

THE IMPACT OF TRADE ACCOUNT DEFICIT ON UNEMPLOYMENT SCENARIO: AN EMPIRICAL STUDY ON JORDAN DURING THE PERIOD OF 2000-2012¹⁴

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Abstract

The aim of this paper is to study the short-term causal relationship between unemployment and the volume of trade deficit in Jordan for the period 2000:01 – 2012:02. This study provides evidence of the absence of a long-term relationship between the two variables. We use granger causality test and propose an augmented dickey-fuller (adf) coefficient test for detecting the presence of a unit root in the model. The results show that trade account deficit causes unemployment, and unemployment causes the trade account deficit in the short run. This indicates that trade liberalization is also able to increase imports, decrease aggregate productivity in the differentiated sectors, and create inefficiency on economic performance. Thus, this would simultaneously decrease employment opportunities for Jordan's labour force. Trade account can also be an additional negative effect in increasing Jordanian's unemployment scenario in the future.

Keywords: Unemployment, trade account, Jordan

Introduction

Jordan has one of the highest rates of human development at the Arab level in terms of high level of education and health care. However, it faces a growing unemployment problem affecting young people in particular. Social official figures show that unemployment in Jordan ranges at the rate of 13%. Consequently, it appears to worsen as a result of its growing population of about a million and a quarter million citizens who are between the age of ten

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and nineteen. Thus, this growing population threatens both the socioeconomic and sociopolitical environment.

Economists attribute the existence of deflationary gaps and the accompanying unemployment rates to be above normal in Jordan due to internal and external factors. Internally, the behavioral patterns that lead young people to abstain from work in certain professions in addition to the structural imbalances in the labor markets is one of the major causes of unemployment. On the external level, economic recession occurred due to political instability over the last three decades, in addition to migrations from neighboring Arab countries such as Iraq and Syria (Arouri, 2008).

Another tension has begun to emerge in the Jordanian economy. Thus, a trade balance deficit side by side with low volume of exports, all reflects an important economic indicator in Jordan, and most notably the issue of unemployment. Between 1990 and 2000, Jordan has recorded unstable trade balance and this happened due to global economic crisis, such as financial crisis in 1997. Consequently, chronic deficit in the balance of trade for Jordan reached 822.2 million Jordanian dinars in 1990, and then continued to rise up to 5105 million dinars in 2007 (Momani, 1995).

Furthermore, the contraction in trade account due to economic crisis continued to grow, as shown in Figure (1). This has generated a large volume of both theoretical and empirical literature. However, most of these studies have paid more attention to developed countries (Moore and Ranjan, 2005; Porto, 2008; Felbermayr, Prat and Schmerer, 2011; Nanthakumar and Sukemi, 2011).

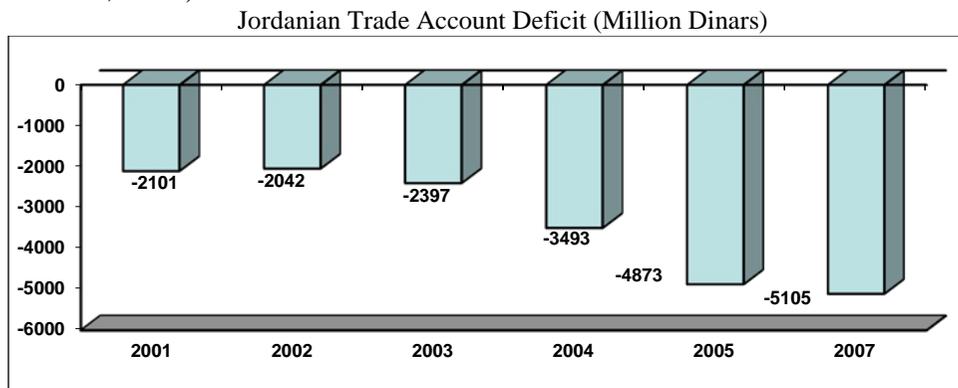


Figure (1)

The dynamic integration between trade account and unemployment scenario has been a topical issue. Considering this background, identifying the reflection of unstable trade account growth rates on unemployment scenario in Jordan has become of great importance.

This paper will contribute significantly to the literature by providing new evidence on Granger causality relationship between trade account and unemployment in Jordan. We will use the innovated causality test proposed by Granger; thus, the causality test is considered as an important statistical test which determines the direction of the relationship between economic variables, and allows the verification of the direction of the relationship between the variables of time-series models (Gujarati, 2003). The purpose of this technique is to evaluate the relative importance of trade account and inflation variables in the movements of unemployment.

In contrast with the previous individual-country level researches, this paper is one of the rare studies addressing the asymmetrical integration between trade account and unemployment dynamics for Jordan. This is done using Granger causality test analysis, the multivariate cointegration test, the error correction procedure, and the impulse response analysis. Our sample will cover the quarterly data from 2000 to 2012. The rest of the paper is organized as follows: section 2 covers the theoretical framework, section 3 contains the related empirical evidence, section 4 deals with data and method, section 5 presents the results and discussion, while section 6 contains the concluding remarks.

Theoretical Framework

This study will focus on testing and interpreting trade accounting and the phenomenon of unemployment in Jordan using a standard model based on macro-economic theories. Specifically, the Okun law linking the rate of real economic growth and the unemployment rate, and the main prediction for this important law that increased growth rates in real production will reduce the unemployment rate by a factor of sensitivity equal to half. For example, an economic growth rate of 6% per annum will reduce the unemployment rate to 3% per annum. On the other hand, Phillips Curve theory linking unemployment and inflation rates involves an opposite relationship existing between the two in the short term. Therefore, the significance of this relationship has implications with regard to the options and the effectiveness of macroeconomic policies adopted in Jordan.

Related Empirical Evidence

The role of trade liberalization in macroeconomic dynamics (specifically after 1970s) has generated large volumes of empirical studies with mixed findings using cross sectional time series and panel data. Most of the global studies are focused on trade liberalization, trade openness, and the effects of globalization on labor market stability. Nevertheless, the local studies dealt only with the problem of unemployment. Consequently, few of the studies are selected for review as follows: Krugman (1981) and Melitz

(2003) assumed homogeneous workers and full employment, and thus predict that all workers win from trade liberalization. Meanwhile, Shapiro and Stiglitz's (1984) linked product marketing mix to labor market churning. It showed that workers care about their jobs because the model features aggregate unemployment and jobs that pay different wages to identical workers. Simulations show that for reasonable parameter values, as much as one-fourth of existing 'good jobs' may be destroyed via liberalization.

Papageorgiou, Choksi and Michaely (1990) studied the benefits of trade liberalization on unemployment in 19 countries. The finding showed that trade liberalization did not increase unemployment rate in the manufacturing sectors of the economy.

Dollar and Collier (2001) recognized a significant transitional correlation between trade liberalization, skill premium, and wage inequality. Moore and Ranjan (2005) using a cross sectional data, concluded that the effect of trade on overall unemployment scenario is ambiguous. Dutt et al. (2009) investigated the effect of trade on unemployment and presented a model of trade and search induced unemployment. Here, trade resulted from Heckscher-Ohlin (H-O) and Ricardian comparative advantage. Using cross country data over the period 1990-2000 on trade policy, unemployment, and various controls while controlling endogeneity and measurement error problems, this study found a strong evidence for the Ricardian prediction which states that unemployment and trade openness are negatively related. This effect dominated the positive H-O effect of trade openness on unemployment for capital abundant countries, which turns negative for labor-abundant countries.

Bjornstad and Skjerpen (2006) studied the relationship between trade and inequality in wages and unemployment in Norway. The motivation for this study is that increased globalization has shifted demand towards skilled labor at the expense of unskilled labor in developed countries. By using a large macro econometric model with heterogeneous labor, this study showed that the downward pressure on import prices has increased skill mismatch and somewhat surprisingly decreased wage differentials.

Menezes-Filho and Muendler (2007) found that Brazil's trade liberalization in 1990s led to the displacement of formally employed workers from protected industries and that comparative advantage industries did not absorb trade displaced workers in full. Therefore, this indicated that trade liberalization was associated with transitions to unemployment cases in Brazil.

Besides that, Porto (2008) examined the links between trade liberalization and unemployment in Argentina. The findings of this study showed that, an increase in agro-manufactured export product lead to both

lower unemployment rate and increase labor market participation rate. In addition, wages also increase given an increase in export prices.

Hasan et al. (2011) investigated the relationship between trade liberalization and unemployment in India. The results showed that there is no evidence of any unemployment increasing effects of trade reforms. The state level analysis revealed that urban unemployment declined with liberalization in states with flexible labor markets and larger employment shares in net exporter industries. Moreover, the industry level analysis indicated that workers in industries experiencing greater reductions in trade protection were less likely to become unemployed, especially in net export industries. The empirical results provided support for trade liberalization along with complementary reforms in domestic policies.

Felbermayr, Prat and Schmerer (2011) observed the relation between trade and unemployment for 20 rich OECD countries. This study used panel data and pure cross-sectional data on a larger set of countries. The time structure of the panel data allowed the control of unobserved heterogeneity, whereas cross-sectional data made it possible to use openness through its geographical component. In both setups, the data of business cycle effects include a host of institutional and geographical variables, and control within the countries trade. The main finding established an empirical regularity, where trade openness does not increase structural unemployment in the long run. Thus, this signifies that it is robust to various definitions of unemployment rates and openness measures. The benchmark specification suggested that a 10% point increase in total trade openness reduced aggregate unemployment by about three quarters of 1% point.

Al-Dairi (2004) linked inflation with unemployment in Jordan. It used cross country data over the period 1967-2001. The empirical results provided support for a strong positive relation. Arouri (2007) observed the problem of unemployment in Jordan, and discussed whether or not foreign direct investment would help in solving the problem of unemployment in Jordan. The empirical results indicated no existence of contributing foreign direct investment to the reduction of unemployment rate in Jordan. Nevertheless, this is partly due to being a capital-intensive investments and its reliance on foreign labor significantly.

Finally, Awad (2011) studied unemployment issue in Jordan over the period 1977-2010. This study included an important result which states that a real economic growth rate of 25% is required to return unemployment rates in Jordan from the current level (14%) to normal level (4%). This showed how difficult it is to achieve this goal.

Most of previous studies focused on trade openness which is measured using empirical formation of import plus with export relative to nominal gross domestic product (Dinopoulos and Thompson, 2000; Alcalá

and Ciccone, 2004). Although the trade openness measure reflect the actual exposure of an economy and are easily measurable, it does not indicate the real effect of the trade stability of a nation. Therefore, in this study, we employ the volume of trade account to ensure that the effects of trade stability can be measured collectively.

The main objective of this paper is to test for the direction of causality between trade account and unemployment in the case of Jordan. This paper will be able to contribute significantly to the literature by providing new evidence on Granger causality relationship between trade account and unemployment in Jordan. We used innovated ‘causality test’ proposed by Granger (1969) to test the direction between the two variables. In this relation, the focus of this study is to investigate both the long run and short run relationship between trade account and unemployment in Jordan over the period from 01/2000 to 02/2012. However, Figure 2 shows unemployment rates among Jordanian labor force according to gender.

Moreover, the study examines Granger causality between trade account and unemployment. It uses commodity terms of trade and income terms of trade. The Dickey and Fuller (1979) unit root test statistic is used to examine the stationarity of the data. The Johansen (1991) cointegration method is used to examine the long-run relationship between trade balance and unemployment. In addition, the impulse response analysis is used to show the impact of the shock trading balance.

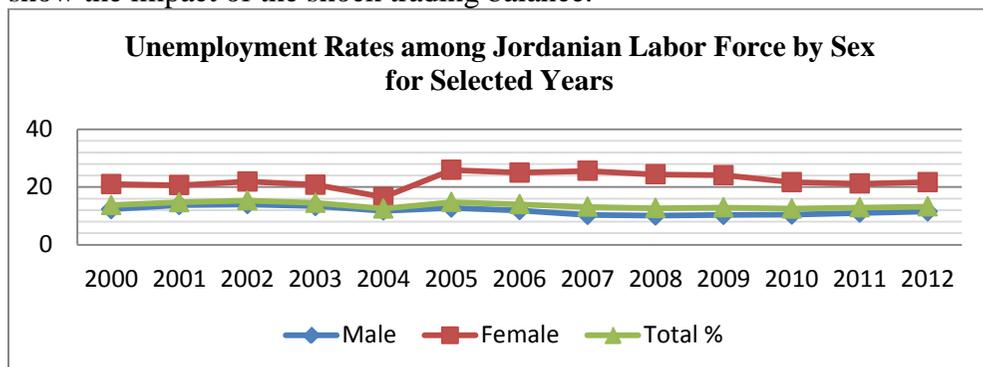


Figure (2) Unemployment Rate

Source: Data unemployment in Jordan, various surveys, the Department of Statistics.

Data and Method

Data

The data used for this study are basically time series covering 2000 – 2012. The data were sourced from Central Bank of Jordan (CBJ) and the Department of Statistics (DOS).

Model Specification

The econometric technique employed in this study is a multivariate cointegration and error correction procedure with the hypothesis that unemployed labor is a function of trade balance. Based on the theoretical arguments presented in the literature, the relationship between trade balance and unemployment can be specified as follows:

$$UE_t = f(TB_t) \dots\dots\dots 1$$

Where ‘UE’ is logarithmic value of unemployed labor in Jordan and ‘TB’ refers to logarithmic value of trade balance volume for Jordan. Data for variables of interest were converted into natural logarithms so that they can be interpreted in growth terms after taking the first different.

Before conducting causality test, we begin our estimation by performing the unit root analysis using Augmented Dickey-Fuller (ADF) test. This is important to avoid the spurious regression and random walk problems. In addition, stationary tests will be conducted for each variable to ensure they are stationary. The simplest version of the model to be analyzed is the random walk as shown in equation (2):

$$y_t = \gamma y_{t-1} + \varepsilon_t \quad \text{where } \varepsilon_t \sim N[0, \sigma^2] \dots\dots\dots 2$$

Where, ‘ γ ’ symbol denotes time trend, ‘y’ is the variable in estimation procedure, and ‘ ε ’ represents the distributed random error term with zero value of mean and constant variance.

The standard Dickey-Fuller test is conducted by estimating the following regression equation:

$$\Delta y_t = \alpha + \beta_t + \delta y_{t-1} + \varepsilon_t \dots\dots\dots 3$$

Where Δ is the differencing operator, ‘y’ represents the variables to be estimated (i.e. LRUE_t, LTB_t), which is constant, ‘ β ’ is the trend coefficient, ‘ ε ’ is the white noise residual of zero mean and constant variance, and “t” is the time or trend variable.

The null and alternative hypotheses may be written as follows:

$$H_0 : \delta = 0$$

$$H_a : \delta < 0$$

.....4a

Accepting the null implies there is a unit root (the series is non-stationary); whereas rejecting the null implies Y_t is a stationary time series.

According to Rao (1994), the problem associated with the simple Dickey-Fuller unit root could be avoided by running the ADF test, which is derived from the regression equation:

$$\Delta y_t = \alpha + \beta_t + \delta y_{t-1} + \sum_{i=1}^m \gamma_i \Delta y_{t-1} + \varepsilon_t \dots\dots\dots 4b$$

Where Δy_{t-1} is equal to $(y_{t-1} - y_{t-2})$, and ‘m’ is the maximum lag length on the dependent variable to ensure that ‘ ϵ ’ is the stationary random error.

The null hypothesis of a unit root is rejected if the t-statistic associated with the estimated coefficients exceeds the critical values of the test. Furthermore, the ADF specification accounts for possible autocorrelation in the error process ‘ ϵ ’ through the lagged dependent variable on the right hand side. The practical rule for establishing the value of m (i.e. the number of lags) is that it should be relatively small in order to save various degrees of freedom, but sufficient to remove serial correlation in the residuals. The weakness in this test is that the power of the test may be adversely affected by miss-specifying the lag length (Rao, 1994).

The next step is to find out whether the variables share a common stochastic trend, i.e. to test whether two or more variables are cointegrated. Cointegration can be regarded as the empirical counterpart of the theoretical notion of a long run relationship among the variables. In other words, a cointegration of two or more variables suggests that there is a long run, or equilibrium relationship between the variables (Rao, 1994).

Cointegration technique provides a means of identifying and avoiding spurious regressions generated by non-stationary series. When variables are cointegrated, the OLS estimates from the cointegrating regression will be super-consistent.

After that, we seek in this study to determine the long run relationship between trade balance deficit and unemployment. Thus, the Johansen (1991) multivariate cointegration test will be employed, which involves three steps⁽¹⁵⁾. The Johansen procedure not only determines the number of cointegrating vectors, but also provides estimates of the vectors. For the purpose of testing the number of cointegrating vectors, Johansen and Juselius (1988, 1990) propose the use of two likelihood ratio test statistics namely, the trace test and the maximum eigenvalues test.

The trace statistic for the null hypothesis of r cointegrating relations is computed as follows:

$$\tau_{trace}(r) = -T \sum_{i=1}^m \log[1 - \lambda_i] \dots\dots\dots 5a$$

The maximum eigenvalue statistic tests the null hypothesis of r cointegrating relations against r+1 cointegrating relations. Thus, it is computed as follows:

$$\tau_{max}(r, r + 1) = -T \log(1 - \lambda_{r+1}) \dots\dots\dots 5b$$

⁽¹⁵⁾ For an intuitive insight into the Johansen method, refer to: Johansen, S. (1988). Statistical Analysis of Cointegration Vectors; Journal of Economic Dynamics and Control, 12(2), 231–254.

If variables are cointegrated, an error correction model exists. Error Correction Model ‘ECM’ combines both the short run dynamics and long run properties, and at the same time eludes the ‘spurious regression’ problem.

However, the VECM can be expressed as follows:

$$DLRUE_t = \alpha_0 + \sum_{i=1}^a \alpha_1 DLRUE_{t-i} + \sum_{i=1}^b \alpha_2 DLRTB_t + \gamma Z_{yt-1} + \varepsilon_t \dots\dots\dots 6a$$

$$DLRTB_t = \beta_0 + \sum_{i=1}^m \beta_1 DLRTB_{t-i} + \sum_{i=1}^n \alpha_2 DLRUE_t + \gamma Z_{xt-1} + \varepsilon_t \dots\dots\dots 6b$$

Where, Z_{yt-1} and Z_{xt-1} represent the error terms lagged by one period for the real trade balance and unemployment equations, respectively. The coefficient ‘ γ ’ measures the long run equilibrium relationship, while ‘ α ’ and ‘ β ’ measures the short run causal relation.

Results

This study examines the degree of integration of the variables of Augmented Dickey Fuller test (1981) for the statement whether variables are stationary or not. This test is performed at the first difference and the second difference levels which intercept together with a constant and trend. The results of ADF test is presented in Table (1), which shows the fact that all the variables appear to be integrated in an order of zero (i.e. I(0)). Accordingly, the results of the unit root tests show that the variables are not able to reject the null hypothesis at their levels. After applying the first differencing, only ‘UE’ was able to reject the null hypothesis.

Table 1: Augmented Dickey Fuller Test (Variables logarithm)

	Variables	Model	ADF	lags
Augmented Dickey Fuller test for levels				
Trade account	TB	With a constant and without a trend	-2.832*	1
Unemployment	UE	constant and a trend	-6.898***	2
Augmented Dickey Fuller test for First Difference				
Trade account	TB	With a constant and without a trend	6.900***	0
Unemployment	UE	With a constant and without a trend	14.340***	1

Note : (*), (**), (***) indicate the rejection of null hypotheses in a level of 10%, 5%, and 1% respectively.

The next procedure is to test for cointegration. The Johansen procedure (1988, 1995) was used for detecting the number of cointegrating vectors. Since Johansen method is sensitive for autocorrelation in residuals,

it will be determined by the appropriate lag lengths to estimate a model that is not suffering from autocorrelation problem. Schwarz criterion (1978) is used to determine the lag length periods (lagged one period), and for testing autocorrelation lengths for a specific lag ⁽¹⁶⁾. In choosing the acceptable test of cointegration, we use Pantula (1989) principle for determining the cointegration rank. Results were estimated and presented in a statistical trace as shown in table (2), which shows that model (2) is the preferred model. Accordingly, the results of model (2) report that there is a cointegration between the variables.

Table 2: Cointegration Rank and Model Selection: Trace Statistics

	Model 2 (Without Constant “Without trend”) in CE and without Constant or trend in VAR	Model 3 Constant in CE & VAR and without trend in CE and VAR	Model 4 Constant in CE & VAR and a liner trend in VAR
R	VAR Lag Order Selection Criteria: SIC (Lag 2)		
0	18.78(20.26)*	18.63(15.49)	33.00(25.87)
1	2.82(9.16)	2.75(3.84)	12.86(12.51)

Note :Figures in parentheses represents the critical value at the level of significance of 5%.

* Includes the first case we encounter; thus, we cannot reject the null hypotheses

Table (3) indicates that the statistical trace and maximal eigenvalue tests confirm these results. Since the variables are cointegrated, the vector error correction model (VECM) was used ⁽¹⁷⁾.

Table 3: Cointegration Test Results

Null Hypotheses	The Optimal Lag	Statistical Test	
		Trace Test	Eigenvalues Test
	2		
$r = 0$		18.78187	15.95521*
$r \leq 1$		2.82666	2.82666

Table (4) specifies the results of the causality test, and the degree of significance for the error term of the dependent variable. It shows that the error term of the growth of the balance deficit (as a dependent growth) is insignificant at the 10% level. Therefore, the growth of unemployment does not cause the trade balance deficit over the long term. It also shows that the error term of the growth in unemployment (as a dependent variable) is

⁽¹⁶⁾ It is defined as $-2L_m + m \ln n$; where n is the sample size, L_m is the maximized log-likelihood of the model, and m is the number of parameters in the model. The index takes into account both the statistical goodness of fit and the number of parameters that have to be estimated to achieve this particular degree of fit, by imposing a penalty for increasing the number of the parameters.

⁽¹⁷⁾ For more details, refer to Phillips, and Ouliaris (1990). Asymptotic Properties of Residual Based Tests for Cointegration, *Econometrica* 58, 165-193.

insignificant at the 10% level; hence, this implies that trade balance deficit does not result to long term unemployment.

Given the parameters which lagged the growth of variables, it is possible to observe a short term relationship. However, the coefficient which lagged the growth of the trade deficit showed statistically significant difference at 1% significance level of the growth of unemployment equation. However, the coefficient between the growth of unemployment in the growth equation trade balance deficit which is statistically significant at the 1% level of significance, implies that unemployment is important in influencing the growth of the trade balance deficit in the short term. Also, trade balance deficit emerges as an important factor in influencing the growth of unemployment in the short term.

Table 4: Results of Granger Causality in multivariate, Summary Statistics, 2000-2012

Dependent Variable	Trade Account Deficit Growth Lagged	Unemployment Growth Lagged	ECT
Trade account deficit growth	-	11.425***	-0.068
Unemployment growth	9.763***	-	0.264

(*), (**), (***) indicate the moral degree of 1%, 5%, and 10% respectively.

Note: Numbers are the calculated value for statistical χ^2

The Autocorrelation LM Test accepted the null hypothesis that there is no serial autocorrelation. The equation is stable during the study period, and this was confirmed by testing AR Roots Graph which displays five roots inside the circle. However, this indicate that the model was stable and meets the requirements for stability as shown in Figure (3). Therefore, this model does not require any modification.

Inverse Roots of AR Characteristic Polynomial

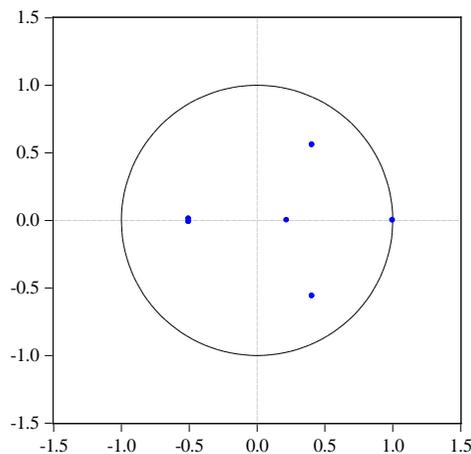


Figure (3)

To complete the study of the multivariate causality relationships, and to have a better understanding of the dynamics of relationships, especially how shocks are transited and how long it takes the end of the impact of trauma, it is very useful to examine the effects of shocks to sample system variables. However, this is aim at analyzing the dynamic characteristics of the model when the relationship cointegration interactive relationship between variables using impulse response function and variance decomposition of the variables are estimated in the model.

The response function shows paths of each variable response to a shock in order to take into account the short term adjustment in reaching the long term balance of the dependent variable. Consequently, it provides a method of analyzing the components of variance information on how a response happens. Furthermore, tracking response function affects shock variable and separates the analysis components; thus it provides analysis components with contrast information about the relative importance of each random shock in influencing variables in the VAR.

This study provides analysis of variance components explanatory power for the trade balance deficit and unemployment. The variance components were calculated along the 50 period to capture the effect of changing the trade balance deficit on unemployment and the trade balance. Table (5) shows the result of the analysis of variance components, where the second column contains the standard error (S.E) for a trading balance account expectations and unemployment forecast horizon. Also, the remaining columns show the percentages of the different trading balance as a result of unemployment variable.

Table (5) shows that the trading balance is twice the impact of unemployment on the value of the trade balance for 50 periods. However, it reached the highest contrast ratio of 5.76%. In addition, the trade balance can change the unemployment rates increase from 5.0275% in the second period, to 28.97% after 8 periods, and finally to 71.967% after 50 periods.

Table 5: Summary Statistics, 2000-2012				
Period	Variance Decomposition of LTD		Variance Decomposition of LUN	
	S.E.	LUN	S.E.	LTD
1	0.081554	0	0.075193	5.028991
2	0.118059	0.375541	0.075246	5.027598
3	0.144822	4.178485	0.07854	4.614881
4	0.16155	4.546319	0.08213	8.828571
5	0.174841	5.764055	0.085175	15.03113
6	0.186896	5.500852	0.089058	22.25076
7	0.199119	5.34368	0.091911	26.08361
8	0.211447	5.081924	0.093988	28.9739
16	0.290397	4.902016	0.108974	45.88694
24	0.351768	4.822411	0.122433	56.17095

32	0.403921	4.779521	0.134555	62.91346
40	0.450072	4.75329	0.145671	67.67586
48	0.491912	4.735607	0.155997	71.21902
49	0.496894	4.733793	0.15724	71.59914
50	0.501827	4.732051	0.158474	71.96747

The next procedure is to use the impulse response analysis which estimates the impact of one variable interpretation on the dependent variable for several future periods. Therefore, in this study, we studied the impact of the shock trading balance on unemployment, apparently to increase standard deviation. As a result, an increased change deficit of current trade balance in subsequent periods through the model structure VAR, were obtained on the average response and the contrast between the trade balance deficit for 50 future period. The change order variables may alter the reactions, and the economic logic in the order of variables is not unique. Hence, it can provide different interpretations when relocation variables did not get reactions replacement order of variables to see if the results change significantly or not.

Figure (4) shows a graph of impulse responses for the time intervals (50 for the period 2000Q1 to 2012Q2) for lags of 1 to 50. Figure 4 (a) graphs shows the impulse response for interval LTD against the impulse response values for interval LUN for lags of 1 to 50. Figure 4 (b) graphs shows the impulse response values for interval LUN against the impulse response values for interval LTD for lags of 1 to 50.

Therefore, the trading balance response to one unit pulse is equal to one standard deviation of the variable unemployment up to 50 periods. Figure (4) shows that unemployment in response to the shock trading account is significant after two periods, and it shows the impact of shock trading balance which is stabilized after period 11. This means that the impact of unemployment is significant on the trade balance in Jordan after two periods, and that the impact of the shock trading balance is settled after period 11.

decrease employment opportunities for labor force in Jordan. In addition, trade account can also become a negative effect of increasing Jordanian's unemployment scenario in the future.

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