 to 2003, GDP growth maintained a stable low growth rate. Between the years 2004- 2008, GDP grew at an impressive growth rate with an average of 8.3% (Central Bank of Jordan, 2008). There was a continuous inflow of foreign direct investment, which came after the second Gulf war in 2003. In 2008, GDP grew by 7.8% which was attributed to the sharp increase in international oil prices. In 2009, in spite of the world financial crisis, the GDP continued to grow but at a slow rate.

Figure (1) shows the increasing trend of *RGDP* of Jordan from 1980 till 2011 (Central Bank of Jordan, 2003 and 2012).
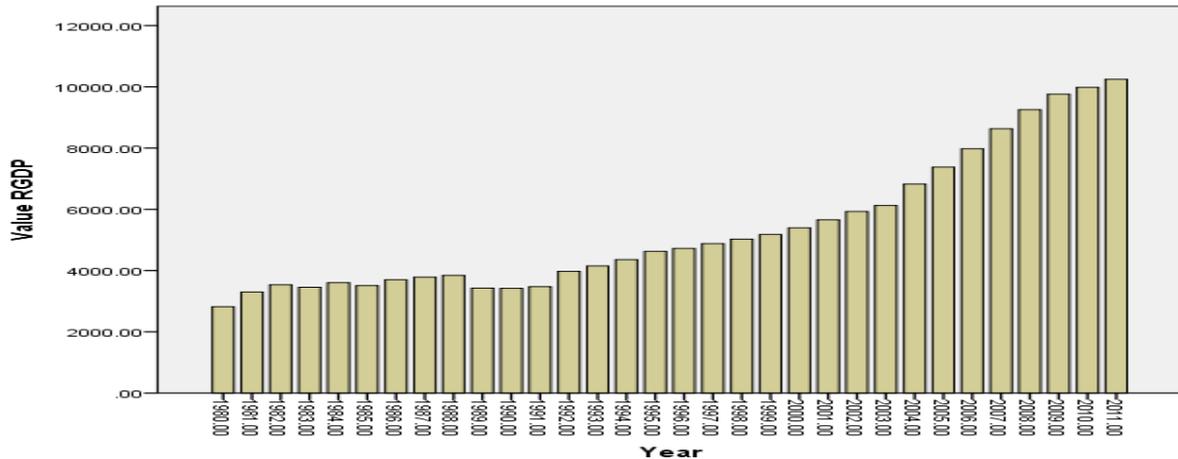

Fig. 1: Real Gross Domestic Product (1980-2011).

C. Empirical Work:

In this study several econometric tests will be used: the Augmented Dickey Fuller (ADF) to test the time series stationary, Johanson Cointegration to test whether a long-run relationship between the variables exists, and Granger Causality to investigate the causal relation between the variables. If the results obtained through the aforementioned tests show the need of using Vector Error Correction Mechanism (*VECM*) to investigate the effects of macroeconomic shocks on the Jordanian banking system, the researchers will perform this test.

To identify the stationary of the data, *ADF* test is used; the results show that the variables are stationary at the first difference. Table (1) reports *ADF* results.

Table 1: Augmented Dickey Fuller Test Results.

	RS Statistics**	CPI Statistics**	RGDP Statistics**	TOT Statistics**
Level	-1.018	1.827	-0.57	-2.29
First Difference	-12.18	-5.013	-7.68	-6.54

*Critical value at 5% level of significance is -2.92
** Intercept with no trend.

In order to test for cointegration, the Johnson Cointegration test is used. The trace and max-egenvalue statistics indicate that at least there is one cointegration vector existing at 5% level of significance. The results are reported in table (2).

Table 2: Johanson Cointegration Test Results.

Hypothesized No. of (Ecs)	Egenvalue	Trace statistic	0.05 critical value	Prob.	max-Egen statistics	0.05critical value	Prob.
None	0.42277	55.326	47.8561	0.008	33.521	27.58434	0.007
At most 1	0.17892	21.805	29.7970	0.309	12.025	21.13162	0.545
At most 2	0.12712	9.7798	15.4947	0.298	8.2934	14.26460	0.349

The results of the casualty test, reported in table (3), indicate that the relationship between *CPI* and *RS* is unidirectional casualty and goes from *CPI* to *RS*, that is, *CPI* does cause *RS* but *RS* does not cause *CPI*. Also the granger casualty test shows that the relationship between *RGDP* and *RS* is a bi-direction relationship, that is, *RGDP* does cause RS, however RS also causes *RGDP*. Finally the results of the test indicate that there is no causality relationship between *TOT* and RS.

Table 3: Granger Causality Test Results.

Null Hypothesis			F-Statistic	Probability	Result
CPI	causes	RS	3.88316	0.0263	Accept
RS	causes	CPI	1.17590	0.3160	Reject
RGDP	causes	RS	7.95416	0.0009	Accept
RS	causes	RGDP	4.49257	0.0155	Accept
TOT	causes	RS	1.86907	0.1638	Reject
RS	causes	TOT	0.40791	0.6670	Reject

In the light of the results of the previous three tests, the Vector Error Correction Mechanism (VECM) is the convenient statistic analysis that could be used in this case (Gujarati, 2009). Estimating the VECM indicates that the adjustment coefficient on cointegration equation 1 for RS is positive and equals 4.66%, the results of VECM reported in table (4).

Table 4: Vector Error Correction Model Results.

Co integrating Eq.	CointEq1	Error Correction:	D(RS)	D(CPI)	D(RGDP)	D(TOT)
RS(-1)	1					
CPI(-1)	-68.94	CointEq1	0.046 (0.09)	0.0033 (0.001)	0.0359 (0.03)	-0.0001 (0.047)
RGDP(-1)	1.975					
TOT(-1)	530.46					

Variance decomposition is a method used to characterize the dynamic behavior of the model. This breaks down the variance of the forecast error for each variable into components that can be attributed to each of the endogenous variables (Dehkordi *et al.,* 2012, and Sendeniz–Yuncu *et al.*, 2006). The results reveal that RS is highly related to the variable itself instead of the other variables. For 10 years forecast, the authors find that 86.3% of the forecast variance will be attributed to RS shocks, 2.2% to *CPI* shocks, 9.8% to *RGDP* shocks and 1.7% to *TOT* shocks. Table (5) reports variance deposition results.

Table 5: Variance Decomposition Results.

Period	S.E	RS	CPI	RGDP	TOT
1	118	100	0	0	0
2	141.3	94.8	0.6	3.9	0.5
3	182.7	92.2	2.7	4.6	0.4
4	199.3	90.3	4.5	4.6	0.4
5	228.7	90.4	4.9	4.2	0.4
6	255.9	88.8	4.2	6.3	0.5
7	289.7	87.9	3.4	7.8	0.6
8	317.6	87.7	2.9	8.2	0.9
9	349.9	87.5	2.5	8.5	1.3
10	382.4	86.3	2.2	9.8	1.7

The Impulse Response Function (*IRF*) traces out the response of one variable in the system to shocks in the error term. One shock of the standard deviation of the variable may affect the other variables positively, negatively, or may have both effects during the period. The IRF traces the response of endogenous variable over time to a shock in that variable, and in every other endogenous variable in the system. The results of *IRF*, as they appear in Table (6), show that one standard deviation innovation in *CPI*, *RGDP* and *TOT* affects *RS* positively for all periods. Table (6) reports Impulse Response Function results.

Table 6: Impulse Response Function Results.

Period	RS	CPI	RGDP	TOT
1	118.0	0	0	0
2	70.6	11.3	27.9	10.8
3	108.8	27.8	27.8	4.3
4	71.5	29.8	17.05	7.1
5	106.7	27.8	19.5	5.5
6	104.3	15.4	43.7	10.8
7	125.2	10.8	49.7	14.1
8	120.9	8.9	41.7	21.4
9	136.7	11.3	45.5	25.2
10	138	11.2	62.5	27.5

D. Conclusion:

This paper has attempted to identify the effects of macroeconomics shocks on the banking system in Jordan, using quarterly data for the period 1997-2012. The unit root, cointegration and the causality tests, applied to the study data, mandated using the error correction model.

These results confirm that the banking system is affected by macroeconomic shocks, and the authors note that the real *GDP* specifically exerts shocks of the highest effect on banking system, despite the fact that the causative relation between the two variables is positive, which theoretically is contradictory to the assumed relationship between variables. Example on the aforementioned is that the monetary reserves should increase when the economy experiences a shock that results in lowering of the real *GDP*, because of fears and decreased confidence in economic activities. But this is not seen in the Jordanian example of economic shocks because the reserves are increasing, and the decision of their increase is not tied to the economic state, but rather it is tied to banking policies that are followed by the Jordanian banking system, that in turn exaggerate with caution, even at times of prosperity and growth.

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