Black Market Exchange Rate and Macroeconomic Performance in Algeria: What Impact?

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Abstract: Excessive control on foreign exchange market undertaken by Algerian government for nearly four decades has led to black market for foreign currencies. As a consequence, two exchange rates (official and black) coexist and operate simultaneously. Despite its negative impact on the Algerian economy, black market exchange rate has not, so far, attracted attention of researchers. The aim of this paper is twofold. First, it attempts to highlight the determinants of the black market exchange rate premium in Algeria over the period 1980- 2016. Second, the impact of such premium on Algerian macroeconomic performance is assessed by focusing on the main macroeconomic indicators, these are namely; economic growth, inflation, foreign direct investment and balance of payment. Our empirical results point out that variables such as money supply, terms of trade, economic growth and real exchange rate affect significantly the black market exchange rate premium. Furthermore, the results reveal a harmful effect of the black market exchange rate premium on the Algerian macroeconomic performance. This effect was captured by using Impulse response functions (IRF) which show the premium's negative shock on economic growth, foreign direct investment and balance of payment. Inflation was however, positively affected. The same effect was found when a variance analysis was introduced. According to the above mentioned results, this paper contributes to the existing literature on the black market for foreign currencies. As far as policy makers are concerned, the gap between the two rates should be narrowed by means of reducing the demand for foreign currencies or unifying the two rates. Finaly, the phenomenon of black market exchange rate has to be taken into account when drawing monetary and fiscal policies in Algeria.

Keywords : Black market exchange rate premium, Macroeconomic performance, Impulse response functions.

Introduction

Black markets for foreign currencies arise in less developed countries as a direct consequence of government execessive control on foreign exchange. The general consensus in the literature on the parallel exchange rate is its negative effects on macroeconomic performance of a country. According to Kiguel and O'Connel (1995), a black market exchange rate premium (the gap between official and black rate), means a market distortion, as it feeds back into the economy through illegal trade and prices. The authors conclude that large black rate premium has harmful effects on official exports and thus on growth. Moreover, the gap between the two rates causes foreign exchange activities and illicit trade which lead to capital flight and deviation of remittance flows from its official channels (Kiguel & O'Connel, 1995; Elbadawi, 1994).

Theoritically, black market for foreign currencies can be best explained and analyzed by three approaches, these are namely; real trade models, porfolio balance models and monetary models. According to real trade models, black market exchange rate is a direct consequence of a mismatch between demand and supply of foreign currencies. such disequilibrium is due to government heavy intervention in trade by means of

tariffs and quotas, thing that creates an excess demand for foreign currency which in turn creates an intensive for black market for foreign currencies(Nowak, 1984). Models of real trade however, were criticized on the basis of their concentration only on black market itself neglecting therefore the interaction of this latter with other macroeconomic variables (Agenor, 1992).

The second approach ; the portfolio balance, developed by De Macedo (1987) and Dornbusch et al. (1983) shifts the emphasize to the role of foreign currency as an asset in portfolio composition. Advocates of this view argue that loss of confidence in the domestic money due inflation, taxes and low real interest rate stimulate the demand for foreign currency, as a hedge and store of value. The role of portfolio as a major cause of the black market emergence was cofirmed by studies of Degefe (1994) and Aron and Elbadawi (1992).

Black markets for foreign currencies, according to the monetary approach stem from high money growth Blejer (1978). Siddiki (2000) also argued that an excess money supply leads to inflationary pressures and thus depreciates the exchange rate which affects the demand for money and causes the black market rates and high demand for foreign currency. An excess money supply may also happen following an increase in interest rate which cause black markets for foreign currencies by the same manner. Given this introduction, the rest of this paper is structured as follows. Section 2 provides a brief profile of black market for foreign currencies in Algeria, section 3 reviews the literature on black market exchange rate. Section 4 describes the data, methodology and presents the empirical results while Section 5 summarizes the main findings, provides an economic interpretation and some policy recommendations.

A Profile of Black Market for Currencies in Algeria

After it independence, Algeria opted for a planned economy system that lasted almost for three decades. National currency (Algerian dinar) was subjected to a set of policies that had reflected the prevailing economic system characterized by a strict government control on foreign exchange. This control policy is seen as the major cause for the emergence of the black market for foreign currencies in the early seventies. Exchange controls in Algeria, though substantially reduced through the adoption of the structural adjustment program (S.A.P), still have its effects. This can be seen clearly from the volume of transactions carried out through the black market.

Supply of funds in this market generally comes from emigrants in France, retirement pensions and other pensions paid in foreign currency and tourist industry while demand originates mainly from individuals wishing to open bank accounts in foreign currency for visas purposes. As a result, a large part of foreign currency liquidity flowing through the black market is regularly held with banks in foreign currency accounts form. This is a positive aspect because it gives the banking system the opportunity to channel some Algerian foreign currency resources available from emigrants, who for obvious reasons prefer the informal market channel rather than the formal sector. Another significant portion of the currency however, flows on the parallel market, and is difficult to assess, goes to the benefit of importers of goods and services. These are a fringe engaged in importing prohibited goods or counterfeit, which generally strengthens the informal sector. Finally, the last part of the foreign exchange resources available to the informal sector, takes the form of capital flight. Indeed, many Algerians invest heavily in activities such as restaurants, hotels, services, or property outright in some countries such as France, Spain and Tunisia.

Two main phases can be distinguished in the history of black market for foreign currency in Algeria. The first one dates back to the seventies and a large part of the eighties, characterized by a strict exchange controls, shortages of all kinds and a total absence of effective and efficient banking system. The second and most crucial stage began with the adoption of the structural adjustment program in Algeria in 1994. The new procedures such as the liberalization of the national economy, the significant change in the liberalization of the convertibility of the dinar that Algeria has undertaken since then were justified as essential for economic development, trade facilitation and foreign investment encouragement. Given the above realities, the black market for currencies in Algeria has taken new dimensions, and therefore deserves more attention.

The purpose of this work is twofolds. First, we attempt to identify the main causes of the black market exchange rate premium in Algeria over the period 1980- 2016. Second, the impact of such premium on Algerian macroeconomic performance is assessed by focusing on the main macroeconomic indicators, these are namely; economic growth, inflation, foreign direct investment and balance of payment. This work is a contribution to the existing literature on the impact of black market exchange rate.

The impact of the black market exchange rate on the macroeconomic performance in Algeria is worth investigating for several reasons: First, compared with other countries, literature on this issue in Algeria is rather scarce. Second, the area of the black market exchange rate in Algeria is unexplored, so, no study on the effects of the black market exchange rate on the Algerian macroeconomic performance has published yet. Finally, the Statistics about black market exchange rate in Algeria bring out an active black market for currencies. The gap between the official exchange rate of the Algerian dinar against the euro and that observed on the black market has widened. The difference amounts today to 60% or even more. The foregoing discussion reveals the importance of black market exchange rate as an important determinant of the demand for money in Algeria.

Literature Review

Considerable attention has been devoted over the last few decades to the issue of black exchange markets from both researchers and policy makers. This is due to the detrimental effect that this phenomenon can have on macroeconomic performance in terms of high inflation rate, low economic growth and low export performance. The literature review on black market exchange rate is split into two subsections as follows:

Black Market Exchange Rate Determination

There have been a vast number of empirical studies that investigated the determinants of black market exchange rate. For example, Ebaidalla Mahjoub Ebaidalla(2017) investigated the determinants of parallel foreign exchange market and its effect on macroeconomic performance in Sudan. Using data for the period 1979-2014, his results show that the parallel exchange rate premium is significantly affected by policy variables such as, real exchange rate, trade openness and money supply. He also found that GDP growth, expected rate of devaluation, and foreign aid have a significant effect on the parallel exchange premium.

Degefa (2001) investigated the determinants of parallel foreign exchange market and its effect on macroeconomic performance in Ethiopia. Using the stock-flow model of Kiguel and O'Connel (1994) and annual time series data covering 1966–1996, his results show that real money balances, real effective exchange rate and inflow of aid have positive effect on parallel market premium in the long-run. Moreover, the terms of trade negatively affects the premium only in the short run. He also found that inflation is Granger-cause the parallel exchange rate premium.

Determinants of black market exchange rate premium have been also investigated by Aron and Elbadawi (1992) for the case of Zambia. They used a portfolio model and annual data over the period 1970-1987. They found that the interest parity differential and the change in the stock of real domestic money are the most significant factors affecting positively the parallel exchange rate premium. Their results also show that the term of trade and foreign aid grants have negative and significant effect on exchange rate premium.

The study of Elbadawi (1992) for the case of Sudan attributed the emergence of black market premium to mis-invoicing and smuggling of exports and imports, and diversion of remittances of expatriates to the black market for foreign exchange. He also found that real exchange depreciation has a significant negative effect on the premium in the both short and long run. Finally, the author pointed out that trade liberalization policy exerts negative and significant impact on the parallel market premium. Nkurunziza (2002) examined the factors that affecting parallel exchange rate premium in Burundi using annual time series data for the period 1970-1988. His results show that expected rate of devaluation, economic growth and trade policy are the most significant factors influencing parallel exchange rate premium.

In the same vein, Siddiki (2000) investigated the determinants of parallel market premium in India over the period 1965-1994. His findings reveal that the black market for foreign exchange is influenced significantly by the official exchange rate, trade liberalization, foreign reserves, and by the interest rate. Moreover, his results show that real per capita income, money supply and political instability do not have any significant effect on black exchange rate premium.

The Impact of Black Market Exchange Rate on Macroeconomic Performance

Studies that have considered the effects of black market exchange rate on macroeconomic performance though are few compared to those that have investigated for the causes of black market exchange rate, agree about the

black market rate premium devastating impact on macroeconomic performance. The impact of black market rate premium was investigated for the first time by Elbadawi (1994) in Sudan. He argued that an increasing in parallel premium exerts negative impact on official exports and tax revenue from foreign trade, as well as a positive effect on capital flight. According to him, a rising premium and expanding black market for foreign exchange could have serious fiscal and commercial impact by squeezing the tax base in foreign trade transactions and by expanding the opportunities for large scale rent seeking activities. He also pointed out that a high premium aggravates the debt problem and foreign exchange constraint through its effects on capital flight. Finally, he found that exchange rate premium has a negative impact on the remittances sent by expatriates Sudanese working abroad.

Kiguel and O'Connel (1995) analyzed the phenomenon of black market exchange rate in eight developing countries: Argentina, Ghana, Mexico, Sudan, Tanzania, Turkey, Venezuela and Zambia. They found evidence of the damaging effects of the black market rate premium on macroeconomic performance in these countries. The same effect was revealed by Pinto (1988) in Sub Saharan Africa, Munoz (2008) for Zimbabwe and Degefa(2001) for the case of Ethiopia.

Ebaidallah Mahjoub Ebaidallah (2017), provided another evidence from Sudan about the impact of black market exchange rate premium on macroeconomic performance. Applying the ARDL technique for a set of annual data covering the period 1979-2014, he found that the parallel exchange rate premium is significantly affected by policy variables such as, real exchange rate, trade openness and money supply. His results also reveal that GDP growth, expected rate of devaluation, and foreign aid have a significant effect on the parallel exchange premium. Moreover, the results demonstrate that parallel premium has a detrimental impact on both economic growth and export performance.

Data, Methodology and Results

In order to achieve our objectives, this section will be divided two sub-sections. The first one deals with the determinants of the black market exchange rate premium while the second one will be allocated to the impact of the black rate premium on macroeconomic performance.

Black Market Exchange Rate Determination

As discussed in the literature review, many economic variables can cause the black markets for foreign currencies. Of the various models developed to single out the determinants of the parallel market premium for foreign exchange, the stock-flow model of Kiguel and O'Connel (1994) is adapted in this study for reasons of simplicity, more appropriateness for the Algerian case and for the availability of reliable data. The estimable econometric equation of black market premium could be expressed in the following form:

Of the various models developed to single out the determinants of the parallel market premium for foreign exchange, the stock-flow model of Kiguel and O'Connel (1994) is adapted

$$Z = B_0 + B_1\,REER + B_2\,\frac{M2}{TCE} + B_3\,TOT + B_4\,GDP + B_5\,IR + U_t \quad (1)$$

The above formula implies that the black market premium Z is explained by real effective exchange rate (REER), real GDP, the ration money supply M2 to nominal exchange rate, terms of trade and international reserves. This study is based on annual time series data covering 1980-2016. According to theoretical and empirical evidence, the coefficient of real official exchange rate is expected to be positive. Coefficients of real GDP, ratio of M2 to nominal exchange rate (M2/TCE) and that of terms of trade are all expected to be negative.

The ARDL Estimation Technique

Equation (1) will be estimated using a cointegration ARDL bounds testing approach developed by Pesaran (1997), Pesaran and Shin (1999) and Pesaran et al. (2001). This method has many advantages over the traditional approaches of cointegration such as, Engle and Granger (1987), Johanson and Juselius (1990)

and Phillips and Hansen (1990).

First, the bound testing (ARDL) technique is more appropriate for small sample studies. Second, the bound testing procedure is simple compared to other multivariate cointegration techniques such as, Johansen and Juselius; thus, it allows cointegration relationship to be estimated by OLS once the lag order of the model is identified. Third, unlike Johansen- Juselius approach, the bounds testing (ARDL) technique does not require a pre-testing of the variables used in the analysis for unit roots. Therefore, its applicable irrespective of whether the underlying regressors are purely *I(0)*, purely *I(1)*, or a mixture of both. Fourth, ARDL approach also is suitable for the data that characterized by structural breaks. Finally, the traditional cointegration technique may also suffer from the problems of endogeneity while ARDL method can distinguish dependent and explanatory variables.

ARDL method yields consistent and robust results because it allows describing the existence of an equilibrium-relationship in terms of long-run and short-run dynamics without losing long-run information (Pesaran et al., 2001). Thus, this study tests the existence of the long-run relationship (cointegration) using bound testing (ARDL) technique for cointegration. Following Pesaran and Pesaran (1997), Pesaran and Shin (1999) and Pesaran and Smith (2001), the unrestricted error-correction version of ARDL framework for equation (1) can be written as follows:

$$\Delta y_t = \alpha + \sum_{i=1}^{n} \gamma_i \Delta Y_{t-i} + \sum_{i=1}^{n} \beta_i \Delta X_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 X_{t-1} + \varepsilon_t \dots \dots \dots (2)$$

The first part in equation (2) with the summation signs represents the error correction dynamics while the second part (with λs) corresponds to the long run relationship. According to Pesaran and Pesaran (1997), there are two steps for implementing the *ARDL* approach to cointegration procedure. First, we test the existence of the long run relationship between the variables in the system using bound cointegration test. Precisely, the null hypothesis of having no integration or long run relationship among variables in the system, $H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ is tested against the alternative hypothesis $H_1: \delta_1 \neq 0, \delta_2 \neq 0, \delta_3 \neq 0, \delta_4 \neq 0$. by judging from the F-statistics.

Since the distribution of this F- statistics is non-standard regardless of whether the variables in the system are stationary or non-stationary, we use the critical values of the F-statistics provided in Pesaran et al. (2001). Pesaran et al. (2001) tabulates two sets of critical values, the first one assumes all variables are *I(1)* and the second one assumes that they are all *I(0)*. According to Pesaran and Pesaran (1997) if the calculated F-statistics is higher than the appropriate upper bound of critical value, the null hypothesis is rejected, indicating cointegration. If the value of F-statistics falls below the appropriate lower bound, the null hypothesis cannot be rejected, supporting lack of cointegration. Finally, if the computed F-statistics lies within the lower and upper bounds, the result would be inconclusive.

After the existence of the cointegration between variables is confirmed, the second step is to estimate the long run coefficients and the error correction representation through *ARDL* approach to cointegration and the use of OLS. The long run coefficients are derived from the estimation of the second part of equation (2) with the level, whereas the short-run error correction estimators are estimated using the first difference of the first part of that equation. The lag order of *ARDL* specification is chosen using Akaike Information Criteria (*AIC*).

Empirical Results and Discussion

Prior to investigate the effect of parallel market exchange rate and its impact on macroeconomic performance, the analysis proceeds via testing the properties of time series using unit root and cointegration tests. First, the order of integration of all variables will be identified, using Augmented Dickey-Fuller (ADF) and Philips- Perron (PP) tests. Even though, ARDL approach does not necessitate a unit root test, but in the case of variables that integrated of order two (i.e, I(2)) the computed F- statistics provided by Pesaran et al. (2001) will be not valid, because the bounds test is designed on the assumption that the variables are I(0) or I(1). Therefore, we implemented the unit root test in the ARDL context to ensure that none of the variables are integrated of order more than I(1). The order of integration for each variable is tested using the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests. The results of the unit root test for each variable are reported in Table 1.

Table1. Unit root test results for all variables

Variables			Test PP	Test ADF	
	1st Diff	Level		1st Diff	Level
Z	10.35***	1.78		7.23***	0.91
REER	3.28***	1.60		5.23***	1.70
M2/TCE	-	2.70***		-	2.70***
TOT	7.50***	2.17		7.50***	2.52
GDP	8.58***	2.35		7.19***	1.71
IR		4.41***			4.41***
CB	6.14	1.69		5.32	1.61
INF	5.40	2.19		5.38	2.07
FDI	7.76	2.08		4.35	1.61
M2	4.43	1.26		4.47	1.60

Table 2. Statistical indicators for estimating Ardl model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Z(-1)	-0.567092	0.298195	-1.901749	0.1534
Z(-2)	-0.181595	0.337812	-0.537564	0.6282
Z(-3)	-2.079147	0.581671	-3.574436	0.0374
Z(-4)	-2.573535	0.718883	-3.579909	0.0373
TOT	-1.869015	0.328189	-5.694927	0.0107
TOT(-1)	0.464461	0.603333	0.769824	0.4975
TOT(-2)	0.876977	0.866400	1.012208	0.3860
TOT(-3)	-2.509796	0.874003	-2.871609	0.0640
TOT(-4)	-0.852169	0.342220	-2.490123	0.0885
IR	3.68^E-09	1.48^E-09	2.486749	0.0887
IR(-1)	-5.14^E-09	2.89^E-09	-1.778777	0.1733
IR(-2)	4.36^E-09	2.78^E-09	1.569051	0.2146
IR(-3)	3.27^E-09	2.50^E-09	1.311983	0.2809
IR(-4)	-3.98^E-09	1.66^E-09	-2.398962	0.0960
IRERE	4.575472	0.821498	5.569666	0.0114
IRERE(-1)	1.640416	1.640818	0.999755	0.3911
IRERE(-2)	-0.101185	1.154901	-0.087614	0.9357
IRERE(-3)	7.146520	2.797717	2.554411	0.0836
IRERE(-4)	-4.287018	1.303595	-3.288613	0.0461
M	-146.1462	40.32976	-3.623780	0.0362
M(-1)	-14.58577	19.49794	-0.748067	0.5087
M(-2)	60.87676	31.04872	1.960685	0.1448
M(-3)	-94.41208	40.07581	-2.355837	0.0998
M(-4)	22.56037	12.68287	1.778806	0.1733
GDP	-30.35133	8.132166	-3.732256	0.0335
GDP(-1)	-7.429622	3.129831	-2.373809	0.0982
GDP(-2)	4.214529	2.646514	1.592483	0.2095
GDP(-3)	-7.459823	2.369178	-3.148697	0.0513
GDP(-4)	-3.881435	2.022893	-1.918754	0.1508
C	-311.4041	232.2945	-1.340557	0.2725
R-squared	0.978423	Mean dependent var		37.54232
Adjusted R-squared	0.769850	S.D. dependent var		27.40944
S.E. of regression	13.14939	Akaike info criterion		7.410915
Sum squared resid	518.7197	Schwarz criterion		8.771376
Log likelihood	-92.28010			
F-statistic	4.691022	Durbin-Watson stat		2.971093
Prob(F-statistic)	0.113548			

According to the results in Table 1, most of the variables are non-stationary at level, except the ratio of M2/TCE and international reserves (IR) which are integrated of order I(0). When taking the variables in the first difference, the results show that all variables are I(1), by both Augmented Dickey-Fuller and Philips-Perron test. Therefore, we can conclude that the series are mixture of I(1) and I(0). This result

represents a suitable rationale for using ARDL approach; since the conventional test of Johanson and Juselius (1990) requires that all variables must have the same order of integration.

After implementing the stationarity tests to ensure the order of integration of the variables, the next step in ARDL approach is to test for the existence of a long-run casual relationship between the variables using the bounds test approach developed by Peasran et al. (2001). Since the test is sensitive to the lag length, this latter is determined according to Akaike Information Criterion (AIC) and presented in Table 2 above.

According to table 2, the ideal number of lags is 4, thus Z can be written in the following form :

$$Z = f(REER_{t-j}, GDP_{t-j}, (M2/TCE)_{t-j}, TOT_{t-j}, IR_{t-j}). \quad j = 1, 2, 3, 4$$

The next step within the ARDL approach is is to test for the existence of a long-run casual relationship between the variables using the bounds test approach developed by Peasran et al. (2001). The results of cointegration test are reported in Table 3.

Table 3. Cointegration test_ F bounds test

Test Statistic	Value	k
F-statistic	5.204794	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

The result of bound tests in table 3 shows that the calculated F-statistics is statistically significant (i.e. higher than the upper bound) at 1% level of significance. This indicates that the null hypothesis of no cointegration between the variables is rejected. In other words, there is a long relationship between the black exchange rate, real effective exchange rate, economic growth, terms of trade and international reserves. Having the existence of a cointegration relationship between the variables in our model, the next step is to examine the determinants of parallel exchange rate in Algeria using ARDL approach for cointegration. To identify the factors that affecting parallel market for exchange rate we estimate equation (1) using ARDL method. First, the results of long-run ARDL model using the specification of (4, 4, 4, 4, 4), selected based on AIC, are reported in Table 4 below:

Table 4. Results of estimated long run coefficients: black exchange rate premium

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT	-0.607611	0.183263	-3.315512	0.0452
IR	0.000000	0.000000	6.587101	0.0071
REER	1.401919	0.211402	6.631537	0.0070
M2/TCE	-26.823463	4.726987	-5.674537	0.0108
GDP	-7.015324	1.054797	-6.650875	0.0069
C	-48.646484	30.544548	-1.592640	0.2095

From long run coefficients reported in table 4, we can see clearly that all the mentioned variables have a significant impact on the black exchange premium in the long run.Therefore, the long run equation for black market determination in Algeria takes the form:

$$Z = -48.6465 + 1.4019 REER - 7.0153 GDP$$
$$- 26.8235 M2/TCE - 0.6076 TOT + 0.0000 IR$$

As far as short-run dynamics are concerned, short-term elasticities (coefficients) are obtained based on the estimation of the ECM model under the ARDL methodology (4, 4, 4, 4, 4) and the Akaike Information Criteria as shown by table 5 below . The ECM results indicate that the coefficient of slowing down the error correction term shows the returnof the parallel exchange rate premium to its long-term equilibrium value with a 6.40% imbalance, ie, the delay in the return of the parallel exchange rate premium to its long-term equilibrium value, which reflects the exchange rate fluctuations in the market. Furtheremore, the determinants have significant

effects on the black exchange rate premium, which varies in response (positive and negative) with different lag times.

Table **5**. Results of error correction representation of ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Z(-1))	4.834277	1.206791	4.005894	0.0279
D(Z(-2))	4.652682	1.280117	3.634575	0.0359
D(Z(-3))	2.573535	0.718883	3.579909	0.0373
D(TOT)	-1.869015	0.328189	-5.694927	0.0107
D(TOT(-1))	-0.876977	0.866400	-1.012208	0.3860
D(TOT(-2))	2.509796	0.874003	2.871609	0.0640
D(TOT(-3))	0.852169	0.342220	2.490123	0.0885
D(IR)	0.000000	0.000000	2.486749	0.0887
D(IR(-1))	-0.000000	0.000000	-1.569051	0.2146
D(IR(-2))	-0.000000	0.000000	-1.311983	0.2809
D(IR(-3))	0.000000	0.000000	2.398962	0.0960
D(IRERE)	4.575472	0.821498	5.569666	0.0114
D(REER(-1))	0.101185	1.154901	0.087614	0.9357
D(REER (-2))	-7.146520	2.797717	-2.554411	0.0836
D(REER (-3))	4.287018	1.303595	3.288613	0.0461
D(M)	-146.146176	40.329763	-3.623780	0.0362
D(M(-1))	-60.876757	31.048717	-1.960685	0.1448
D(M(-2))	94.412080	40.075811	2.355837	0.0998
D(M(-3))	-22.560373	12.682874	-1.778806	0.1733
D(GDP)	-30.351330	8.132166	-3.732256	0.0335
D(GDP(-1))	-4.214529	2.646514	-1.592483	0.2095
D(GDP(-2))	7.459823	2.369178	3.148697	0.0513
D(GDP(-3))	3.881435	2.022893	1.918754	0.1508
CointEq(-1)	-6.401369	1.358787	-4.711091	0.0181

* ARDL(4,4,4,4,4) selected based on (AIC) : Dependent variable is black exchange rate premium

In order to make sure that the data used in this study are free of any structural changes, we perform the cumulative total of the CUSUM and the cumulative total of the CUSUM of Squares. These two tests are the most important tests in this field because it shows two important things: the existence of no structural change in the data and the long-term stability and consistency of parameters with short-term parameters. Many studies have shown that such tests are always associated with the ARDL methodology. The structural stability of the estimated coefficients of the error correction formula for the self-regression model of the distributed time lags is achieved if the CUSUM and CUSUM of Squares test patterns are within critical limits at 5%. In light of most of these studies, we applied the CUSUM and CUSUM of Squares tests proposed by Dublin Brown and Evans, (1975).

The Impact of Black Market Exchange Rate on Algerian Macroeconomic Performance

Over the past few decades, the issue of black exchange markets has gained considerable interest form researchers and politicians. This is because the huge gap between the black and official exchange rates has a negative impact on macroeconomic performance in terms of high inflation, low economic growth, Exports. After identifying the determinants of the black rate premium the next step is to assess the impact of this premium on some Algerian macroeconomic indicators, these are namely; real GDP, Inflation,FDI and commercial balance(CB). So, the the general equation that will be subject to the study is as follows:

$$GDP = C_1 + C_2 Z + C_3 INF + C_4 FDI + C_5 CB + \varepsilon_t$$

As for any econometric study, a stationarity test has to be done to see if the series can have a long- run relationship. This has already been done in table 1. Series in the equation above are not integrated of the same order which leads us to accept the null hypothesis; ie the existence of the unit roots and therefore, they are not stationary. Table 6 provides the results of the Johansen test for cointegration.
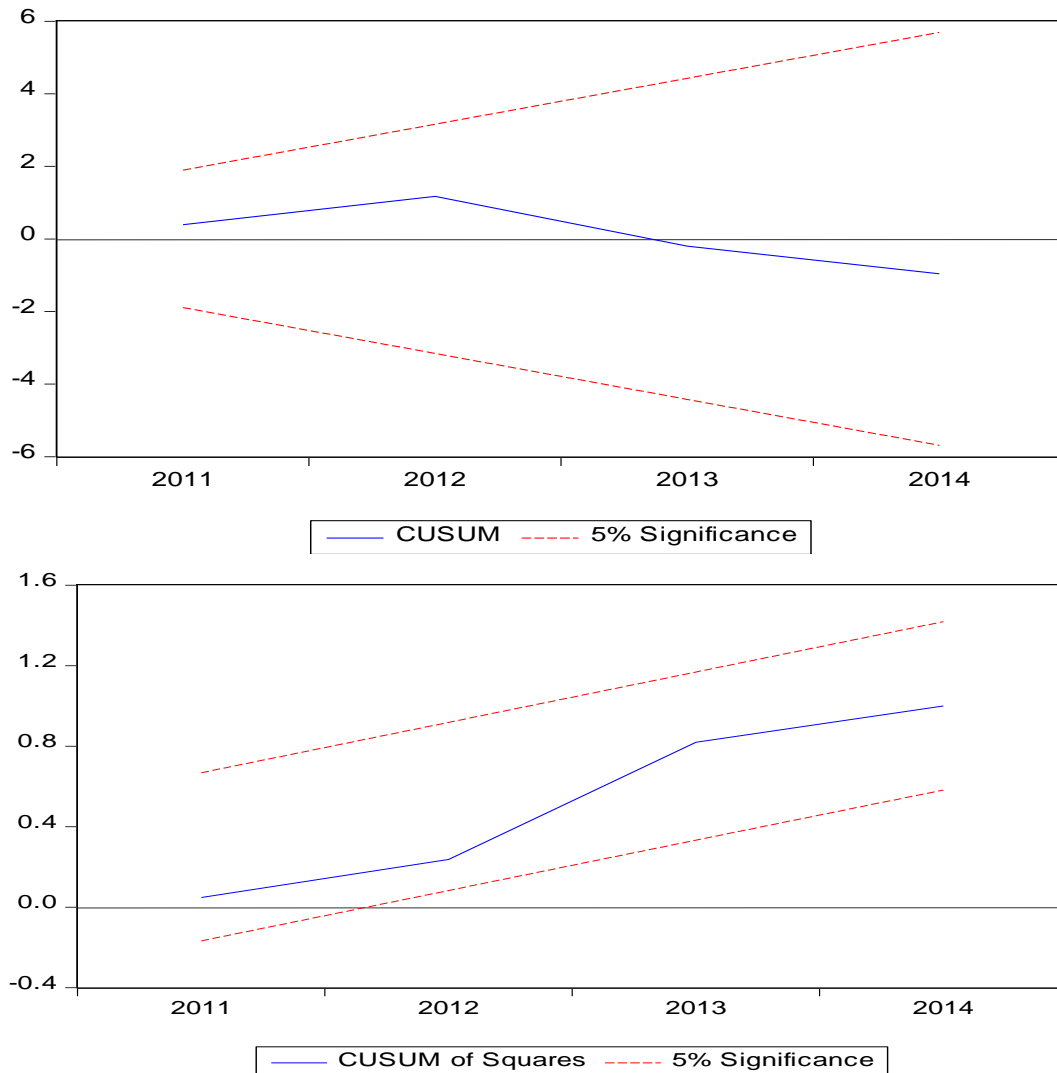
Figure1. Structural stability test for estimated Ardl model

Table 6. Johansen test for cointegration

		Unrestricted cointegration rank test (Trace)		
Hypothesized		Trace	0.05	
No. Of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.553995	50.76277	69.81889	0.6043
At most 1	0.334292	26.54004	47.85613	0.8711
At most 2	0.278784	14.33292	29.79707	0.8214
At most 3	0.136619	4.528414	15.49471	0.8567
At most 4	0.004039	0.121422	3.841466	0.7275

According to the results in table 6, the series in question can not have a long- run relationship, thus we will proceed to vector autoregression technique(VAR)**.** Table 7 shows the estimate of the autorregressive model based on (LR. FPE. AIC. SC.HQ) criteria.

Table 7. Lag order in the model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-433.8270	NA	3491605.	29.25513	29.48867	29.32984
1	-385.5211	77.28943*	758689.4*	27.70141*	29.10260*	28.14966*
2	-365.1663	25.78281	1203444.	28.01108	30.57995	28.83289

* Indicates ideal lag order selected by the criterion

The results obtained in table 8 indicate that the value R-squared or the explanatory capacity of the model is

equal to **0.47**. This indicates that there is a general and average linear trend of the series in question. The value of Durban Watson is equal to 1.90 thus, there is no error autocorrelation which means that the series are stationary at level.

Table 8. Results of estimated VAR short run relationship (OLS)

	GDP	Z	BP	INF	INVES
GDP(-1)	0.438281	-3.000164	0.186610	-0.125905	-0.071582
	(0.21093)	(3.01915)	(1.04492)	(0.47021)	(0.06523)
	[2.07786]	[-0.99371]	[0.17859]	[-0.26777]	[-1.09737]
GDP(-2)	-0.101976	2.098925	0.684300	-0.078619	0.050744
	(0.19958)	(2.85674)	(0.98872)	(0.44491)	(0.06172)
	[-0.51094]	[0.73473]	[0.69211]	[-0.17671]	[0.82215]
Z(-1)	-0.006595	0.006183	0.190340	0.026725	0.000547
	(0.01775)	(0.25409)	(0.08794)	(0.03957)	(0.00549)
	[-0.37150]	[0.02433]	[2.16446]	[0.67536]	[0.09960]
Z(-2)	-0.024335	0.099620	-0.108693	-0.006583	0.003135
	(0.01458)	(0.20868)	(0.07222)	(0.03250)	(0.00451)
	[-1.66916]	[0.47738]	[-1.50496]	[-0.20257]	[0.69540]
BP(-1)	-0.036782	0.636694	1.013779	0.138284	0.002696
	(0.04352)	(0.62299)	(0.21562)	(0.09703)	(0.01346)
	[-0.84507]	[1.02199]	[4.70175]	[1.42523]	[0.20030]
BP(-2)	0.027087	0.249379	-0.649655	-0.192104	0.003572
	(0.06765)	(0.96824)	(0.33511)	(0.15080)	(0.02092)
	[0.40043]	[0.25756]	[-1.93865]	[-1.27394]	[0.17074]
INF(-1)	-0.101096	0.122280	0.215757	1.113810	-0.035652
	(0.09392)	(1.34438)	(0.46529)	(0.20938)	(0.02905)
	[-1.07636]	[0.09096]	[0.46371]	[5.31968]	[-1.22744]
INF(-2)	0.212083	0.943508	-0.033579	-0.221546	-0.022830
	(0.11281)	(1.61468)	(0.55884)	(0.25147)	(0.03489)
	[1.88003]	[0.58433]	[-0.06009]	[-0.88099]	[-0.65442]
INVES(-1)	0.694600	-3.246679	2.652224	0.423289	0.325895
	(0.96099)	(13.7552)	(4.76066)	(2.14225)	(0.29719)
	[0.72280]	[-0.23603]	[0.55711]	[0.19759]	[1.09659]
INVES(-2)	0.943016	9.605197	3.696377	-1.475443	0.095908
	(0.83991)	(12.0221)	(4.16082)	(1.87233)	(0.25974)
	[1.12276]	[0.79896]	[0.88838]	[-0.78803]	[0.36924]
C	1.192681	14.82769	-7.755427	2.497652	0.718162
	(1.59293)	(22.8005)	(7.89123)	(3.55097)	(0.49262)
	[0.74873]	[0.65032]	[-0.98279]	[0.70337]	[1.45784]
R-squared	0.470544	0.321598	0.699372	0.761766	0.584992
Adj. R-squared	0.191882	-0.035455	0.541146	0.636379	0.366567
Sum sq. resids	65.46495	13412.28	1606.585	325.3188	6.260912
S.E. equation	1.856212	26.56896	9.195494	4.137879	0.574040
F-statistic	1.688587	0.900700	4.420096	6.075347	2.678226
Log likelihood	-54.27292	-134.1091	-102.2782	-78.32228	-19.06508
Akaike AIC	4.351528	9.673939	7.551879	5.954818	2.004339
Schwarz SC	4.865300	10.18771	8.065651	6.468591	2.518111
Mean dependent	3.098667	32.58235	4.627667	7.083606	0.732193
S.D. dependent	2.064859	26.11012	13.57494	6.862045	0.721260

Table 9 below presents the estimating equations. According to these equations, the regression coefficient of the black exchange rate is not significant for macroeconomic variables with a value of **(-0.024)** which indicates the negative impact of the parallel exchange rate variable on Algeria's economic growth in the short term. This reflects the reality of the Algerian dinar purchasing power .In addition transactions in the black market are not t subjected to tax and depriving thus, the public treasury of a significant source of support for the state budget.

This means that the loss is double for the banking system and for the state treasury. Thing that contributes to a slowdown in economic growth rates, which leads to imbalance in financial stability and negative effects on the main activities of the economy, which is consistent with the low GDP growth rate which reached the average of (-0.5%) in the eight-year period (1986-1993). The Algerian dinar also experienced a rise in the black market in

the millennium years, where the black exchange rate reached 107.40 dinar per dollars in 2016 with the emergence of a growing difference between the value of official and informal exchange which has widened especially with the repercussions of the financial and economic crisis and scarcity of resources. All this coincided with the decline in economic growth rates in Algeria, which amounted to 3.7% in the same year.

Table 9. Estimating equations

Estimated eequations
GDP = 0.438281486034*GDP(-1) – 0.101975888533*GDP(-2) – 0.00659459887489*Z(-1) – 0.0243348853969*Z(-2) – 0.0367815706287*BP(-1) + 0.0270870517745*BP(-2) – 0.101095593109*INF(-1) + 0.2120826654*INF(-2) + 0.694599875759*INVES(-1) + 0.943015961839*INVES(-2) + 1.19268147283
INVES = - 0.0715824630775*GDP(-1) + 0.050744400596*GDP(-2) + 0.000546753693757*Z(-1) + 0.00313531578953*Z(-2)   +   0.00269613063539*BP(-1)   +   0.00357179796435*BP(-2)   – 0.0356524610197*INF(-1)   –   0.0228302600046*INF(-2)   +   0.325894507746*INVES(-1)   + 0.0959084186366*INVES(-2) + 0.71816206906
INF = - 0.125905431331*GDP(-1) – 0.0786188881259*GDP(-2) + 0.0267251519078*Z(-1) – 0.00658344447208*Z(-2) + 0.138283951105*BP(-1) – 0.192103736734*BP(-2) + 1.11380972371*INF(-1) – 0.221545912725*INF(-2) + 0.423288815387*INVES(-1) – 1.47544333726*INVES(-2) + 2.49765188649
BP = 0.186609686186*GDP(-1) + 0.68429981603*GDP(-2) + 0.190340354844*Z(-1) – 0.108693361691*Z(-2) + 1.01377910099*BP(-1) – 0.649655236738*BP(-2) + 0.215757460222*INF(-1) – 0.0335792062097*INF(-2) + 2.65222427165*INVES(-1) + 3.69637742466*INVES(-2) – 7.75542682148

Table 10 below summarizes the follwing points of causality :

- The parallel exchange rate premium affects the gross domestic product at a significant level of **5** percent by **0.02**. The existence of a parallel exchange rate leads to an imbalance in economic growth rates, which results in distortion of economic indicators in the form of lower estimates from reality or exaggerated estimates of economic growth leading to the failure of economic stability policies.
- We note that the ratio of the causal link from inflation to economic growth reached 0.08. This results is logical according to economic theory. The rise in prices will lead directly to the low level of economic growth. This can be due to the negative effects of inflation on the efficiency of the performance of macroeconomic mechanisms. Failure to achieve monetary stability results in an increase in inflation rates which negatively affect the performance of all economic activities. This reduces the economic growth rates due to the low efficiency of the distribution of resources through changes in the relative prices of these resources. In addition, inflation in the society raises the uncertainty of economic conditions in the future. This affects the investment decisions. Therefore, the volume of investment is reduced and the decisions of the savers are also affected when the price increase is expected due to the decrease in the real value of the savers. The low purchasing power of local currencies and erosion of the real value of the entry of individuals, which prompts them to demand better wages and raise salaries, which negatively affects economic growth.
- The ratio of the causal relationship of the balance of payments to the economic growth was **0.04**, as Algeria's exports are characterized by total control of hydrocarbons, which represent the main factor that controls the major balances. All the development strategies adopted were based on their financial structure on the resources derived from the export of hydrocarbons and the resulting fluctuations in the petroleum market In addition, fuel sales are priced in US dollars, reflecting the degree to which the Algerian economy is linked to this currency and its volatility.

Table 10. Causality test

Explanatory Variables \ Explained Variables	GDP	INF	INVES	Z	BP
GDP		0.53	0.77	0.50	0.20
INF	0 .08		0.26	0.77	0.82
INVES	0.24	0.26		0.65	0.56
Z	0.02	0.43	0.58		0.53
BP	0.04	0.03	0.07	0.36	

The estimated model achieves conditions of stability as shown by figure 2 .All coefficients are smaller than one (all roots fall within the unit circle)   which means that   the model does not have the problem of errors autocorrelation   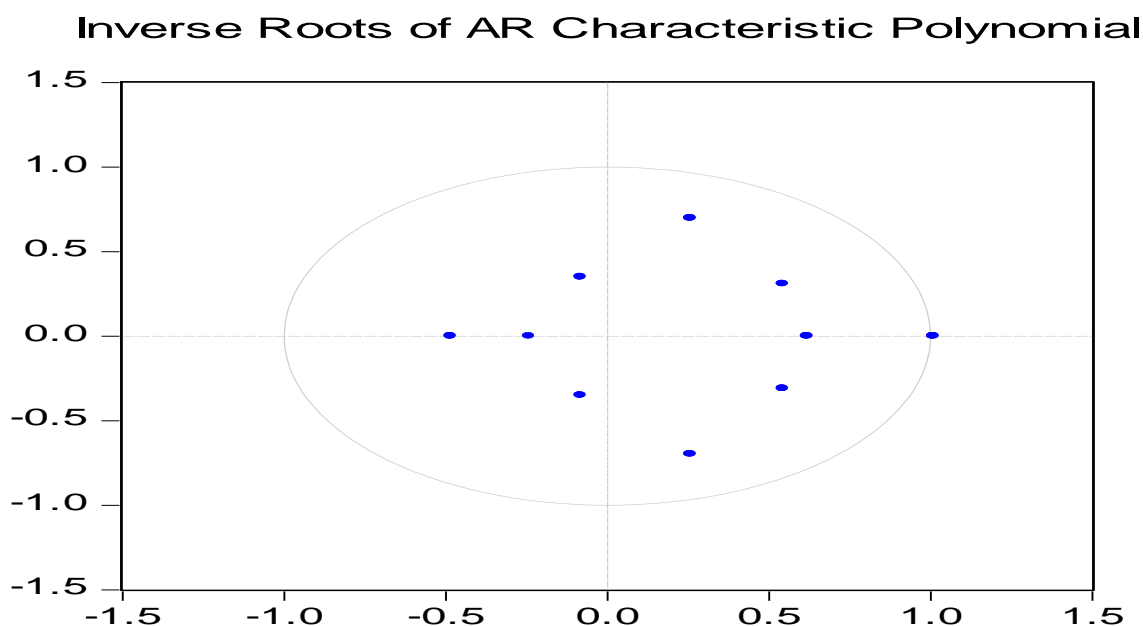   or   variance   instability.

Figure 2. Model stability

The above empirical analysis has investigated the impact of parallel exchange rate premium on macroeconomic indicators. for the purpose of further inference and robustness check for our above results; alternatively, we investigate the impact of exchange rate premium using multivariate analysis by implementing the variance decompositions and impulse response function based on unrestricted Vector Autoregression (VAR) model.

First,t the results of variance decomposition analysis are presented in Table 11. We note that :

- The parallel exchange rate premium is considered as the most important internal variable in the interpretation of the variation of the gross domestic product in the short term, it was estimated at 8.26 percent after the foreign direct investment. The rise in the money supply in the parallel market led the government to seek through its programs to find all the means to attract these funds and return them to the banking sector and thus exploit them in financing the economy, especially after the collapse of oil prices and the low income of the Algerian state and the search for financing alternatives for their development programs.
- The parallel exchange rate premium ranked first in the interpretation of inflation variance and the third in the interpretation of both FDI and balance of payments. It rose gradually and reached a maximum of 7.69% and 9.51%.

Table 11. Variance analysis

Period	S.E.	GDP	Z	BP	INF	INVES
			Variance Decomposition of GDP :			
1	1.856212	100.0000	0.000000	0.000000	0.000000	0.000000
2	2.185764	92.32360	0.307079	0.859561	3.526225	2.983535
3	2.418271	75.92575	8.268776	1.178105	2.916151	11.71122
4	2.482330	72.06004	8.224889	1.215142	3.219692	15.28023
5	2.494741	71.72129	8.145130	1.536530	3.468133	15.12891
6	2.512384	70.72158	8.031870	1.637483	4.543222	15.06584
7	2.531221	69.85796	7.960741	1.616316	5.720356	14.84463
8	2.550970	69.03904	8.039387	1.592037	6.628991	14.70055
9	2.568800	68.24208	8.179893	1.579514	7.335633	14.66288
10	2.585063	67.46546	8.278714	1.630760	8.013620	14.61145
			Variance Decomposition of Z :			

Period	S.E.	GDP	Z	BP	INF	INVES
1	26.56896	1.028371	98.97163	0.000000	0.000000	0.000000
2	28.01716	6.966108	89.53211	3.064462	0.040585	0.396733
3	31.13235	5.657857	76.02708	12.08412	3.868237	2.362709
4	32.92926	5.325796	70.28243	16.65215	4.911085	2.828533
5	33.98983	4.998974	67.17332	17.05594	6.054600	4.717165
6	34.55177	4.913717	65.85774	16.50654	6.490454	6.231551
7	34.76196	4.920540	65.23827	16.76263	6.442062	6.636500
8	34.90388	4.924929	64.70895	17.28728	6.485752	6.593086
9	35.04267	4.901291	64.25874	17.45691	6.756371	6.626690
10	35.14878	4.874662	63.98584	17.37270	7.037638	6.729159
Variance Decomposition of BP :						
Period	S.E.	GDP	Z	BP	INF	INVES
1	9.195494	2.955974	12.52654	84.51748	0.000000	0.000000
2	13.13542	1.751172	9.019507	87.69078	0.334059	1.204484
3	14.83505	1.374147	8.387692	82.17585	0.814475	7.247833
4	15.93532	2.067503	8.513086	72.04154	1.063797	16.31407
5	16.51261	2.857065	8.130460	67.78258	1.224026	20.00587
6	17.01241	3.361352	7.782560	65.66672	3.480726	19.70865
7	17.60872	3.563327	8.015012	62.19067	7.834576	18.39641
8	18.21895	3.592482	8.666714	58.12404	12.34176	17.27500
9	18.73961	3.593124	9.253624	55.22508	15.59208	16.33609
10	19.17534	3.616021	9.518665	53.62167	17.53007	15.71357
Variance Decomposition of INF :						
Period	S.E.	GDP	Z	BP	INF	INVES
1	4.137879	3.560540	9.112960	0.038175	87.28832	0.000000
2	6.421567	5.086226	10.66135	3.167311	80.95674	0.128369
3	8.129433	7.020162	13.89495	3.131843	75.67017	0.282874
4	9.362060	7.122506	15.76236	2.365412	74.31452	0.435208
5	10.34406	6.669066	16.54329	2.942731	73.14469	0.700223
6	11.18592	6.369225	16.17790	4.611386	71.47496	1.366527
7	11.95628	6.313378	15.37086	6.075596	69.66145	2.578721
8	12.69695	6.480829	14.52916	6.737267	68.09683	4.155915
9	13.44234	6.752619	13.81549	6.757420	67.05803	5.616448
10	14.21874	7.010188	13.28858	6.480284	66.59599	6.624954
Variance Decomposition of INVES :						
Period	S.E.	GDP	Z	BP	INF	INVES
1	0.574040	1.549566	2.246229	6.305096	0.242079	89.65703
2	0.628538	3.101461	1.903222	6.595101	5.674320	82.72590
3	0.691026	3.359677	1.574782	6.487586	18.87740	69.70055
4	0.789219	4.523403	1.884207	5.250657	34.77496	53.56677
5	0.892212	5.898950	3.924627	4.378037	42.99170	42.80669
6	0.985412	6.641292	5.644848	4.242686	46.71397	36.75721
7	1.070755	6.749821	6.736325	4.737593	48.93641	32.83985
8	1.152254	6.742179	7.264924	5.415939	50.58673	29.99023
9	1.233111	6.815704	7.512584	5.862026	52.02852	27.78116
10	1.315465	6.982821	7.697516	5.984395	53.34737	25.98790
Cholesky Ordering : GDP Z BP INF INVES						

Second, the results of impulse response functions of each macroeconomic variable to one standard deviation in parallel exchange rate premium are presented in Figure 3 : the following points are worth to be noted :

- The response of the gross domestic product to the shocks of the black exchange rate differential is almost negative throughout the study period and at close rates. The presence of two exchange rates, has negative repercussions on the national economy. The existence of a huge monetary mass outside the official channels and the widening phenomenon of currency exchange (dollarization) and widening gap between the black exchange rate and the official price increases the likelihood of a devaluation of the national currency and the negative effects

such as inflation and affects Algeria's budgets during the study periods.

- The FDI response to shocks of the parallel exchange rate premium was negative throughout the study period. The black exchange rate in the economy leads to the creation of a negative financial and economic environment that weakens the climate of foreign investment and encourages the phenomenon of capital flight abroad through informal and non-banking channels and thus the phenomenon of parallel economy and exacerbate the dilemma of tax evasion because traders dealing in these markets do not have records Trade and are not subject to the tax system and therefore do not pay taxes on their profits, causing the state to lose

- access to additional public revenues. Foreign direct investment flows have been declining since 2012, which coincided with the rise in the black exchange rate, which jumped to 77.53 dinars per dollar for the year 2011, where it was 72.93 dinars per dollar. In 2008, there was a significant increase in the percentage of foreign direct investments compared to 2007, which increased by 56.07%. This is in direct proportion to the decrease in the black exchange rate which reached 64.58 dinars per dollar compared to 2007. The pace of global investments was also reduced due to the financial crisis. The total inflow of imports reached 18% in 2010, reflecting the delayed impact of international investment flows towards Algeria, which coincided with the parallel exchange rate of 74.83 dinars per dollar in 2010.

- The black market for foreign currencies is popular because of smuggling in currencies, which are sold in the parallel market at a price much higher than the official price, which decreases the value of the Algerian dinar. The Algerian dinar is and marginalize against foreign currencies in economic transactions as reflected in the high cost of importing goods on suppliers who buy foreign currency from the black market and bear the degree of risk and all reflected on the high level of general prices of goods received by the consumer.
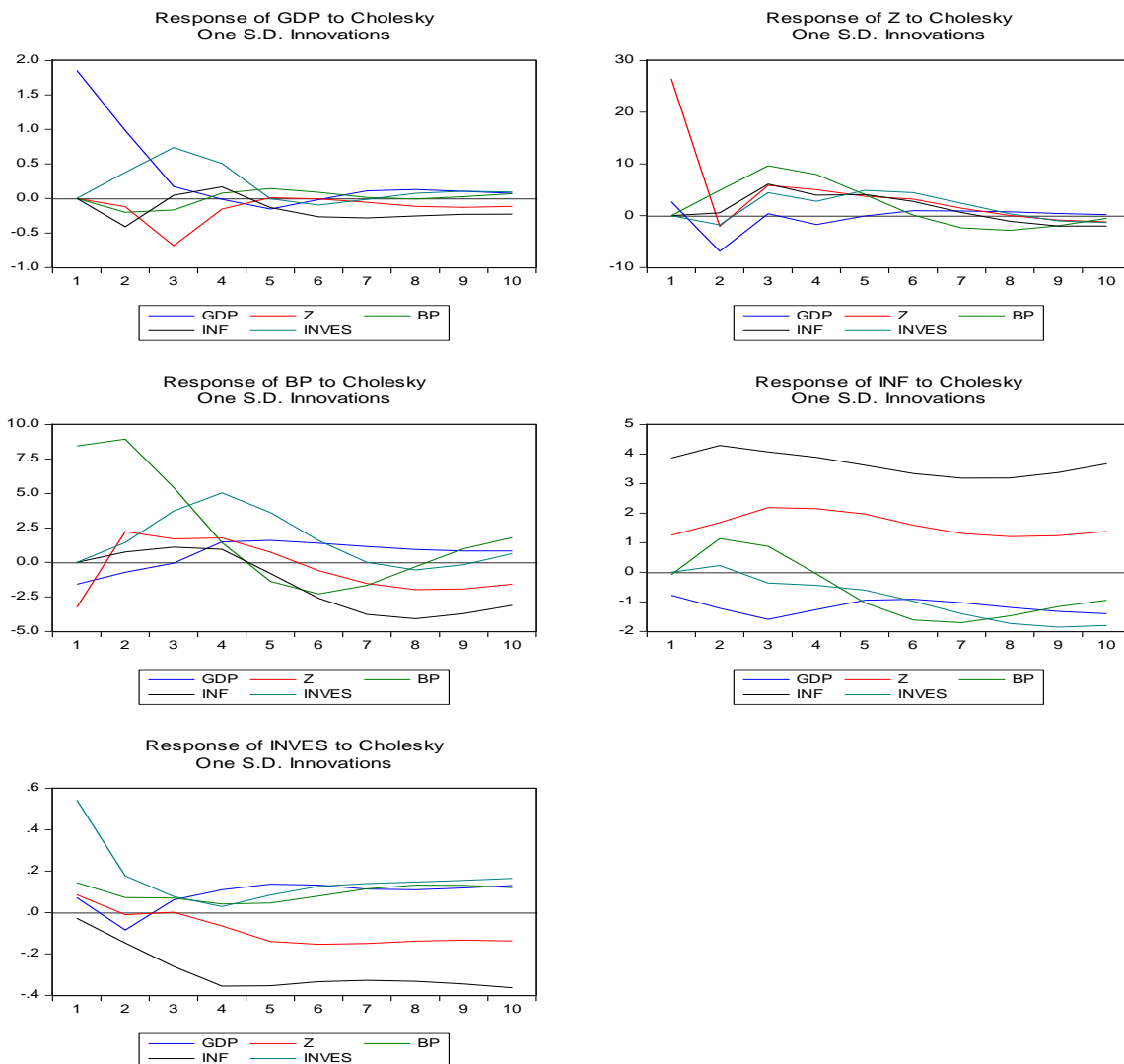

Figure 3. Results of impulse response functions

The parallel exchange rate shocks negatively affect the trade balance as the Algerian economy witnessed a fluctuation in oil prices which negatively impacted the balance of trade balance. The Algerian economy is distinguished by the low diversification of exports of non-hydrocarbon goods and the increasing pace of imports. The collapse of oil prices, the shortage of hard currency in banks and the tightening of the process of settling foreign operations at the level of commercial banks made the parallel market the only destination not to cover some ordinary needs but to smuggle the currency abroad as a result of the decline in confidence in the national currency. The sharp fall in oil prices in 1986 showed total economic imbalances, the vulnerability of the national economy and the decline in the value of oil exports by half between 1985 and 1986. The Authority resorted import restrictions, thus reducing imports by 43% in 1985-1987, The biggest deficit in 1995 was estimated at $ 6.3 billion. The main reason for the deficit in the balance of payments is the decrease in oil prices and consequently the decrease in the value of oil exports, which causes a deficit in the trade balance and thus the current balance and then the balance of payments.

Concluding Remarks

For more than three decades, the Algerian economy has undergone the black market phenomenon. Accordingly, two exchange rates (official and black) coexist and operate simultaneously. The gap between the two rates has widened since the adoption of the structural adjustment program imposed by the international monetary fund in 1994.This spread is accompanied by extremely disappointing economic performance. The aim of this study was to investigate the determinants of black market exchange rate premium and its impact on macroeconomic performance during the period 1980–2016. The analysis has focused on four key macroeconomic variables namely, economic growth, inflation and foreign direct investment and trade balance. Our econometric findings indicate that variables such as money supply, terms of trade, economic growth and real exchange rate affect significantly the black market exchange rate premium. Furthermore, the results reveal a detrimental effect of the black market exchange rate premium on the Algerian macroeconomic performance. This effect was captured by using Impulse response functions (IRF) which show the premium's negative shock on economic growth, foreign directinvestment and balance of payment. Inflation was however, positively affected. The same effect was found when a variance analysis was introduced.

Based on the above findings, effective policies need to be adopted in order to narrow the gap between parallel and official exchange rate. Mostly, gradual unification of the parallel and the official exchange markets should be adopted. This also needs to be accompanied by appropriate trade liberalization policies that enhance exports performance. In the context of the significant role of macroeconomic policy variables in reducing premium, policy makers need to pay a considerable attention to macroeconomic policies, such as money supply and real exchange rate. Thus, tightened fiscal and monetary policies, and adequate tariff policy should be followed to maintain the exchange rate at a sustainable stable level. In addition, expansionary policy that finances the budget deficits by money creation should be avoided in the short-run.

Scientific Ethics Declaration

Acknowledgements or Notes

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