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THE IMPACT OF UNEMPLOYMENT ON FERTILITY IN ALGERIA: ECONOMETRIC STUDY

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ABSTRACT: This paper is interested in modeling the relationship between unemployment and fertility in Algeria from 1991 to 2016.We applied the Auto Regressive Distributed Lags, (ARDL), method of modeling to model the long-term and the short-term of the dynamic impact of the unemployment rate on fertility rate in Algeria. Results estimations, in the frame of the used specification, lead to the conclusion that there is a negative impact of unemployment on fertility. The main explanation for these results is that the desire to have children is linked to couples' feelings of confidence in the future.

KEY WORDS: Fertility, Unemployment, Co-integration, ARDL Model.

JEL Classification: J13, C50, C51.

Résumé : Le présent travail s'intéresse à la modélisation de la relation entre le chômage et la fertilité en Algérie sur la période 1991–2016. Nous avons appliqué la méthode de cointégration par les retards échelonnés ou Auto Regressive Distributed Lags (ARDL) pour modéliser la dynamique de long terme et de court terme de l'impact du taux de chômage sur le taux fertilité en Algérie. Les résultats des estimations, dans le cadre de la spécification utilisée, nous ont conduits à conclure qu'il y a un impact négatif du chômage sur la fertilité. Ces résultats s'expliquent essentiellement que le désir d'avoir des enfants est lier au sentiment de confiance des couples dans l'avenir.

MOTS-CLEFS : Fertilité, Chômage, Co-intégration, Modèle ARDL.

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1. INTRODUCTION:

The econometric studies diverge on the links between economic factors and fertility. In this regard, the fertility variable takes on its importance through its influence on economic growth. Therefore, it is considered as an independent variable in the explanatory modeling.

However, some researchers believe that the level of economic development is a factor that generates the reduction in fertility. In this sense, economic and social development is of fundamental importance in influencing the fertility rate. Hence, fertility reveals the degree of influence of economic development on social life and its outcomes.

As such, this study tries a treatment the impact of unemployment on fertility in Algeria, with an econometric study over a period of 25 years from 1991 to 2016. In this sense, we seek to provide answers to the following fundamental question:

What is the impact of unemployment on fertility in Algeria?

In order to answer our problematic, we propose the following fundamental hypothesis:

There is a negative effect of unemployment on fertility in the short and long term.

The crucial objective of this study is to analyze how the association of the unemployment rate and total fertility has changed over time.

The response's elements of this study could be an interest to the Algerian government authorities in order to provide them an overview of the two phenomena, but also to improve the quality of life and the labor market.

The study is structured as follows: first, we introduce with a theoretical framework; then we present the model and the main results of the estimation, and finally, the last part is reserved for the presentation of the results of the research.

2. THEORY AND ASSOCIATED LITERATURE

Before modeling the relationship between unemployment and fertility, we consider that it is appropriate to present the theoretical framework of this relationship, as follows:

The analysis of fertility in a microeconomic framework makes its fundament from the pioneering work of **"Becker" in 1960**. In his study, "Becker" observed that there are two effects in the income's increase: an "income effect" which allows buying more normal goods, and a "price effect" that increases the opportunity cost of any activity that requires time spending. In this sense, he considered that all goods involve an expenditure of time, but for the children, they are considered as durable goods and more intensive than other goods in time. In this case, their opportunity cost has a greater share in the total cost of the household than the other goods' opportunity cost.

Therefore, as income increases, the opportunity cost of children increases faster than the cost of other goods and services, and the "demand" for children may decrease if the price

effect outweighs the income effect (Cédric Doliger, 2008). Further, the economic condition influences not only the desired number of children, but also the desired quality (The quality of children is measured by infant mortality and birth weight). This quality is largely determined by the health behaviors adopted by pregnant women during their pregnancy (Lan Wei, 2013). In addition to Becker's theory, Easterlin gave a progress in this way. His theory, which existed in the early 1960s, is based on two essential aspects: the effect of the relative number of young adults and the effect of wages and unemployment, which 'we can present it as follows:

The first aspect of the hypothesis concerns the "relative size of the cohort". According to "Easterlin", the economic and social prosperity of a cohort tends to evolve in the opposite direction of the relative size of this cohort. This result is due of "clutter or congestion mechanisms" which operate within the three social institutions that are the family, the education system, and especially the labor market. The fundamental point of the "Easterlin" model is based on the moment of entry into the labor market. In fact, the entry of a large proportion of young workers into the labor market creates a phenomenon of congestion which results in the deterioration of their relative wage rates, unemployment conditions, and an increase in mobility within jobs.

The second aspect of the hypothesis concerned the "relative income" in order to relate these congestion effects to the fertility behavior of young adults. According to Easterlin, the general sociological notion seems correct when it suggests the existence of a process of economic socialization, which creates internalized norms as one, grows up. Although a multitude of influences affect preferences, such as geographic area or socioeconomic group of reference, "Easterlin" emphasizes the obvious and significant influence of the standard of living enjoyed by parents. Consequently, he maintains that the determinants of the fertility rate are the couple's earning possibilities, their material aspirations, and their socializations resulting from the family environment (Cédric Doliger, 2008).

The classical microeconomic models of fertility predict that the demand for children should be negatively correlated with levels of female activity. In fact, the decline in the opportunity costs of motherhood, during periods of high unemployment, should lead to an increase in the number of children births (Emilia Del Bono, Andrea Weber, Rudolf Winter-Ebmer, 2015).

Therefore, the theoretical microeconomic models indicate that recessions are periods when the opportunity cost of having children for working women decreases, such phenomenon known as countercyclical fertility (Héctor Pifarrré i Arolas, 2017).

On the empirical side, several studies are linked to this subject.

(Tomáš Evan & Pavla Vozárová, 2018) confirm the long standing negative impact of state pensions and all other social policies of the welfare state, except family-friendly ones, on fertility between 1990 and 2013 in OECD countries. They also claimed that reports on the positive correlation between women's labor force participation and fertility, which have prompted a recent surge in research, are spurious.

Indeed, the researchers concluded that the developed countries' societies have an unsustainable level of reproduction that allows depopulation. This result caused , in large

part, of the high and ever-increasing participation of women at work and the high level of social spending, especially in of pensions. For that, they suggest an alternative combination of family, birth rate and a reduction in social spending as a possible solution.

In addition, (fares saleh haider & hassan abdelkader salah, 2005) dealt the impact of the human fertility on the distribution of poverty and unemployment in Jordan. In fact, applying simple regression and multiple regression revealed that there is a strong relationship between high human fertility and low income. Otherwise, it is very important to examine the opposite relationship. In fact, (Ana-Maria Amariei, 2012) highlight the influence of the unemployment rate on the evolution of fertility in Romania during the period 1991-2011. Like there is the strong relationship between high human fertility and low income, the unemployment has a very strong negative impact on motherhood.

As most studies show in case of unemployment the fertility declines in the short term. For that, it is crucial expose and test if these negative effects persist in the long term. In different studying's orientation of the link between fertility and unemployment, (Currie Janet & Schwandt Hannes, 2014) examined over 140 million birth registry for the period 1975-2010, where they found that women in their early 20s are most affected in the short-term by high unemployment and the negative effects on fertility are increasing in the time.

(Michaela Kreyenfeld & Gunnar Andersson, 2014) examined how the association of unemployment and fertility varies across socio-demographic subgroups using data from the German Socio-Economic Panel (GSOEP) and Danish population registers during the period 1981-2001. They also examined how the link between unemployment and fertility varied by birth order, age, educational level and sex. The results reveal the link between unemployment and fertility varies across socioeconomic groups. In addition, the fertility tends to be lower during periods of unemployment among highly educated women and men, but not among their less educated counterparts. The research confirmed the general expectations and previous research in this area. In fact, the male unemployment decreases the fertility from the first and second births. This tendency seems to be stronger in Germany than in Denmark, which is compatible with the idea that Germany has a conservative social protection system in which a stable economic situation of the breadwinner is a prerequisite for having children

Other study demonstrated that, whatever the value of the minimum wage, a pension promotes the fertility rate by exceeding a high level. In fact, to increase the fertility rate and reduce the unemployment rate, a public pension or a combination of a public pension and family allowances may be considered. The first is better for reducing the workers' tax base, and the latter is greater for increasing the capacity and strength of fertility's progress. (Leran Wang, 2015)

By using the official aggregate data for the period 1995-2012 and dynamic regression to identify specific temporal links between unemployment and fertility, (Cazzola Alberto & Pasquini Lucia & Angeli Aurora, 2016) tried to assess whether changes in female and male unemployment are differently related to fertility in different geographical areas of Italy. They found that male and female unemployment rates are negatively associated with fertility in the northern and central regions of Italy; although male unemployment appears, reduce the fertility beyond the reduction predicted by unemployment.

In other study (Emilia Del Bono & Andrea Weber & Rudolf Winter-Ebmer, 2015) investigated the distinct effects of unemployment and job displacement on fertility from a sample of women in Austria during the period 1990-1998. Using an instrumental variable approach, they showed that the unemployment's outcrop as such does not negatively affect fertility decisions, but the opposite effect occurs when the fact of being displaced from a job career-oriented. The fertility rates of women affected by a business closure are significantly lower than a control group, even after six years, regardless of the incidence or spell's length of the associated unemployment.

(Aksoy Cevat Giray, 2016) reconsiders the causal effects of local unemployment on fertility. He argues that conflicting empirical results in existing empirical research may have emerged due to the neglect of sub-demographic differences and the inability to recognize endogeneity. (Aksoy Cevat Giray, 2016) made hypothesizes that male and female unemployment have different impacts on fertility from one population subgroup to another.

Drawing on the UK Labor Force Survey and National Statistics Office data on birth statistics, the results of this study suggest that female unemployment tends to increase births, so that male unemployment has the opposite effect. More importantly, the results reported indicate that the relationship between unemployment and fertility exhibits large variations between demographic subgroups.

(James M. Raymo & Akihisa Shibata, 2017) tested directly the questions of the relationship between unemployment and non-standard employment with fertility. For that, the Analyzes of retrospective data on employment, marriage and fertility for the period 1990-2006 in Japan, indicate that changes in men's working conditions are associated with lower levels of marriage, while changes in female employment are associated with higher fertility rates.

Despite these studies, a contradiction appears between the empirical studies and the theoretical studies through the existence of a negative relationship between unemployment and fertility on the one hand, and the low opportunity cost of procreation in the absence of work on the other hand. (Héctor Pifarrré i Arolas, 2017) offered explications of this contradiction through using a data panel methods applied on sample of developed countries.

By distinguishing two forms of unemployment, (Héctor Pifarrré i Arolas, 2017) applied a cohort-based model to study the two life cycle effects. The results show that higher levels of structural unemployment decrease fertility, but that the effects of unemployment’s cyclical variations depend, in a large extent, on the life’s age.

The cyclical reductions in the unemployment’s level mainly lead to an increase in fertility rates. However, the positive results of changes in the unemployment’s cyclical component can also have a positive impact on fertility, for certain age groups.

(Deniz D. Karaman Örsal & Joshua R. Goldstein, 2018) carried out a work almost similar to the previous study by (Héctor Pifarrré i Arolas, 2017). The study base on using a panel data methods to study short-term changes in fertility and unemployment rates in various Organization for Economic Co-operation and Development (OECD) countries from 1957 to 2014. In fact, this study made emerge whether there has been a fundamental change in the

relationship between economic conditions and fertility. In addition, (Deniz D. Karaman Örsal & Joshua R. Goldstein, 2018) have shown that fertility was countercyclical before 1970, with favorable economic conditions associated with declining fertility. However, after that, the fertility become procyclical, with favorable economic conditions associated with higher fertility.

After having exposed various contributions on the subject, it is very important to take an interest in this subject in Algeria. Given the lack of Algerian studies on the link between fertility and unemployment, the treatment of the empirical study aims to add value, across the period, subject of our study, or even the method used in the estimation, as the majority of previous studies relied on the panel method.

3. SPECIFICATION AND METHODOLOGY

For study and measure the impact of economic changes represented by the unemployment rate on the fertility rate in Algeria, we will use an autoregressive model with distributed lags, ARDL (Auto Regressive Distributed Lag model).

The ARDL models, which are part of the class of dynamic models, make possible the capture of temporal effects (adjustment delay, anticipations, etc.) in the explanation of a variable, thus improving forecasting and policy effectiveness.

In fact, ARDL models combine the characteristics of two models:

- An Autoregressive Model (AR) which is interested in explaining a dependent variable by its own lagged values,
- Staggered delay models (DL) which explains a dependent variable by the present values of the independent variables and their time-shifted values.

If we consider the dependent variable "y_t" and the independent variable "x_t", the general form of ARDL models is of the following type:

$$y_t = \alpha_0 + \sum_{i=0}^{n} \beta_{1i}\, y_{t-i} + \sum_{i=0}^{n} \beta_{2i}\, x_{t-i} + \varepsilon_t \ldots\ldots(1)$$

With: $\varepsilon_t \sim iid(0,\sigma)$; Error term ; (β_{20}) reflects the short-term effect of x_t on y_t , and to calculate the long-term effect « λ», of x_t on y_t , it is possible in considering the following long-term relationship (or equilibrium equation): $y_t = \propto + \lambda x_t + \mu_t$ and then we can calculate « λ» as : $\lambda = \sum_{i=0}^{n} \beta_{2i} \Big/ (1 - \sum_{i=0}^{n} \beta_{1i}) \ldots\ldots\ldots\ldots\ldots\ldots(2)$

In other side, the ARDL models, which inherit the characteristics of the AR and DL models, could suffer from certain econometric problems which complicate its estimation by Ordinary Least Squares (OLS): collinearity between explanatory variables (DL model), autocorrelation of errors (AR model), etc. In order to escape these problems, robust estimation techniques are generally used.

In the framework of our study, we seek to capture the effects of the fertility rate TFER (dependent variable) on the unemployment rate TCH (independent variable). Thus, we propose to estimate an ARDL model for the following function (linear functional form)

$$TFER = f(TCH)\ldots\ldots\ldots(3)$$

If we propose to enter the short-term and long-term effects of the variable TCH on the variable TFER, the ARDL representation of the function (3) will be:

$$\Delta tfer = \alpha_0 + \sum_{i=0}^{n} \beta_{1i}\ \Delta tfer_{t-i} + \sum_{i=0}^{n} \beta_{2i}\ \Delta tch_{t-i} + \lambda_1 tfer_{t-1} + \lambda_2 tch_{t-1} + \varepsilon_t \ldots.(4)$$

With λ_1, λ_2 : the coefficients of the long-term relation;

β_{ji} : The coefficients of the short-term relationship;

Δ: The First Difference Operator;

α_0: The constant;

$\varepsilon \sim (0, \sigma) \sim \text{iid}(0, \sigma)$: (White Noise).

In addition, writing an ARDL model in the form of relation (4) assumes the existence of a cointegrating relation between the two variables.

According of the econometric literature, we can provide several tests of cointegration including that of :

- Engel "and" Granger "(1987),
- " Johansen "(1988, 1991) and" Johansen "and" Juselius "(1990),
- " Pesaran " "et al. (1996)," Pesaran "and" Shin "(1995) and" Pesaran "et al. (2001).

For that, the cointegration test of" Engle "and" Granger "(1991) is only valid for two integrated variables (3) of the same order (ie order of integration = 1), but also, this test is less efficient for multivariate cases.

Although the "Johansen" test answers the problem of the number of variables to integrate, it also requires that all the variables be integrated in the same order, which is not always the case in practice.

However, when there are several integrated variables of different orders (I (0) , I (1)), we can resort to the cointegration test of "Pesaran" et al. (2001) called the "Bounds Test of Cointegration".

In fact, in order to apply the "Pesaran" cointegration test , we can follow two Steps as:

- Determination of the optimal offset, primarily, basing on the Akaik selection criteria (AIC);
- Use the Fisher test to verify the hypotheses of the existence or not of a cointegration relation.

Through the procedure of "Pesaran" et al. (2001), an error correction model can help to confirm the existence or not of cointegration between two or more variables. This model will have the following form in the context of our study:

$$\Delta tfer = \alpha_0 + \sum_{i=0}^{p} \beta_{1i}\, \Delta tfer_{t-i} + \sum_{i=0}^{q} \beta_{2i}\, \Delta tch_{t-i} + \gamma u_{t-1} + \varepsilon_t \quad \ldots.(5)$$

In fact, the relations 4 and 5 will be subject to estimates. But in first we should:

- Determine the degree of integration of the variables (stationarity test): Dickey-Fuller test Augmented;
- Testing the possible existence of a cointegrating relationship between the variables: Cointegration test of "Pesaran" et al. (2001) or "Bounds Test of Cointegration";
- Testing causality between the variables of the study: causality test within the meaning of "Granger", causality test in the sense of "Toda" and "Yamamoto".

4. DATA: NATURE AND DESCRIPTIVE CHARACTERISTICS

4.1 **Nature** and **Source**

The data of our study is annual and taken from the databases of the World Bank (WDI). These annual data cover the period from 1991 to 2016. Table N°1 provides presentation and information on the variables used.

Table 1: Definition of variables and data sources

Variables	Description	The calculating formula of variable	The measuring Unit of variable
TFER	Fertility rate	the number of live births in a year / number of women of childbearing age	Number of children per woman
TCH	Unemployment rate	The number of unemployed (people actively seeking employment) / the active population percentage * 100	the percentage of people in the labor force who are unemployed

Source: Developed by the authors

4.2 Descriptive Characteristics

Table 2 summarizes the descriptive characteristics of the two variables studied over the period 1991-2016. This table shows us that on average 19% of the working population was unemployed during this period with the highest rate of 31.84% recorded in 1996, this increase can be interpreted as a result of the structural reforms initiated by the Algeria since the beginning of the 1990s, concretizing the transition to the market economy. Instead, this rate fell or reached the minimum value in 2013 with 9.8%, this decrease is due to the increase in oil prices recorded since the end of the 2000s, which shows that the Algerian economy remains very strongly dependent on the rent of hydrocarbons.

On the other hand, the average fertility rate was 2.97, so, an average of three births per woman of childbearing age. This rate recorded a continuous decline from 1991 with almost 4.5 births per woman of childbearing age, until 2003 with a loss of two points, 2.40. This decline can be explained by the period of the black decade, from 1991 to 2000, which reduced marriages and births and caused large population movements.

It can also be seen from this table that the unemployment rate is more volatile than the fertility rate, by comparing their two variation coefficients (CV(TCH) = std.dev/mean= 0.48> CV (TFER) (1) std.dev/mean= 018). Also, we note that the variable TCH is normally distributed (Prob. Jarque-Bera> 5%), however the variable TFER is not.

Table 2: Descriptive statistics of the variables: Unemployment rate and Fertility rate

	Mean	Median	Max	Min	Std. Dev	Skewness	Kurtosis	Jarque-Bera	Probability
TFER	2,97	2,83	4,48	2,40	0,56	1,39	4,06	9,54	0,01
TCH	19,29	20,08	31,84	9,82	8,03	0,04	1,29	3,16	0,21

Source: Eviews' software outputs

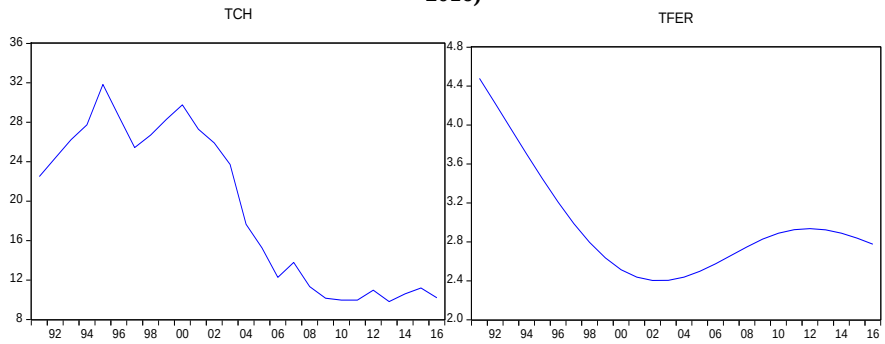
4.3 Graphic Representation

The Figure 1 shows that the unemployment rate was characterized by an upward trend from 1991 until the beginning of the 2000s. This case can be explained by the political and economic changes that the country has experienced,

However, the Fertility rate has been on a downward trend throughout this period, which can be explained by the worry of families and the feeling of insecurity, which has diminished the desire to have new children.

Following the increase in oil prices and the revival of the Algerian economy, the unemployment rate began to make a significant drop, which reached an average of 11% for the decade from 2006 to 2016, in other side; this decade has seen a remarkable increase in the fertility rate**.**

Figure 1: Evolution of the TCH unemployment rate and the TFER fertility rate in Algeria (1991 - 2016)



Source: Eviews' software outputs

5. EMPIRICAL RESULTS

In our study, we used Eviews 9 Software for the empirical study: the stationarity of the series, the cointegration test, the causality test and the estimations.

5.1. The stationarity of the series:

A time series with mean and / or variance varies over time is presented as non-stationary. In fact, if this non-stationarity (the deterministic or stochastic type) is not treated (stationarization), it can lead to spurious regressions.

A several tests help to verify the stationary character of a series including the Augmented Dickey-Fuller / ADF test that we applied in our study. Therefore, the results are given in the Table 3 (the statistics calculated are t of student):

The results of the study of stationarity show that the two series are integrated into different orders, which makes, the cointegration test of "Engle" and "Granger" and that of "Johansen", ineffective and makes the Bounds Test of Cointegration as appropriate test (Pesaran, 2001).

Table 3: unit root test ADF

Variables	Model	Level	**1st difference**	**Decision**
TCH	A	-0.274503	-3.652505***	**I(1)**
	B	-2.434943	-3.586350**	
	C	-1.105324	-3.524936***	
TFER	A	-5.553724***		**I(0)**
	B	-2.113454		
	C	-3.559518***		

Source: Eviews' software outputs

Notes :

I. A: Model with constant, B: Model with linear and constant trend, C: Model without trend and without constant
II. Values represent the calculated statistics of Dickey-Fuller Augmented
III. *, **, *** represent a significance rate of 10%, 5%, 1%

5.2. Cointegration test of Pesaran et al. (2001)

We reported that the Bounds Test of cointegration of "pesaran" et al. (2001) was adapted for our series. Also, remember that there are two steps to follow in applying the this test: Estimation of the ARDL model, and use the Fisher test as test of cointegration between series:

5.2.1 Estimation of the ARDL model

By using the information criteria of Akaik (AIC) and Schwarz (SIC), the used software (Eviews 9) selects the optimal ARDL model, which means the model that offers statistically significant results with the fewest parameters. The ARDL (3.0) model is the most optimal among several other models, as it offers the smallest SIC value, where 3 is the optimum lag(p) for the dependent variable (TFER), and 0 is the optimum lag (q) for the independent variable (TCH). The estimation results of the optimal ARDL model selected are presented in the Table 4.

Table 4: The results of the ARDL Model (3,0) estimation

	Dépendant Variable : TFER			
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TFER(-1)	2.689886	0.052802	50.94247	0.0000
TFER(-2)	-2.484797	0.104485	-23.78137	0.0000
TFER(-3)	0.781686	0.054498	14.34348	0.0000
TCH	-1.29E-06	0.000235	-0.005503	0.9957
C	0.034688	0.006962	4.982151	0.0001
R-squared	0.999967	Akaike info criterion		-9.328917
Adjusted R-squared	0.999960	Schwarz criterion		-9.082070
F-statistic	136700.8	Hannan-Quinn criter.		-9.266836
Prob(F-statistic)	0.000000			

Source: Eviews' software outputs

Furthermore, according to the tests helping to diagnose the estimated ARDL model, we note the absence of autocorrelation of the errors, there is no heteroskedasticity, there is normality of the errors, and the model has been well specified (Table 5).

5.2.2 Diagnostic tests of the estimated ARDL model

The null hypothesis is accepted for all of these tests. Our model is, statistically, valid. The estimated ARDL (3.0) model is generally good and explains 99% of the dynamics of the fertility rate in Algeria for the period 1991-2016.

Table 5: Results of diagnostic tests of the estimated ARDL model

Test Hypothesis	Tests	Values	(Probability)
Autocorrelation	Breusch-Godfrey	2.367597	(0.3061)
Heteroscedasticity	Breusch-Pagan-Godfrey	5.729732	(0.2203)
	ARCH	3.833781	(0.28)
Normality	Jarque-Bera	0.6851	(0.70)
Specification	Ramsey(Fisher)	2.866109	(0.1087)

Source: Eviews' software outputs

5.3. Cointegration test (Bound Test)

The results of the cointegration test at the "Bounds Test", in Table 6, show that the Fisher statistic (F = 14.75504) is greater than the upper limit at the significance level of 1%. Thus, we confirm the existence of a long-term relationship between the two variables, which gives the possibility of estimating the long-term effects of TFER and TCH.

The results of the cointegration test are in the below table as:

Table 6: Results of the cointegration test of "Pesaran" et al. (2001)

F-statistic	14.75504	
Significance	Bound<	Bound>
10%	4.04	4.78
5%	4.94	5.73
2.5%	5.77	6.68
1%	6.84	7.84

Source: Eviews' software outputs

5.4. Causality between TFER and TCH

First, we try to look at the causality between our two variables.

When nonstationary variables are not cointegrated or are integrated in different orders, the traditional Granger causality test becomes ineffective. In this case, we resort the causality test in the sense of Toda-Yamamoto (1995) which is based on Wald's "W" statistic, which is distributed according to a chi-square. The null hypothesis states the absence of causality between variables (probability> 5%). Table 7 exhibits the results of the causality test of Toda-Yamamoto.

Table 7: Results of Toda-Yamamoto Causality Tests

Dependant Variables	Independant Variables	
	TFER	TCH
TFER	-	68.43899
		(0.0000)
TCH	9.785737(0,0075)	-

Source: Eviews' software outputs

From this table, we deduce a two-way causality in the sense of "Toda-Yamamoto" between the fertility rate TFER and the unemployment rate TCH: the unemployment rate has an impact on the fertility rate and the fertility rate influences unemployment rate.

5.5. Estimation of short and long-term models:

We can show the Long-term coefficients and short-term dynamics as following:

5.5.1. Short-term coefficients (CT)

From the bellow Table, we can note that the adjustment coefficient is statistically significant: its value is negative and situated between zero and one in absolute value. This situation guarantees an error correction mechanism, and therefore the existence of a long-term relationship (cointegration) between variables.

In addition, we note that the unemployment rate has a weak negative effect on short-term fertility. In fact, this effect does not continue over time. Moreover, the fertility level of other years has a significant effect on that of the current year: an effect varied from positive in t (-1) to a negative effect in t (-2). Thus, Table 8 presents the estimation results of short Term coefficients.

Table 8: Estimation results of the short-term coefficients

CointegratingForm				
Variables	Coefficients	Std. Error	t-Statistic	Prob.
D(TFER(-1))	1.703111	0.050670	33.611798	0.0000
D(TFER(-2))	-0.781686	0.054498	-14.343485	0.0000
D(TCH)	-0.000001	0.000235	-0.005503	0.9957
CointEq(-1)	-0.013225	0.002577	-5.131798	0.0001
Cointeq = TFER - (-0.0001*TCH + 2.6228)				

Source: Eviews' software outputs

5.5.2. Long term coefficients (LT)

The bellow Table provides the estimated coefficients. As in the short term, the effects of unemployment on fertility in Algeria remain negative and weak in the long term: an

increase in the unemployment rate of 1% may influence the fertility rate by a decrease of 0.000098 in LT. Therefore, Table 9 presents the estimation results of long Term coefficients.

Table 9: Estimation results of LT coefficients

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TCH	-0.000098	0.017743	-0.005501	0.9957
C	2.622823	0.244802	10.714065	0.0000

Source: Eviews' software outputs

6. Conclusion

In this article, we are interested in studying the susceptible of the level of fertility to the unemployment rate in Algeria. We based our study on annual data from the World Bank data. In addition, the two variables are integrated in different order. Hence, we used the Autoregressive modeling with staggered delay (ARDL), this type of modeling, which is part of the class of dynamic models, makes possible measuring the various temporal effects.

The causality test, adapted to this type of modeling, allowed the conclusion the existence of the two-way relationship between the unemployment rate and fertility. Moreover, the procedure of "pesaran" et al. (2001) has shown the existence of a long-term integration relationship of these two variables, which allowed the estimation of the short and long-term relationships.

The estimate results show that the unemployment rate has a weak negative effect on the fertility level in short-term and long-term. In fact, this effect is quite large with different signs compared to the fertility levels of the previous two years.

The effect of unemployment on the level of fertility indicates that the state's economic situation is a factor influencing the evolution of the average number of children per woman of childbearing age. Moreover, the economic crisis, which has been experienced by Algeria before, led a decrease in this average number, and even after the enhancement of the economic situation (drop in the unemployment rate). Furthermore, the level of fertility continued to drop which prompts us to conclude that the fertility indicator cannot stop falling or even increasing unless the fall in unemployment is confirmed and confidence in the future continues to recover.

Based on the above, and given the close link between family and professional life, the study recommends that any analysis aimed to regulate the risks inherent in the labor market functioning (unemployment risk) cannot be carried out by ignoring their impact on the family. As well as the consideration of the spouse, constitutes a reliable insurance against the individual risk of unemployment.

Finally, the study proposes a line of research on the impact of the spouse and the degree of coverage offered by public unemployment insurance on the fertility rate.

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