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HOW FAR DOES THE CENTRAL BANK INFLUENCE ITS ECONOMIES? THE EXAMPLE OF ALGERIA

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Abstract: *This study focused on Algeria and it looked at how education quality affected the knowledge economy. The theoretical anchor was the endogenous or new growth hypothesis. Secondary sources were used to get panel-structured data that spanned 48 Algerian provinces in 22 years (1999–2020). The equations were estimated using the fixed-random effect model and Hausman test, Also the Kao (Engle Ganger-based) cointegration test proved that the series did indeed have a long-run connection. The findings indicated that the knowledge economy was boosted by a rise in students' Baccalaureate and Intermediate test success rates. This is due to the fact that a rise in exam success rates indicates that individuals at various educational levels are now receiving education of a higher caliber, and the economy depends on this caliber of education. The rise in students and professors is a sign that there are more knowledgeable people and specialized educators accessible to fuel the knowledge economy. As more educated citizens pass their exams and graduate from college, they are hired from the labor market into industries as significant production factors whose skills, values, and knowledge acquired through specialized training are expected to promote machine handling and coordination of other human and nonhuman production factors to fuel the knowledge economy. Teachers should be provided with ongoing professional development opportunities to help them provide instruction at all educational levels, according to a recommendation. This would improve their ability to educate and inspire students and help them do better on their intermediate and baccalaureate exams.*

Keywords: economic growth, monetary policy, monetary policy variables, money supply, oil prices, VECM.

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Introduction

Monetarism as a theory was developed by economists such as Milton Friedman and argues that for the sake of influencing inflation and interests, and ultimately industrial prosperity, monetary policy should focus on regulating its funding (Friedman, 1995). For theorists and money clerks, changes in the funding will cause changes at the level of the merchandise as well as facilities requested, which in turn will affect industrial prosperity. Keynesian economics, argues that government intervention, through fiscal actions, is necessary to make its industry steady and ensure industrial prosperity. Keynesians believe that changes in government spending and taxation can be of highly substantial control over economic performance. They also hold that fiscal programs can be used to stimulate demand and reduce unemployment (Keynes, 1936). According to the New Keynesian theory, monetary actions can make the industry steady, but only in conjunction with other policies that address market frictions and imperfections, such as fiscal policy.

Monetizing annual flows, including net foreign assets as well as domestic credit, increases all means of payment held by nonmeasure (IMF, 2022). To analyze financial agents and increases the money supply as a result. Since 2001, Algeria witnessed an increase in the value of hydrocarbon exports. The rise of hydrocarbon exports and their prices Algeria experienced since 2001, in addition to the extra in the general balance of income have made net foreign assets to be the pivotal counterparts to money supply M2. Their total has even exceeded that of M2 since the year 2005. Accordingly, the process of monetizing net flows coming from foreign reserves boosts even actual bank liquidity. The process can even increase the incomes of banks that are placed at the Central Bank. However, the Algerian economy remains far from strong and stable because almost 95% of its exports depend on the hydrocarbon sector, which has unsteady prices (Oussama & Ibtissem, 2022). The Algerian economy began to improve in 2021 due to the contagion added to the dropping prices of oil in 2020. The repeated foreign demand for oil, Algerian amplified manufacturing, and its increasing costs boosted Algerian industrial prosperity. Algeria witnessed a growth of 4.0% after a 4.9% reduction in 2020. This increase in oil returns has, albeit partly, compensated for the rise in capital expenses. Such advances that accompanied the merging procedures in 2021 prompted a percentage of 4.8 points in the budget as a shortage decrease. As a result, and due to the lower availability of food, inflation intensified to 7.0% in 2021. The Algerian Central Bank has cut down the ratio required for the reserve to 2% from 10% before, reduced its policy rate to 3% from 3.5% before, and released sensible protocols of the banking sector to relieve monetary policy.

Inflation in Algeria has accelerated significantly and has become a major concern as in many other countries. Lately, the Algerian annual average rate of inflation reached 9.4% a degree that was untouched in the last quarter of a century. The Algerian Central Bank has taken measures to control price pressures, but fiscal actions remained an accommodative measure (IMF, 2022). To analyze the magnitude of the effect that the Algerian fiscal actions exercise over its industrial development between 1980 and 2020, the present research applies empirical analysis as a method for analysis. This article is structured as the following: Empirical studies were described in this follow-up section and the second section. The third section of the study was attributed to the methodology. The fourth part explains the research outcomes and the last part is devoted to the conclusions. The research problem that the paper intends to solve concerns the effects economic programs exert over industrial development within Algeria throughout four decades from 1980 until 2020. The research tests two main hypotheses:

H_1: There is a positive effect between fiscal programs and industrial prosperity in Algeria.

H_2: There is a causal relationship and a close correlation between oil prices and fiscal action variables.

Literature Review

Several empirical studies show how fiscal actions promote industrial prosperity. Recent studies claim that the effect between fiscal programs has an almost feeble or zilch effect on industrial prosperity (Islam, Hossain, Chakrobortty, & Ema, 2022). For example, a recent study on the Kenyan economy examined the influence of its fiscal programs on its industrial development and resolved that Kenyan industrial development does not respond to its fiscal programs (Kamaan, 2014). This means that mainly other factors influence Kenyan industrial prosperity instead. The study also concluded that the credit channel, which tracks “the interest rate channel, is [by far] the most effective” factor that guides industrial prosperity (Kamaan, 2014). In the period under review, the fiscal action shock accounts for 14.98% of the inflation growth.

Another research on the effect that fiscal programs exert over industrial prosperity employed annual info from 1989-2016 and concluded that industrial prosperity responds to the real economic situation that exists in Laos (Srithilat, Sun & Thavisay, 2017). The study indicated that alterations witnessed in the stock funding processes could be harmful and, in the end, would hurt economic development. There exists a negatively significant connection concerning money supply Vis a vie per capita GDP. Abille (2020) analyzed the influence of fiscal programs on the development of the Ghanaian industry employing annual info between 1983 & 2017. The finding shows that inflation was recognized as having remarkably damaging consequences over development in Ghana. It proposes that increasing inflation harmfully disturbs industrial prosperity and therefore distorts the price system. Other studies examined the dynamic consequence of fiscal programs and the industrial prosperity of Laos, using the VAR (Vector Autoregressive Model) and trimestral figures between 1995 & 2018 (Srithilat, Khamthoummabounmy, Lienpaserth, Chanthavixay, & Douangty, 2022). The empirical results indicated that industrial prosperity responds negatively to fiscal programs of an expansionary nature.

Alternatively, many other studies confirmed that monetary policy has a central and significantly crucial role in influencing and guiding industrial prosperity. Research evaluating the effect the funding exercises over industrial prosperity from 1974 to 2008 in Iran concluded that "Using Levine and Renelt's growth model" and adopting "Ordinary Least squares" (OLS) shows that the Iranian economy has a positive as well as a highly substantial connection concerning funding and industrial prosperity (Danladi & Ngada, 2017); (Nouri and Samimi, 2011). Onyeiwu (2012) studied the outcome fiscal programs have over the industry of Nigeria. The research employed the OLS Method (Ordinary Least Squares). It analyzed statistics from 1981 to 2008 and concluded that, although it exercises a negative outcome over the ratio of inflation, the funding of the Nigerian fiscal actions has a progressive control on the development of the Gross Domestic Product (Gnahe and Huang, 2020). Precious & Makhetha-Kosi (2014) investigated the function of fiscal actions in supporting industrial prosperity in the industry of South Africa between 2000 and 2010. To investigate ultimate in addition to direct actions that occur among the factors and variables, the study used the Johansen co-integration. It also used the Error Correction Mechanism. Their results concluded that an ultimate connection occurs amid its variables and that inflation is a highly significant mechanism for fiscal programs to guide industrial prosperity in South Africa whilst its funding, its exchange as well as its repo rates turned out to be irrelevant. Mugableh (2019) investigated the connection of the balance and active causality existing between Jordanian industrial prosperity and fiscal actions means between 1990 and 2017, and using the ARDL model, concluded that funding, inflation ratio, as well as interest ratio, lead to a direct and remarkable industrial prosperity and an ultimate indirect one as well. Using the Vector Error Correction Model (VECM) method, the study confirmed the presence of a bidirectional and causative connection between industrial prosperity and monetary policy variables.

A recent study examines the influence of fiscal programs on the industrial prosperity in an unindustrialized country as Bangladesh and an industrialized country as the UK, employing minor figures dating from 1980 to 2019 (Islam, Hossain, Chakrobortty, and Ema, 2022). The result of the F-bounds investigation confirms a direct as well as an indirect connection between industrial prosperity Vis a vie fiscal programs variables. The ultimate numbers used in the ARDL model indicated that the funding boosts industrial prosperity considerably in Bangladesh in addition to the United Kingdom. In Algeria, industrial prosperity is highly significant because it is the main source of public funding (Ramli, Boutayeba & Nezai, 2022).

Methodology and research methods

This research attempts to diagnose the outcome that fiscal programs exercise over Algerian industrial prosperity by employing an econometric model.

The research tests two hypotheses:

H_1: There is a positive effect concerning funding and industrial prosperity in Algeria
H_2: There is a causal relationship and a close correlation between oil prices and monetary policy variables.

The methods adopted for empirical and statistical analyzes include the Philip-Perron test (PP) and estimation using Eview9.0. To analyze the correlation between the variables, the study uses the yearly figures between 1980 and 2020. These time series data selected were the ones determined in the WDI (World Development Indicator 2021) in addition to the World Bank. The following equation is then derived:

$RGDPt = \alpha 0 + \alpha 1M2 + \alpha 2\ TINF + \alpha 3oil + \alpha 4REER + et$

Table 1. Data and source

Symbol	The variable	Source
_NGDP	Real gross domestic product	WDI 2021
M2	Money supply	WDI 2021
OIL	Oil price	OPEC
TINF	Inflation rate	WDI 2021
REER	Real Exchange Rate	WDI 2021

Source: Compiled by the authors based on (WDI & OPEC, 2021).

Empirical Results

The Unit Root exam:

To examine the static of the sequence and to prevent any issues related to spurious regression, this research uses the Philip- Perron test (pp) because it is the most applicable test for a unit root for its ability to isolate and avoid all errors and lapses. Accordingly, the fundament of this exam is the premise of serially correlated error terms and their contribution which is concerned both with intercept as well as intercept and trend. The following table details the Philip- Perron test (pp test) as follows.

Table 2. Philip-Perron Test (PP)

UNIT ROOT TEST TABLE (PP)						
At Level						
		LN_M2	LN_NGDP	LN_REER	LN_TINF	LNOIL
With Constant	t-Statistic	-1.8592	0.5406	-1.1429	-2.6099	-1.1088
	Prob.	*0.3475*	*0.9861*	*0.6892*	*0.0994*	*0.7030*
		n0	n0	n0	*	n0
With Constant & Trend	t-Statistic	-0.0953	-1.1691	-1.4072	-3.2078	-1.4249
	Prob.	*0.9932*	*0.9034*	*0.8436*	*0.0974*	*0.8381*
		n0	n0	n0	*	n0
Without Constant & Trend	t-Statistic	8.0397	1.6072	-1.5623	-1.2674	-1.6555
	Prob.	*1.0000*	*0.9716*	*0.1099*	*0.1854*	*0.0918*
		n0	n0	n0	n0	*
At First Difference						
		d(LN_M2)	d(LN_NGDP)	d(LN_REER)	d(LN_TINF)	d(LNOIL)
With Constant	t-Statistic	-4.6930	-6.3180	-4.7425	-8.8038	-4.9637
	Prob.	*0.0005*	*0.0000*	*0.0004*	*0.0000*	*0.0002*
		***	***	***	***	***
TWith Constant & Trend	t-Statistic	-5.0676	-6.6533	-4.7030	-8.6805	-4.9204
	Prob.	*0.0010****	*0.0000****	*0.0028* ***	*0.0000****	*0.0015****
Without Constant & Trend	t-Statistic	-1.7905	-6.1130	-4.3971	-8.8711	-4.6012
	Prob.	*0.0700**	*0.0000****	*0.0001****	*0.0000****	*0.0000****

Source: Regression result from (EViews version 7).

The results of the Philip-Perron test above shows that M2, GDP, REER, TINF, and OIL are all stationary at first difference.

The VECM (Vector Error Correction Model) turned out to be a suitable method to examine the influence Algerian fiscal programs have on Algerian industrial prosperity in more detail, separating any movements apart from the ultimate balance. The table below illustrates the various criteria employed to regulate the impeccable lag length of the VAR method.

Table 3. Standard Designated Lag Order

Lag	LogL	LR	FPE	AIC	SC
0	-4.688392	NA	1.15e-06	0.509915	0.725387
1	209.5092	360.7539	5.50e-11	-9.447853	-8.155022*
2	234.0984	34.94258	6.04e-11	-9.426233	-7.056043
3	**268.8158**	**40.19911***	**4.40e-11***	**-9.937676***	**-6.490126**
* implies the lag order nominated via the criterion					
LR: sequential modified LR exam statistic (each test at 5% level)					
FPE: Final prediction error					
AIC: Akaike information criterion					
SC: Schwarz data criterion					
HQ: Hannan-Quinn data criterion					
* implies the lag order nominated via the criterion					

Source: Estimation developed by the authors using Eview9.0.

The lag order designated through the standard is three for the VAR in this study.

Table 4. Monetary Policy and GDP Long-run Relationship Co-integration Test

TRACE				
Assumed		TRACE	The level of 0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.721553	93.74466	69.81889	0.0002
At most 1	0.480147	45.16055	47.85613	0.0877
At most 2	0.296875	20.30062	29.79707	0.4027
At most 3	0.159905	6.916228	15.49471	0.5874
At most 4	0.007736	0.295094	3.841466	0.5870
Trace denotes 1 co-integrating eqn(s) at the point of 0.05				
* denotes nullification of the premise at the point of 0.05				
** p-values of MacKinnon-Haug-Michelis (1999)				

Source: Estimation developed by the authors using Eview9.0.

Cointegration analysis result and interpretation. This research undergoes an applied research methodology, using a trace exam (Unrestricted Cointegration Rank Test), a maximum eigenvalue test, and the MacKinnon et al. (1999) critical standards. Its purpose is to define the number of vectors that exert a co-integration model. As concluded via the Pantula Principle exam consequences, all variables undergo the premise of zilch deterministic inclination and limited continual.

The consequences for both the trace exam as well as the determined eigenvalue aimed at the unlimited cointegration rank exam are accessible in Table 4 below.

Table 4. illustrates both the Trace test statistics as well as the Max-Eigenvalue tests.

Both tests specify only one cointegrating equation that reached the 5% level of significance. This is proof that discards the null hypothesis (H_0) since it states that no cointegrating vectors exist. Alternatively, the other premise is valid due to the manifestation of cointegrating vectors. This concludes that the relationship existing amid the variables is a long-run connection. Thus, the hypothesis that states that there exists no cointegration amid the variables is invalid in the case of Algeria.

VECM Estimates Results and Interpretation. Vector Error Correction Models (VECM) include an error correction term that evaluates all activities and isolates them from the long-run balance, which labels them the most fundamental Vector Auto Regression (VAR).

VECM (Vector Error Correction Models) long-run interactions findings are illustrated in detail in Table 5. below:

Table 5. VECM Estimates Findings

Cointegrating Eq:	CointEq1				
LN_NGDP(-1)	1.000000				
LN_M2(-1)	-0.620745 (0.08648) [-7.17757]				
LN_REER(-1)	29.27583 (4.48069) [6.53378]				
LN_TINF(-1)	0.466510 (0.07162) [6.51359]				
LNOIL(-1)	-345.2434 (55.1909) [-6.25545]				
C	95.22379				
Error Correction:	D(LN_NGDP)	D(LN_M2)	D(LN_REER)	D(LN_TINF)	D(LNOIL)
CointEq1	-4.124845 (2.32478) [-1.77429]	-0.120064 (0.06541) [-1.83552]	0.296424 (0.07215) [4.10821]	-0.969227 (0.82890) [-1.16929]	0.026390 (0.00593) [4.45309]
D(LN_NGDP(-1))	3.916885	0.113511	-0.307840	0.893336	-0.027331
	(2.38246)	(0.06703)	(0.07394)	(0.84947)	(0.00607)
	[1.64405]	[1.69332]	[-4.16315]	[1.05164]	[-4.50024]
D(LN_NGDP(-2))	4.136729	0.116569	-0.305853	0.993656	-0.027276
	(2.37479)	(0.06682)	(0.07371)	(0.84673)	(0.00605)
	[1.74194]	[1.74455]	[-4.14963]	[1.17352]	[-4.50567]
D(LN_NGDP(-3))	-4.102674	0.080339	-0.136645	-2.061474	-0.012801
	(5.49101)	(0.15450)	(0.17042)	(1.95783)	(0.01400)
	[-0.74716]	[0.51999]	[-0.80179]	[-1.05294]	[-0.91449]
D(LN_M2(-1))	-6.186656	0.026954	0.602585	-0.970414	0.052592
	(9.13164)	(0.25693)	(0.28342)	(3.25590)	(0.02328)
	[-0.67750]	[0.10491]	[2.12614]	[-0.29805]	[2.25930]
D(LN_M2(-2))	-14.09511	-0.375955	0.807128	0.882632	0.070194
	(7.71801)	(0.21716)	(0.23954)	(2.75187)	(0.01967)
	[-1.82626]	[-1.73124]	[3.36945]	[0.32074]	[3.56780]
D(LN_M2(-3))	-24.10443	-0.040762	0.267297	-3.377153	0.026871
	(8.91567)	(0.25086)	(0.27671)	(3.17889)	(0.02273)
	[-2.70360]	[-0.16249]	[0.96596]	[-1.06237]	[1.18231]
D(LN_REER(-1))	122.3142	1.427126	4.126936	28.51009	0.280339
	(82.1286)	(2.31083)	(2.54902)	(29.2831)	(0.20936)
	[1.48930]	[0.61758]	[1.61903]	[0.97360]	[1.33904]
D(LN_REER(-2))	4.843210	4.521762	-2.449253	-4.078887	-0.214820
	(88.8705)	(2.50052)	(2.75827)	(31.6869)	(0.22654)
	[0.05450]	[1.80833]	[-0.88797]	[-0.12872]	[-0.94824]
D(LN_REER(-3))	70.85542	1.644884	1.262977	-6.882956	0.117679
	(86.2220)	(2.42600)	(2.67607)	(30.7426)	(0.21979)
	[0.82178]	[0.67802]	[0.47195]	[-0.22389]	[0.53541]
D(LN_TINF(-1))	2.117409	-0.013814	-0.154242	-0.012074	-0.013696
	(1.24342)	(0.03499)	(0.03859)	(0.44334)	(0.00317)
	[1.70290]	[-0.39484]	[-3.99677]	[-0.02723]	[-4.32099]
D(LN_TINF(-2))	2.566182	0.008495	-0.137959	0.317703	-0.012153
	(1.13378)	(0.03190)	(0.03519)	(0.40425)	(0.00289)
	[2.26339]	[0.26629]	[-3.92052]	[0.78590]	[-4.20507]
D(LN_TINF(-3))	2.120006	-0.002600	-0.047009	0.482404	-0.004296
	(0.93130)	(0.02620)	(0.02890)	(0.33206)	(0.00237)
	[2.27640]	[-0.09924]	[-1.62635]	[1.45278]	[-1.80970]
D(LNOIL(-1))	-1286.483	-18.71385	-54.82814	-315.8413	-3.872719
	(937.210)	(26.3700)	(29.0881)	(334.164)	(2.38909)
	[-1.37267]	[-0.70966]	[-1.88490]	[-0.94517]	[-1.62100]

Table 5 (cont.). VECM Estimates Findings

Cointegrating Eq:	CointEq1				
D(LNOIL(-2))	39.41705	-52.20126	19.44494	74.44065	1.692820
	(1026.41)	(28.8797)	(31.8565)	(365.967)	(2.61647)
	[0.03840]	[-1.80754]	[0.61039]	[0.20341]	[0.64699]
D(LNOIL(-3))	-783.9771	-19.51848	-19.35836	87.92298	-1.784727
	(1000.25)	(28.1437)	(31.0447)	(356.641)	(2.54979)
	[-0.78378]	[-0.69353]	[-0.62356]	[0.24653]	[-0.69995]
C	4.169668	0.053863	-0.005711	-0.047194	-0.000387
	(1.38485)	(0.03897)	(0.04298)	(0.49377)	(0.00353)
	[3.01092]	[1.38234]	[-0.13286]	[-0.09558]	[-0.10962]
R-squared	0.457414	0.647321	0.795874	0.391043	0.806185
Adj. R-squared	0.023345	0.365178	0.632573	-0.096123	0.651133
Sum sq. resids	100.6193	0.079658	0.096926	12.79163	0.000654
S.E. equation	2.242982	0.063110	0.069615	0.799738	0.005718
F-statistic	1.053781	2.294299	4.873664	0.802689	5.199458
Log-likelihood	-71.00862	61.10655	57.47677	-32.85138	149.9551
Akaike AIC	4.757223	-2.384138	-2.187933	2.694669	-7.186764
Schwarz SC	5.497374	-1.643986	-1.447782	3.434821	-6.446612
Mean dependent	0.491370	0.126271	-0.038424	-0.024446	-0.003216
S.D. dependent	2.269630	0.079209	0.114847	0.763868	0.009680
Determinant resid covariance (dof adj.)	8.72E-12				
Determinant resid covariance	4.02E-13				
Log-likelihood	265.5096				
Akaike information criterion	-9.487008				
Schwarz criterion	-5.568559				

Source: Estimation developed by the authors using Eview9.0.

Table 5 demonstrates the consequences of VECM evaluations. The columns illustrate the calculation of internal variables in the archetype. They summarize short-run interactions analyzed through the Vector Error Correction Models (VECM).

In Algeria, there is a positive correlation that occurs amid inflation, conversion ratio, as well as real GDP (industrial prosperity) over the near term, although this correlation is statistically insignificant. There is also a negative correlation between money supply, oil price, and industrial prosperity. The R-squared coefficient 0.457414 suggests a solid fit and the model clarifies the reason there is a 54.74% variation in industrial prosperity. The nature of the connection between the variables and the GDP is witnessed in the end.

LN_NGDP= -0.620745 LN_M2 + 29.27583 LN_REER+0.466510 LN_TINF-345.2434 LNOIL+95.22379

In the long run in Algeria, oil prices, money supply, and industrial prosperity exhibit a negative correlation whereas inflation, exchange rate, and real gross domestic product display a positive correlation.

Conclusions and Recommendations

The current research examined actual money supply (M2) inflation, exchange rate, and oil prices) employing yearly figures ranging between 1980 and 2020 and a VECM (Vector Error Correction Model). It diagnosed the connection that these variables and industrial prosperity undergo in detail. The recommendations include a few points that can summarize the study as follows:

- The research explained the negative effect oil prices have on industrial prosperity as well as oil crises during the period 1980-2021. The conversion ratio influences industrial prosperity positively, and the improvement of the local currency is proof.

- The money supply has a negative impact because of the issuance of the monetary mass without a corresponding production.
- Algeria should use monetary policies to form a satisfactory investment atmosphere and facilitate the appearance of exchange rate systems in addition to market-based interest rates that draw foreign as well as domestic investments.
- Algeria should invest in financial loans for productive projects.
- Algeria should diversify its economy.
- Algeria should avoid total dependence on oil.
- The Central Bank should design a practical method to reduce the extent of the shortage of funding, advance the supply of the casual part and the SMEs, as well as support their incorporation within the official part.
- The Central Bank should simultaneously work with the state to advance the tariff system to reduce taxation dodging to the minimum, to enable the tariff capability approximate to its potential, and to ensure that there is a proper balance between the capital and recurrent expenditures of the government.

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