THE IMPACT OF EXTERNAL SHOCKS ON THE ALGERIAN EXPORT PERFORMANCE

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Abstract

The goal of this study is to measure the effect of the External Shocks on the Algerian export performance through an empirical analysis by applying the Vector Error Correction Model VECM. Using quarterly for the period (2002-2013), main results of this study shows that the external shocks (GDP world, euro-dollar exchange rates, oil prices, financial crisis variable) affected on the Algerian exports performance. Test cointegration result establish that there is a relationship between variables estimating in short and long term and Granger causality tests made it clear that two directional flow, at 5% significance level for oil prices and financial crisis to Algerian exports.

Keywords: Financial crisis, Algerian exports, oil, exchange rate, VECM Model.

I. Introduction

Oil and gas play important role of the Algeria economy, while dominant about 97% of Algerian exports and 45 percent of GDP and 46 to 70 percent of government revenue and present more than 60% trade openness. Indeed, the choose flexible exchange rate system since 1996 after the long experience with the former regime (1974-1995) was built a strong concentration of US dollar. In this situation any external shock can be unbalanced the structure of the Algerian economy. The goal of this study is to examine the impact of GDP world, euro-dollar exchange rates, oil prices, as explanatory variables on the Algerian exports using VECM Model (Vector Error Correction Model) on quarterly data over the years (2002-2013).

We present the Research Methodology in section two, following by the results and discussions in Section Three, and finally the main conclusion.

Hypothesis

First hypothesis: GDP World and oil prices coefficients indicate an impact on the Algerian exports in the period of (2002-2013).

Second hypothesis stating a positive response of Algerian exports performance to euro-dollar exchange rates.

Third hypothesis: financial crisis is play important role to explain exports variation in short and long term.

II. Research Methodology

Revue Literature: Many early and recent studies highlighted the impact of oil supply shocks on economics countries. Some papers have been

found impact as recession, slower GDP growth and other consequences effects like unemployment rates, inflation, Stock market ... Hamilton (1983¹, 1996², 2003³, 2009⁴, 2013⁵), Santini (1985)⁶, Lee et al. (1995)⁷, Rasche and Tatom (1977)⁸, Abel and Bernanke, (2001)⁹, Brown and Yücel (2000)¹⁰, Zhong Xiang Zhang (2010)¹¹, Chen (2010)¹², Elder and Serletis (2010)¹³, Basher and al. (2012)¹⁴.

Some others found a positive effect like Bjørland (2007)¹⁵, Eltony (2001)¹⁶, Husain, Tazhibayeva, Ter-Martirosyan (2008)¹⁷, Omar Mendoza and David Vera (2010)¹⁸, Yudong Wang, Jung and Park (2011)¹⁹.

Both empirical and theories generation investigations interest the effect of exchange rate on trade flows, Clark $(1973)^{20}$; Hooper and Kohlhagen $(1978)^{21}$, Cushman $(1983^{22}, 1986^{23})$, Bailey et al. $(1988^{24}, 1987^{25})$, McKenzie $(1998)^{26}$ and Doyle $(2001)^{27}$.

Franck Cachia (2008)²⁸ concluded that there is negative impact of depreciation Euro Against other currencies on economy of France over the period 2002-2008.

Serge REY (2011)²⁹ estimated the period from 1971 to 2010 to compare the German exports with French exports and find the first is more responsive to external demand and less sensitive to changes in exchange rates Euro. Baak (2008)³⁰ assessed the impact of the real exchange rate between the Yuan an US dollar for the period from 1986Q1 to 2006Q2. He used cointegrating vectors and error correction models to arrive that the depreciation of %1 of the Renminbi raises the Chinese exports to the USA by1.7%, while 1% depreciation of the US dollar raise the US exports to China by 0.4%. Sulaiman Mohammad (2010)³¹examined the effect of Euro-Dollar Exchange rates on Pakistan macroeconomic variables (real output, price

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level, and money supply). He applied VAR based approaches to find no significant impact of Euro and US dollar exchange.

Data source: In our analysis, we make use of four macroeconomic variables: Algerian exports (exp), oil price (oil) and Euro-US dollar exchange rates (Euro-US Dollar), GDP world. The sample comprised quarterly observations for the 2002: Q1- 2013: Q12 period. The sources of the data are collect from International financial Statistics different issues, IMF and world development indicator.

Econometric approach The mathematical representation of a model is:

logexp= a_0 + a_1 lgdpw+ a_2 loil+ a_3 logeuus+ a_4 fcri+ ϵ_t Where:

logexp = logarithm of the Algeria's exports

loggdpw = logarithm world GDP

logoil= logarithm of oil price

logeuus= logarithm of us dollar-Dinar Algeria

fcris=financial crisis : dummy variable (1= period of global financial crisis, 0= period beforefinancial crises).

 a_0 = Intercept of the function

 ε_t = Random error

 $a_{0,} a_{1,} a_{2,} a_{3,} a_{4}$ are parameter estimates.

III. Results and discussion:

Before illustrating VECM result, we shall be starting by following the steps econometric:

1/ Test the stationary by Augmented Dickey-Fuller& Philips and Perron.

2/ Analysis co-integration tests (Granger, 1987) ³³

3/ Causality test.

4/ The Impulse responses and the variance decomposition analysis

Stationarity and Cointegration tests: Augmented Dickey-Fuller $(1979)^{33}$ and Philips and Perron,(1988) ³⁴ tests can be avoid false results cases and test stationary of times series. Tables (2) and (3) present tests drawn from the stationary using ADF and PP which allow a rejection of the null hypothesis in the first difference that signifies that the t-statistics is more than the critical values suggesting stationary in I(1).

 Table 1: Augmented Dickey Fuller (ADF) Unit Root

 test

Variables	ADF					
	Le	difference				
	intercep	Trend and	intercept	Trend and		
	t	intercept		intercept		
Logexp	-1.949	-1.803	-5.887***	-6.036***		
logdpw	-2.339	-1.413	-5.656***	-4.983***		
logoil	-1.579	-2.76	-2.99*	-5.10***		
logeuus	-2.219	-2.842	-5.83***	-8.19***		
fcris	-0.626	-1.951	-5.876***	-5.880***		

*show values are significant at 5 % level with MacKinnon (1996).

**show values are significant at 1% level with MacKinnon (1996).

***show values are significant at 5 % and 1 level with MacKinnon (1996).

Table 2:	Phiilips	Perron	(PP)	Unit	Root	test
	1 1111105		,	0	11001	

	РР					
Variables						
	Le	evel	First di	First difference		
	intercep	Trend and	intercept	Trend and		
	t	intercept		intercept		
Logexp	-1.949	-1.814	-5.887***	-6.067***		
logdpw	-1. 593	-1.434	-3.141*	-3.326***		
logoil	-1.494	2.069-	-4.748***	-5.111*		
logeuus	-2.942	-1. 951	-9.097***	-11. 369*		
fcris	-0.626	-3.04	-5.832***	-5.819***		

* Significant at 5 % level

** Significant at 1%.

*** significant at 5 % and 1 level.

Analysis co-integration: Johansen develops two tests: Trace statistics ((λ trace) and maximum eigen statistic (λ max). The result of trace tests and Max-eigenvalue indicate two cointegrating at the 0.05 level (Table 3, 4).

Table 3: Trace test

Hypothesized	Figenvalue	Prob.**				
None * At most 1 *	0.681348 0.497095	0.0002 0.0423				
At most 2	0.130402	0.5715				
At most 3	0.065461	0.1292				
Trace test indicates 2 cointegrating eqn(s) at the 0.05						

**MacKinnon-Haug-Michelis (1999) p-values

Table 4: Max-eigenvalue test

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Unrestricted Cointegration Rank Test (Maximum Eigenvalue)						
Hypothesized						
No. of CE(s)	Eigenvalue	Prob.**				
None *	0.755157	0.0006				
At most 1 *	0.561350	0.0440				
At most 2	0.337430	0.3654				
At most 3	0.144045	0.7051				
At most 4 0.040304 0.2369						
Max-eigenvalue test indicates 2 cointegrating eqn(s) at						
the 0.05 level						
**MacKinnon-Haug-Michelis (1999) p-values						
• The Causality:	Granger cau	sality test				

suggest a many directional flows, at 5% significance level, for oil prices and financial crisis to Algeria's exports, (see table 5),In addition, Granger causality test suggest a most relationship between variables the study as the directional flow for euro-us dollar exchange rates to oil prices, relationship bi-directional between oil prices and GDP world.

Causality F-Statistic		F-Statistic	Prob.	
	No	0.47717	0.6253	
No		1.16669	0.3256	
	No	0.21565	0.8073	
Yes		10.3091	0.000	
	No	2.04993	0.0514	
No		1.22749	0.3078	
	Yes	3.39762	0.0472	
No		1.75290	0.1911	
	Yes	8.13943	0.0016	
Yes		4.35198	0.0222	
	No	0.31184	0.7345	
Yes		4.11291	0.0268	
	No	0.43439	0.6518	
Yes		2.70371	0.0538	
	Yes	6.61244	0.0043	
No		1.71817	0.1972	
	No	0.16198	0.8512	
No		1.99345	0.1545	
	No	0.39949	0.6743	
No		2.12236	0.1380	
	No Yes No Yes No Yes Yes Yes Yes No No	CausalityNoNoNoYesNoYesYesYesYesYesYesYesYesYesYesNoYesNoYesNoYesNoYesNoNoYesNoNoNoNoNoNoNoNoNoNoNoNoNoNoNoNoNoNo	Causality F-Statistic No 0.47717 No 1.16669 No 0.21565 Yes 10.3091 No 2.04993 No 2.04993 No 1.22749 No 1.75290 Yes 8.13943 Yes 4.35198 Yes 4.35198 Yes 4.11291 No 0.43439 Yes 2.70371 No 1.71817 No 1.6198 No 1.219345	

Table (5) Causality test

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Vector Error Correction Model (VECM)

After we find cointegration relations between variables in this study, we must to build Vector Error Correction Model (VECM) of Engle and Granger $(1987)^{35}$ for restrict the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics.

Our results established the long-run equilibrium relationship between Variables study, the short-run adjustments are estimated using the error correction model (ECM). The deviation from long-run equilibrium is corrected very slow adjustment speed about 0.14% every quarterly (one year and three months).

Table 6: the speed of adjustment of VECM

the speed of	R2	Durbin-Watson
adjustment		stat
coefficient		
0.014	0.958	2.108

The Impulse responses

The impulse responses present the dynamic responses of the exogenous variables in relation to the time of variation of the endogenous variable. It shows the responses of the exportto a one standard deviation of GDP world, exchange rate, oil prices and financial prices variables (figure 3).

A one-standard deviation shock of financial crisis causes Algeria exports to decrease about 3 a standard deviation over four first period and about 5 to 7a standard deviation in four years later.

We also note that after the 3, 4 periods, Algeria's exports have negative response to oil prices and GDP world due to its impact of crisis financial.

Responses analyses Shows the results of all period, the euro-dollar exchange rates increase Algeria exports about 4 to 2 a standard deviation over two first years percent then its begins decrease about 1 to 2 a standard deviation in three years later, this positive impact between depreciation the us dollar against the euro and Algeria exports explain by the relation negative between the us dollar and oil price over the period 2002-2010, when in the same time U.S dollar against the euro decline per annual rate from 0.944 Euro/dollar since 2002 from 1.42 euro/dollar in2010 , the Algeria exportation rises about of 18.79 billion dollars in 2002 to 57 billion dollars in 2010, subsequently , Algeria exports benefitted the weakness of the US dollar.



The decomposition of variance

The variance decomposition tables show that importance of financial crisis to explain exports variation in short and long term. Moreover, percentage change of Algeria export explained about % 40 - % 60 by oil prices and %3 to %8 by Euro-Dollar exchange rates and financial crisis for a forecast horizon. This resultant determined how external shocks are important affected on Algeria economy.

Table 7: the Variance decomposition

Period	LOGEXP	LOGGDPW	cris	LOGEUUS	LOGOIL
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	61.14231	0.147938	0.283300	0.065425	38.36103
3	35.42916	0.171902	3.004961	3.945825	57.44815
4	32.46239	0.474121	5.731991	3.758568	57.57293
5	26.79136	0.560984	6.498491	6.226789	59.92237
6	24.24837	0.687535	7.487063	7.525143	60.05189
7	23.88829	1.103647	7.966080	7.420739	59.62124
8	23.16115	1.601586	7.858586	7.475457	59.90322

IV. Conclusion

In this paper, we investigated our results shows that there is long-run relationship between the Algerian exports and its most external shocks can be affected on exports performance. However, our estimation of a VECM model indicates that granger causality from reel and monetary (exchange rate) shocks to Algerian exports. A result of this stady helps explain the Algerian government how can reduce them vulnerability to such shocks.

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