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Abstract:

There is a growing literature on how macroeconomic variables can have effects on equity returns in both developed and emerging stock markets. We test for the long run relationship between some key macroeconomic indicators and equity returns in Jordan. Using both GETS methodology and the ARDL approach to cointegration, we find that the trade surplus, foreign exchange reserves, the money supply and oil prices are important macroeconomic variables which have long run effects on the Jordanian stock market. The results are broadly consistent with similar studies carried out for other emerging economies.

Keywords: Macroeconomic Factors, Equity Returns, Cointegration, Emerging Market, Jordan.

JEL Classification: E1, G1.

1. Introduction

A number of studies have investigated the link between stock market returns and the state of the economy. Several economic variables are found to be associated with the business cycles which may affect the risk\return of stock markets (Gangemi *et al.*, 2000). Chen *et al.* (1986) studied the impact of economic forces on stock returns using the Arbitrage Pricing Theory (APT). They find variables such as interest rates, inflation rates, bond yield spreads, and industrial production being included in stock values and hence conclude that these economic forces have major impacts on the stock market. Similar studies were carried out by Hamao, (1989), Kaneko (1995), Burmeister and McElroy (1988), and Mesiss (2006) amongst others, for both developed and emerging markets. In this paper we study the role of economic forces in the emerging stock market of Jordan taking into account of the price oil which has been left out in previous studies. Although the price of oil is an exogenous factor for a country like Jordan which is a major oil importer, there are two reasons for us to include it in the model. First, Jordan is an emerging economy heavily dependent on subsidized oil supply from neighboring country Iraq. The supply of cheap oil terminated after the war broke out in Iraq in 2003 which, we believe, led to structural changes in the overall economy as well as in the equity market in Jordan. Secondly, we believe oil price serves as a good proxy for real economic activity on the goods market as it can affect production not only in the industrial sector but as well as in the manufacturing and in agricultural sector.

The links between the stock returns and macroeconomic innovations (or 'surprises') have been investigated in the short-run (Chen at al., 1986; Abell and Krueger, 1989; Bekaert and Harvey, 1997; Anderson *et al.*, 2005) and also in the long-run using the cointegration technique (Mukherjee and Naka, 1995; Groenewald and Fraser 1997; Mookerjee and Yu, 1997; Maysami and Koh, 2000; Cheung and Ng, 1998; Gjerde and Saettem, 1999; Dickinson, 2000). Furthermore, other studies have attributed the predictable variation in the stock returns to the underlying economic fundamentals of the financial and industrial assets (Hassan *et al.*, 2003; Yao, *et al.* 2005; Johnson and Sakolis, 2008). Also, there are studies which have documented the co-movement between stock prices and economic fundamentals (McMillan, 2005; Verma and Soydemir, 2006; Cheung and Ng, 1998; Andrade and Teles, 2006 Andrade and Teles, 2008).

Factors that affect the equity markets are very important for investors. Although previous studies have documented significant predictive power of economic fundamentals, for both developed and emerging equity markets, the results are sensitive to the choice of models, the choice of selected variables in the regression, and how the macroeconomic variables are capable of significantly affecting equity returns (Gangemi *et al.*, 2000; Panetta, 2002; Hooker, 2004; Andrade and Teles, 2006; Aguitar and Broner, 2006). Therefore, the analysis and assessment on how market returns are exposed to the changes in economic conditions are considered as one of the major challenges facing both investors and finance academics in both emerging and developed markets. Jordan is an emerging market, and to the best of our knowledge no study so far has been carried out to understand the effects of macroeconomic variables on equity returns on the Jordanian stock market.

In this paper, we present an empirical model to fill this gap. The way we organize the paper is as follows. Section 2 outlines the model and the hypothesized relations between equity returns and macro variables. Section 3 provides the econometric methodology and discusses data, and presents the econometric results. Section 4 concludes the paper.

2. Model Specification and Hypothesised Relations

Based on the earlier empirical studies cited, we hypothesise that there is a relationship between the Jordanian stock market and several macroeconomic variables. We made an attempt to integrate the goods market, money market, and the external sector with the securities market. Our baseline specification to explore the long run and short-run relationship between Jordanian stock market and the macroeconomic variables is as follows:

$$\ln MSCI_t = a_0 + a_1 \ln XIM_t + a_2 \ln RES_t + a_3 \ln M2_t + a_4 \ln OIL_t + a_5 INT_t + \varepsilon_t \quad (1)$$

Where ε_t represents the error term and all variables except INT are in logs. The dependent variable is Stock Market Index; XIM is the quotient of export over import, hence the log of XIM denotes trade surplus; RES is official reserves; M2 is the money supply; OIL is the oil price, and INT is the interest rate on deposits. The explanatory variables are chosen carefully so that they are theoretically a-priori interrelated. The variable MSCI represent the securities market and M2 and INT represent the money market. Money markets can affect the securities market through its effect on the discount rate (Mukherjee and Naka, 1995). The variables XIM and RES represent the external sector and they affect the stock market index through the exchange rate. OIL is included as a measure for the goods sector because it is an essential input for all production sectors and thereby serves as a good proxy for the real economic activity. A high 'OIL' indicates lower economic activity (eg. lower industrial/manufacturing production) and vice versa.

Based on the previous literature the expected signs of the coefficients are as follows:
a) Expected sign of the coefficient a_1 is negative. Mukherjee and Naka (1995) and Wongbangpo and Sharma (2002) have shown that exchange rates have impacts on the domestic stock market – currency depreciation has favourable impacts whereas an appreciation has the opposite consequence. An increase in the trade surplus will lead to an appreciation of the exchange rate making exports from Jordan expensive. Thus the adverse effect in the production of the tradable goods sector will drive down their profitability and asset return;
b) Expected sign for a_2 is negative. Accumulation of foreign exchange reserves is indicative of overall surplus in the country's balance of payments (Dornbusch et al, 2004) which can cause currency appreciation. This is also suggestive of an active role of the central bank to control the flow of currency in the foreign exchange market which may cause an adverse effect on the stock market in the long run. Increases in RES can also lead to increase in money supply and thereby lower stock prices via an increasing discount rate;
c) Expected sign for a_3 could be both positive as well as negative. According to Fama (1981), an increase in money supply may lead to increase in discount rate and lower stock

price because inflation rate is directly proportional to rate of growth of money. On the other hand, a negative effect might emerge if the economic stimulus provided by monetary growth leads to increases in cash flows in the stock market and hence increased stock prices (Mukherjee and Naka, 1995);

d) Expected sign a_4 is negative. Since oil is an essential input for production, the price of oil (OIL) is included as a proxy for real economic activity. In previous studies industrial production is used as a proxy for real economic activity and a positive relation between industrial production and stock prices is suggested. Mayasami and Koh (2000) have suggested that the level of real economic activity (proxied by industrial production and exports) is more likely to be positively related to stock prices through increasing expected future cash flows. Similarly Fama (1990) and Geske and Roll (1983) find a positive relation between industrial production and stock prices. In the present study we propose that since oil is used as an input for production in all sectors including industry, manufacturing and agriculture, the oil price (OIL) serves as a better proxy than industrial production. An increase in the price of oil (OIL) in the international market means lower real economic activity in all sectors, which will cause stock prices to fall. Hence we expect a negative long run relation between 'OIL' and stock prices;

e) Finally, the expected sign for a_5 – the coefficient for INT is inconclusive. In fact our expectation is that the in the long run stock returns and interest rate are independent of each other in Jordan. The reason for this is that Jordan is a Middleastern country where the religious disposition of the majority of the population may incline the investors to be not responsive the changes in the level of interest rate. In such case, the stock market return is independent of interest rates. In normal circumstances, one would expect this relationship to be negative because an increase in interest rate raises the opportunity cost of holding cash and thereby create a substitution effect between stocks and other interest bearing securities.

In Figure 1, where we have inserted the graph of the MSCI, it can be noted that there is an abnormal increase in the stock index starting from mid 2004 continuing till mid 2005. We believe the economy as well as the stock market had undergone a structural change during this time which is just after the war that broke out in Iraq and supply of cheap oil to Jordan terminated. With this information, we checked for breakpoints in the stock index series. Using Zivot-Andrews breakpoint test for the MSCI series to test for a break in the intercept using maximum lags of 12, we found that there is a structural break starting from the 10th month of 2004 (see figure 2). To take account of this structural change, we amended our model specified in equation (1) by including an intercept dummy as follows:

$$\ln MSCI_t = a_0 + a_1 \ln XIM_t + a_2 \ln RES_t + a_3 \ln M2_t + a_4 \ln OIL_t + a_5 INT_t + a_6 DUM_t + \varepsilon_t \qquad (2)$$

where $DUM_t = 1$ for the period of 2004:05 – 2005:04 and $DUM_t = 0$ elsewhere. This dummy is included to capture the sudden increase in the stock market index starting from 2004:05 and ending at 2005:04. We believe, during this period there was a positive shock in the stock market. Therefore, the expected sign of a_6 is positive.

Figure (1): Jordan Stock Index (MSCI)

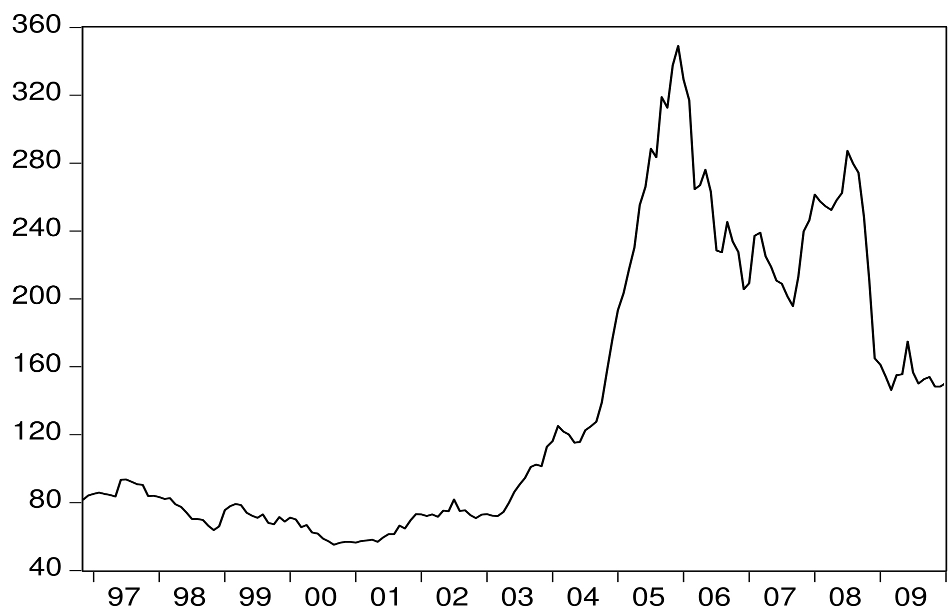
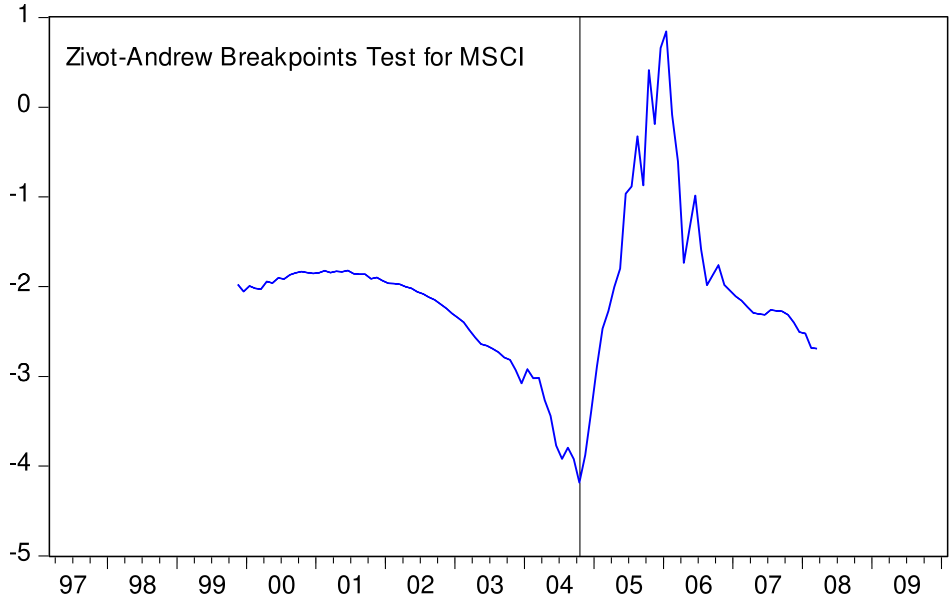


Figure (2): Structural Break in Jordanian Equity Market



3. Estimation Methodology, Data and Econometric Results

Our empirical methodology has two approaches: regression approach and a cointegration approach. In the regression approach we estimate the specification in equation (2) using the "general-to-specific" (GETS) algorithm implemented in PcGets (Hendry and Krolzig, 2001). In the cointegration approach we specify an unrestricted error correction model for equation (2) and estimate the long run coefficients and short run equilibrium adjustments using the ARDL approach to cointegration. We have used monthly data from 1997:03 – 2010:01.

3.1 GETS Results

The GETS approach to econometric modelling involves formulating a 'general' unrestricted model that is congruent with data and then applying a 'testing down' process, eliminating variables with coefficients that are not statistically significant, leading to a 'specific' model that encompasses rival models (Hendry, 1995). PcGets implements the GETS algorithm by minimizing the 'path dependency' bias. Using PcGets we implemented the GETS algorithm for equation (2) by estimating a general unrestricted model (GUM) with 5 lags of each variable in equation (2). An autoregressive term ln$MSCI_{t-1}$ is added to the specification and the variable INT is included by taking its logarithm. Table 1 shows the corresponding specific model and the long run estimates of the model which is selected by the GETS estimation process.

As can be seen from column (1) in Table 1, the estimated coeffecients of the specific model do correspond to their hypothesised signs discussed in section 2. The Jordanian stock index is significantly related to its value in the previous month, as shown by the positive coefficient of $MSCI_{t-1}$. It is important to note that while specifying GUM we did not allow for more than one lag for the MSCI variable. The trade surplus variable has negative estimated coefficients. The second and third lags of the variable XIM are negative and significant. This means the negative effect of surplus builds up in two to three months time. On the other hand, it takes about four months time for the negative of reserves to build up as can be seen from the coefficient of RES which is significantly negative for the fourth lag. The effect of money supply on the Jordanian stock index is positive and this effect has a month lag which can be seen from the coefficient of $M2_{t-1}$. The oil price has a negative effect on the stock market as can be seen from the negative coefficient of OIL_{t-1}. So far all these variables have obtained a correct sign according to our expectations based on the theoretical relationships concerned.

The explanatory variables also retain their correct signs and significances when dynamic analysis is carried out. Their estimated long run coefficients are reported in column (2). XIM, RES and OIL have expected negative signs. M2 also bears the correct positive sign in the long run. The variable DUM has a positive coefficient and is highly significant as well. However, we can see that the variable INT has been dropped by PcGets in both the specific and dynamic models. This is not unexpected as per our previous discussion. Interest rate and stock market return may be unrelated in Jordan as Muslims usually choose to invest in interest-free bearing securities without considering the level of interest rates.

Table 1 Estimation of Eq. (2) by GETS Dependent Variable: ln *MSCI*		
Explanatory Variables:	(1) Specific Model	(2) Long Run Coefficients
Constant	-3.356 (-2.63)***	-53.022 (-2.47)**
$\ln MSCI_{t-1}$	0.937 (61.66)***	
$\ln XIM_t$	--	-4.556 (-4.00)***
$\ln XIM_{t-2}$	-0.159 (-2.92)***	
$\ln XIM_{t-3}$	-0.129 (-2.30)**	
$\ln RES_t$	--	-1.911 (-2.28)**
$\ln RES_{t-4}$	-0.121 (-2.06)**	
$\ln M2_t$	--	8.706 (3.30)***
$\ln M2_{t-1}$	0.551 (3.41)***	
$\ln OIL_t$	--	-1.106 (-2.47)**
$\ln OIL_{t-1}$	-0.070 (-3.42)***	
$\ln INT_t$	--	--
DUM_t	--	1.623 (4.37)***
DUM_{t-5}	0.103 (6.27)***	
Trend	-0.002 (-1.96)*	-0.038 (-1.91)
Adjusted R^2	0.994	
Chow(2003:11)	1.817 (0.007)	
Chow(2008:11)	1.298 (0.217)	
AR 1-4 test	1.327 (0.263)	
Hetero test	1.398 (0.153)	
Note:	t-ratios in parentheses. *, **, & *** mean significance at 1%, 5% & 10% level respectively.	

The results in Table 1 should be taken as a preliminary test for the hypothesised relations between stock return and the macroeconomic variables in our model in equation (2). But there are some issues to consider. For dynamic models, PcGets implement a lag order pre-search testing stage and provides long-run solutions and roots of the autoregressive polynomial for the first estimated models. In its current form testing for cointegration and adopting equilibrium error correction (ECM) formulation is not part of the algorithm. If cointegration is present among the variables then adopting an ECM formulation is better. In fact, in version 1.0 of PcGets, specifying GUM in levels is recommended, as a second best solution, when cointegration properties of the system are unknown, or cointegration analysis is not feasible (Owen, 2003). Hendry and Krolzig (2001) have noted, following results of Wooldridge (1999) and Sims, Stock and Watson (1990), that the mis-specification tests and most selection tests will still be valid even with I(1) level variables.

In light of above discussions, the appropriate technique to test whether macroeconomic variables affect the stock price in Jordan, would be to adopt a cointegration and ECM approach. The two approaches to cointegartion which are popular are the usual residual based approach proposed by Engel and Granger (1987) and the maximum likelihood-based approach proposed by Johansen and Julius (1990) and Johansen (1992). An important problem in the usual residual-based and maximum-likelihood based tests for cointegration is given by a decisive precondition. Both approaches require with certainty that the underlying variables in the model are integrated of the same order, i.e. they are I(1). This precondition poses two problems. One when the system contains variables with different orders of integration and the other is the degree of uncertainty of the underlying variables given the low power of unit root tests. To overcome these problems, Pesaran, Shin and Smith (1996, 2001) proposed the bounds testing procedure to test for a linear long run relationship, known as Autoregressive Distributed Lag (ARDL) approach to cointegration which does not require the classification of variables into I(0) or I(1) or the orders of integration of underlying regressors to be known with certainty. Therefore, adopting the ARDL approach for the cointegration test, we do not require a unit root test, which is a prerequisite for the residual based and maximum-likelihood based approach. With these advantages in mind, we plan to undertake the ARDL approach to cointegration to test for the long run relationship of the macro variables and a stock market index in Jordan.

The model described in equation (2) can be written as an unrestricted error correction version of the ARDL (p,q) model as follow:

$$\begin{aligned}\Delta \ln MSCI_t = \alpha + \sum_{I=1}^{P}\phi_i \Delta \ln MSCI_{t-1} + \sum_{i=0}^{q}\beta_i \Delta \ln XIM_{t-i} + \sum_{i=0}^{q}\gamma_i \Delta \ln RES_{t-i} + \sum_{i=0}^{q}\eta_i \Delta \ln M2_{t-i} \\ + \sum_{i=0}^{q}\mu_i \Delta \ln OIL_{t-i} + \sum_{i=0}^{q}\vartheta_i \Delta INT_{t-i} + \lambda_1 \ln MSCI_{t-1} + \lambda_2 \ln XIM_{t-1} + \lambda_3 \ln RES_{t-1} \\ + \lambda_4 \ln M2_{t-1} + \lambda_5 \ln OIL_{t-1} + \lambda_6 INT + \lambda_7 DUM_{t-1} + \upsilon_t\end{aligned} \quad (3)$$

Where $\varphi, \beta, \gamma, \eta, \mu, \vartheta$ are short-run dynamic coefficients and λ_i are long-run multipliers, (p,q) are the order of the underlying ARDL model and α is the constant term. It is assumed that the error term v_t is uncorrelated with current and lagged values of the 'forcing variables'.

The ARDL procedure consists of two steps (Pesaran and Pesaran, 1997). First, the existence of the long run relation between the variables in the system is tested. In order to do so, the null hypothesis of no cointegration or no long run relationship defined by H_0 : $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$ is tested against the alternative H_1 : $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq \lambda_7 \neq 0$ by computing F-statistics. The asymptotic distributions of this F-statistic is to test whether the significance of the lagged levels of the variables are non-standard and whether or not the variables in the system are I(0) or I(1). The critical values of the F-statistics are provided by Pesaran and Pesaran (1997) and Pesaran et al (2001). The authors provide two sets of critical values in which one set is computed with the assumption that all variables in the ARDL model are I(1), and another with the assumption that these variables I(0). For each application, the two sets provide the bands covering all the possible classifications of the variables into I(0) or I(1), or even fractionally integrated ones. If the computed F-statistics is higher than the appropriate upper bound of the critical value, then the null hypothesis of no cointegration is rejected;

if it is below the appropriate lower bound, the null hypothesis cannot be rejected, and if it lies within the lower and upper bound, the results is inconclusive.

When the computed F-statistics rejects the null hypothesis of no conitegration in the bounds testing procedure described above, one can proceed to the second step of the ARDL approach. In this step the long run coefficients and the associated error-correction model are estimated. The lag orders of the variables in the ARDL are chosen using Akaike Information Criterion (AIC) or Schwartz Bayesian Criterion (SBC) or adjusted R-square criterion. Diagnostic tests are performed on the associated model to check for serial correlation, functional form and heteroscedasticity. In addition to this, the paper also presents the CUSUM (Cumulative Sum) and CUSUMSQ (CUSUSM of Squares) test of the recursive residuals to check for the stability of the model.

3.2 ARDL Results

In Table 2, the results of the F-statistics to test for cointegration in equation (3) is presented using monthly data over the period 1997:03 – 2010:0. From the results we can see that there exist a cointegrating relationship between the Jordanian stock market index and the macroeconomic variables viz. The trade surplus, foreign exchange reserves, money supply, oil price and interest rate. This finding is broadly consistent with previous literature. For example, Kwon and Shin (1999) found the Korean stock market index was cointegrated with the foreign exchange rate, trade balance, money supply and a production index. Mookerjee and Yu (1997) found that stock prices are cointegrated with the money supply and foreign exchange reserves. Majid and Yusof (2009) recently demonstrated that the Malaysian stock index is cointegrated with the money supply, industrial production index, real exchange rate, federal funds rate and treasury bills rate. One crucial finding, that the set of macro variables which affect the most advanced stock market are different from those which affect the less mature markets like Malaysia, Korea, and Singapore, is also supported in our paper for the case of Jordan. The USA and Japanese stock markets are rather sensitive to changes in unexpected and expected inflation rates, the risk premium and term structure of interest rates (Burmeister and Wall, 1986; Chen et al 1986, Hamao, 1988 and Chen, 1991).

In order to test for cointegration, the determination of the order of lags in the first differenced variables is important. According to Bahmani-Oskooee and Bohl (2000), the results of the first step of ARDL approach are sensitive to the order of VAR. Therefore we decided to impose lag orders of 1-12 on the first difference of each variable and calculate the F-statistics for the joint significance of the level variables. The results, along with the critical values of the bounds computed by Pesaran and Pesaran (1997), are reported in Table 2.

As can be seen from the results in Table 2, the null hypothesis of no cointegration is clearly rejected as the computed F-statistics has exceeded the critical upper bound at the 95% level for lag orders of 1, 2, 3, 6, 10, and 11. But the F-statistics is greater than the upper bound at the 99% level for lag order of 5. Therefore we employ a lag order of 5 to estimate the ARDL model.

Table 2
F – statistics for testing the existence of a long – run stock market equation

Order of lag (p, q)	F-Statistics
1	4.5374**
2	4.1384**
3	4.0335**
4	3.1723
5	4.8351***
6	3.8668**
7	3.4676*
8	3.0482
9	3.6867*
10	4.3665**
11	4.0904**
12	3.5452*

Notes: i) The relevant critical value bounds are given in Appendices C in Pesaran and Pesaran (1997) for case II with intercept and no trend and number of regressors = 6. They are 3.267 – 4.540 at the 99% level of significance; 2.823 – 4.069 at the 97.5% level of significance; 2.476 – 3.646 at the 95% level of significance; and 2.141 – 3.250 at the 90% level of significance.

ii) The symbols ***, ** and * represent significance at 99%, 95% and 90%.

The second step involves estimating the ARDL model in equation (3) for which we have used a maximum lag order of 5 because of the F-statistics results. The model is chosen based on selection criterion including the adjusted R^2, AIC or SBC according to the appropriate lag length. The long run coefficients of the ARDL model based on these three selection criterion are presented in Table 3. It can be seen that the sign of these long run coefficients are broadly similar to those obtained previously using the GETS approach in Table 1. In column (1) where the model selection criterion is adjusted R^2, the variables that affect the Jordanian stock market in the long run are the trade surplus (LXIM), reserve (LRES), money supply (LM2) and oil price (LOIL). Coefficient on LXIM and LRIS are negative and significant. This means the trade surplus, and increase in reserves, have a negative effect on stock return which is in line with our expectations. LM2 has an expected positive sign, meaning that increase in money supply leads to increase in stock price in the long run. The sign of LOIL is negative. This is also expected as increase in the price of oil will depress real economic activity, so a negative sign is justified. Interest rate does not affect the stock market.

Table 3
Long Run Estimated Coefficients of the ARDL Model

	Model Selection Criterion		
	(1) R-Bar Squared	(2) Akaike Information Criterion (AIC)	(3) Schwarz Bayesian Criterion (SBC)
LXIM	-4.524 (-3.17)***	-3.811 (-3.91)***	-3.322 (-2.10)*
LRES	-1.911 (-1.64)*	-0.688 (-0.86)	-1.566 (-1.11)
LM2	4.516 (3.42)***	3.144 (3.75)***	2.718 (1.74)*
LOIL	-0.880 (-1.95)*	-0.751 (-2.08)**	-0.119 (-0.24)
INT	0.101 (1.52)	0.091 (1.63)	-0.036 (-0.38)
DUM1	1.173 (3.35)***	1.432 (4.32)***	1.476 (2.26)**
C	-18.975 (-3.09)***	-16.832 (-3.61)***	-7.064 (-1.08)

Note: t-statistics on parentheses. The symbols ***, ** and * represent significance at 1%, 5% and 10% level of significance.

In column (2), where the model is selected using AIC criterion, it can be seen that the trade surplus and oil price continue to have a negative effect on the stock market. The effect of monetary growth is still positive. Foreign exchange reserves are no longer significant while interest rate continues to have no effect on the stock market. Finally, if we take a look at the model selected through SBC criterion presented in column (3), only the trade surplus and money supply have a long run effect in the Jordanian stock market where the coefficient on LXIM is negative and that on LM2 is positive, both as expected. In all these three models, the dummy is significant having a positive coefficient.

In Table 4 we present results of the error correction (ECM) representation of the ARDL model selected by the Adjusted R2, AIC and SBC criterion. It can be seen that the error correction term (EC_{t-1}) has the correct negative sign and is highly significant in all three selection criteria. The speed of adjustment for error correction is rather low, ranging from 0.04 – 0.08. This means that last period's disequilibrium is corrected, on average, only by 5 – 8 percent in the following month. This perhaps means that the Jordanian stock market is not as efficient as other emerging markets like Malaysia where the speed of adjustment ranges from 25 – 71 percent (Majid and Yusof, 2009).

Finally, to confirm the stability of the long run coefficients, along with the short run dynamics of the estimated ARDL model, the test of CUSUM and CUSUMQ are employed in this paper. The CUSUM test is the cumulative sum of the recursive residuals based on the first set of n – observations and then plotted against a break point. If the plot remains within critical bounds at 5 percent significance, the null hypothesis that all coefficient and the ECM are stable cannot be rejected. Similarly for CUSUMQ test which is based on squared recursive residuals. Figure 3 and 4 plots the CUSUM and CUSUMQ plot based on the based on AIC criterion. It can be seen that our model is stable. Having applied the stability tests for other model selection criteria, we found similar results.

Table 4 Error Correction Model Dependent Variable: MSCI			
	Model Selection Criterion		
	(1) R-Bar Squared	(2) Akaike Information Criterion (AIC)	(3) Schwarz Bayesian Criterion (SBC)
ΔXIM_t	-0.076 (-1.21)	-0.063 (-1.03)	-0.150*** (-3.10)
ΔXIM_{t-1}	.247*** (2.86)	0.256*** (3.47)	-
ΔXIM_{t-2}	0.161** (2.05)	0.141 (2.18)	-
ΔXIM_{t-3}	0.012 (0.16)	-	-
ΔXIM_{t-4}	-0.099 (1.48)	-0.056 (-0.80)	-
ΔRES_t	0.052 (0.35)	-	-0.07 (-0.96)
ΔRES_{t-1}	0.205 (1.38)	-	-
ΔRES_{t-2}	0.129 (0.87)	-	-
ΔRES_{t-3}	0.185 (1.22)	-	-
ΔRES_{t-4}	-0.206 (1.35)	-	-
$\Delta M2_t$	-0.287 (-0.64)	0.254*** (3.03)	0.123 (1.42)
ΔOIL_t	0.011 (0.24)	0.050 (1.25)	-0.006 (-0.24)
ΔDUM_t	-0.007 (-0.19)	-0.007 (-.180)*	-0.025 (-0.64)
ΔDUM_{t-1}	-0.046 (-1.14)	-0.056 (-1.46)	-
ΔDUM_{t-2}	-0.150*** (3.89)	-0.150 *** (-3.93)	-
ΔDUM_{t-3}	-0.076* (-1.95)	-0.067** (-1.76)	-
ΔDUM_{t-4}	-0.094** (-2.43)	-0.078** (-2.07)	-
ΔINT_t	-0.048 (-0.94)	0.007* (1.65)	-0.002 (-0.39)
ΔC	-1.40*** (-3.44)	-1.36*** (-3.79)	-0.319 (-1.06)
ECM_{t-1}	-0.074*** (-3.15)	-0.081*** (-4.28)	-0.045** (-2.45)
$\bar{R}^2$	0.341	0.399	0.199
S.E. of Regression	0.049	0.050	0.054
DW-Stat	1.888	1.883	1.731
F-Stat	5.149[0.00]	6.395[0.00]	6.144[0.00]

Figure – 3

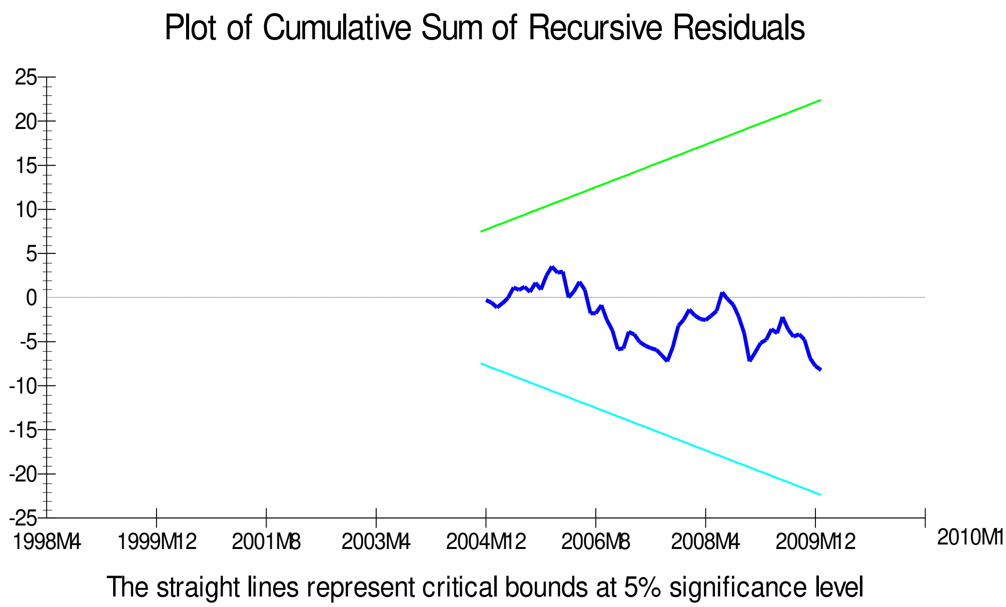
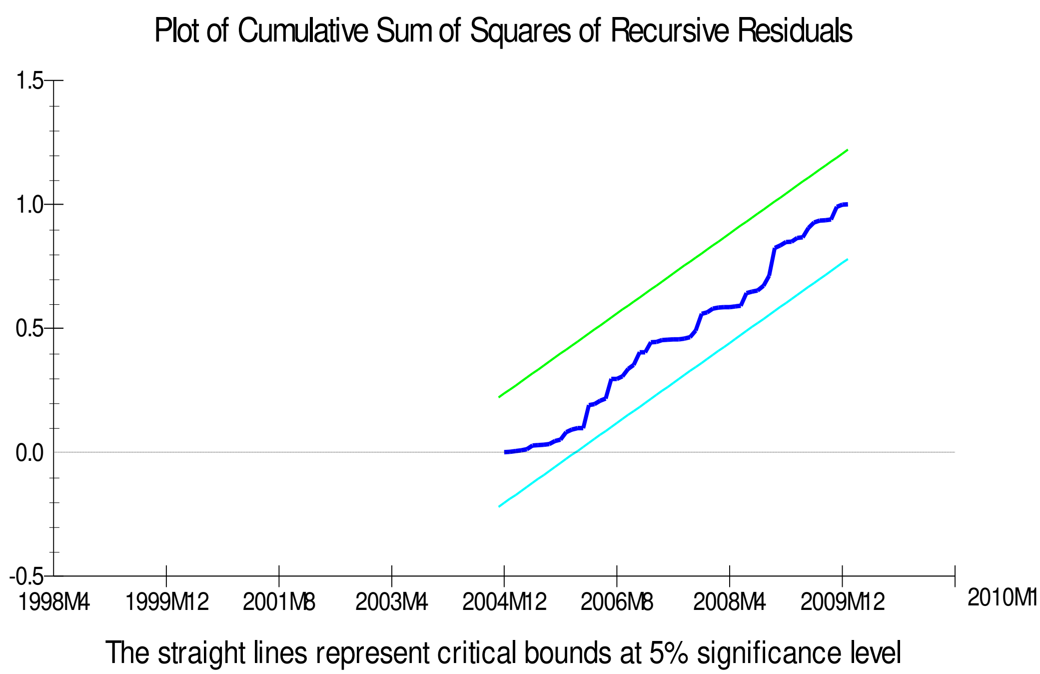


Figure – 4



4. Conclusion

The paper investigates whether the Jordanian equity market responds to long term changes in macroeconomic variables using a regression analysis based on GETS and the ARDL approach to cointegration. Both econometric methodologies used in the paper complement each other and show that the trade surplus, foreign exchange reserves, money supply and oil price are important macroeconomic variables which have long run effects on the Jordanian stock market.

Our findings are consistent with similar studies. Mukherjee and Naka (1995) found a positive relation between the stock market and money supply. A negative relation between the foreign exchange rate (increase in exchange rate means depreciation) and stock prices are reported in several studies, eg. Kwon and Shin (1999) for Korea, Kim and Davidson (1996) and Kim (2003) for the USA. That the trade surplus and increase in foreign exchange reserve negatively affect stock markets, which we found in this study, complement the previous evidence as the former two can lead to exchange rate appreciation.

To our knowledge none of the previous studies had included the price of oil in their models which we have done. Although changes in oil price is an exogenous factor, it can have substantial impact in the economy as well is in the stock market for country like Jordan which used to be heavily dependent on subsidized supply of oil from Iraq until the broke out. This led to a structural change in the economy which we took into account our model. Our findings show that that increases in oil price have a negative effect on stock markets. To measure for economic activity, we believe that the oil price is a better proxy than industrial production which previous studies have used. The dummy included to capture for the period of unrest after the war in Iraq is statistically significant. Though the interest rate is found to have significant impact on stock markets in other studies, we find no such evidence for the Jordanian case. This could be because Jordanian investors do not respond to interest rate changes and consequently there is not much of a portfolio shift from stock market to money market due to changes in interest.

Finally, the limitation of the paper is that if there are one or several structural breaks in the dependent (or other) variables in the model, then the cointegration analysis could give misleading results. Although we included a dummy in our model to account for the structural break, this may be anecdotal. However, to the best of our knowledge this is a deficiency that also characterises previous studies. There is an opportunity in future to incorporate the issue of structural breaks and re-investigate the link between equity returns and macroeconomic variables in the long run with a more appropriate methodology.

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