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Estimating the degree of integration of the flour industry in Algeria according to the plant production of durum and soft wheat and barley Using the general difference method of moments (GMM) and generalized empirical probability GENERALIZED MET HOD OF MOMENTS-GMM

maoua WAFA [1]

[1] Larbi Tebessi University - Tebessa (Algeria),Wafajouri90@gmail.com)

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Abstract :
This study comes to analyze and estimate the complementary relationship between the industrial production of flour and the vegetable production of wheat and barley in the short and long term, according to a sample study of the development of industrial production of flour for seasons (1979-2020) from all sectors and a sample of the development of plant production from Soft wheat, durum wheat, and barley for seasons (1962-2020) from all sectors, according to a dynamic analysis using the general difference method of moments (GMM). between industrial and plant production under study, but it failed to explain the existence of this relationship in the long term, and these results are consistent with the results of the research explaining that in increasing Algeria's imports of wheat.

Keyzords: Flour industry, wheat production, barley production, complementary relationship

Jel classification codes: c1, c23

Resumen
Este estudio viene a analizar y estimar la relación de complementariedad entre la producción industrial de harina y la producción vegetal de trigo y cebada a corto y largo plazo, según un estudio muestral del desarrollo de la producción industrial de harina por temporadas (1979-2020).) de todos los sectores y una muestra del desarrollo de la producción vegetal de Trigo blando, trigo duro y cebada por temporadas (1962-2020) de todos los sectores, según un análisis dinámico utilizando el método de diferencia general de momentos (GMM). producción industrial y vegetal en estudio, pero no logró explicar la existencia de esta relación a largo plazo, y estos resultados son consistentes con los resultados de la investigación que explica que en Argelia aumentan las importaciones de trigo.

Palabras clave Industria harinera, producción de trigo, producción de cebada, relación de complementariedad

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maoua wafa, wafajouri90@gmail.com

1. Introduction

Algeria is among the largest wheat consuming and importing countries in the world. Although local wheat production has increased over the years, the crop still depends on favorable climatic conditions and is not sufficient to meet local demand. The US Department of Agriculture estimates Algeria's wheat imports for the 2022/2023 season at 8.3 million tons.

Algeria is the largest country in Africa, with a population of more than 43 million people and has vast natural resources. More than four-fifths of the country, which has an area of 2 million 381 thousand square kilometers, is covered in desert. In addition to its impressive geographic size, Algeria has the fourth largest economy in Africa and is one of the continent's most competitive countries. Algeria hosts the operations of multinational corporations in northwest Africa

The agricultural sector is one of the priorities of the Algerian government in its efforts to diversify the economy and attract foreign and domestic investment outside the energy sector. Agriculture, which employs 25 percent of the population, is the second largest contributor to GDP, after hydrocarbons, with a share of 10 percent. In Algeria, there are about 8.5 million hectares of arable land

In a country that encourages modern industrial agriculture, the Algerian government plans to intensify production, revitalize natural resources, and improve the use of water resources to increase agricultural development. The government's new development policy prioritizes investment in agricultural products that guarantee food security in Algeria. Large-scale agricultural investments are also encouraged in many areas. The Agricultural Development Strategy also encourages foreign direct investment and partnerships, especially in the production of cereals, oilseeds and sugar. Incentives are also granted for food processing and refining industry projects. These projects include supporting grain storage capacity, increasing cold chain infrastructure and packaging projects.

This study came to contribute to the interpretation of the complementary relationship between the plant production of wheat material and the extent of its exploitation in the industrial production of flour in the short and long term in Algeria.

On this basis, the following forms can be put forward:

Is there a co-integration relationship between the plant production of soft and durum wheat, barley, and the industrial production of flour in Algeria?

- **Sub questions**:

Through the main question, the following questions can be concluded:

– Is there a positive complementary relationship between wheat and barley production and flour industry in Algeria?

– In the case of an integration relationship between plant and industrial production under study, will this be in the long term or not?

- **Study hypotheses:**

According to the model that estimates the complementarity relationship, which will be used in the study, it puts forward a null hypothesis, which states that there is no long-term complementarity relationship for wheat production and flour industry at a significant level of more than 5%. The model acknowledges the existence of a long-term complementarity relationship between plant production of wheat and industrial production. For flour at a significant confidence level less than 5%

- **Study methodology:**

An inductive approach will be relied upon by building and estimating a measurement model using the method of the system of generalized moments (GMM) to clarify the extent of the existence of a joint integration relationship between the plant and industrial production under study. The model also clarifies, if it acknowledges the existence of the relationship, whether this relationship is long-term or not. It is only in the short term.

- **Method and tools used:**

Based on the collection of a sample of more than 60 observations, consisting of data on the development of industrial production of flour material for seasons (1979-2020) from all sectors, and the development of plant production from soft wheat, durum wheat and barley material for seasons (1962-2020) from all sectors, from Through the database provided by the Algerian Bureau of Statistics for the year 2023 / as well as the use of the economic statistical program eviews 10, Through the estimates of the generalized model of moments GMM in the axis of the parametric estimation frameworks for time series, as this statistical economic model collects the observed data and information in the circumstances of the moment without certain restrictions on the data or assumptions that are not justified in theory, and this model was completely designed for the shape of the data that will be used and very well for the type of information obtained.

- the development of plant production in Algeria(1967-2019)

It appears clear through the time series for the development of grain production, and wheat production in particular, a fluctuation in the stability of the series, as we find approximately from one to two years a decrease and an increase in the volume of production, for example in 1973 the volume of production was 14 802 750 quintals, then it developed until the year 1977 to return to decline to 11 425 090 quintals, then it rises again to 24 208 770 quintals in 1980, where it decreases in a short period of time to 12 979 620 quintals in 1983, with very clear differences, and this indicates the fluctuation of the time series, also clear differences in production between 2004 to 2008, when production decreased From 35 274 335 quintals to almost half 15 356 665 quintals, so that production will rise again in the year that follows, almost more than double the production, and it is noticeable that the chain has stabilized somewhat recently during the years 2017-2018-2019, with a production volume, respectively. 34 778 580, 60 659 430, 56 332 856 quintals.

table 1. the development of plant production in Algeria(1967-2019)

season	grain quintals	season	grain quintals	season	grain quintals	season	quintals grain	season	grain quintals
1968/1967	21 282 330	**1974/1973**	14 802 750	**1992/1991**	33 289 140	**1998/1997**	30 256 050	**2016/2015**	34 449 184
1967/1966	16 417 000	**1973/1972**	15 959 940	**1991/1990**	38 083 030	**1997/1996**	8 697 170	**2015/2014**	37 609 485
1966/1965	7 762 300	**1972/1971**	23 626 250	**1990/1989**	16 254 120	**1996/1995**	49 005 050	**2014/2013**	34 352 150
1965/1964	17 341 700	**1971/1970**	17 354 480	**1989/1988**	20 031 190	**1995/1994**	21 384 570	**2013/2012**	49 122 300
1964/1963	14 882 610	**1970/1969**	20 580 920	**1988/1987**	10 345 020	**1994/1993**	9 634 200	**2012/2011**	51 371 533
1963/1962	23 200 000	**1969/1968**	18 524 290	**1987/1986**	20 650 500	**1993/1992**	14 520 970	**2011/2010**	42 472 155
1980/1979	24 208 770	**1986/1985**	24 024 090	**2004/2003**	40 328 280	**2010/2009**	40 016 470	**2019/2018**	56 332 856
1979/1978	16 198 080	**1985/1984**	29 175 790	**2003/2002**	42 659 620	**2009/2008**	52 531 502	**2018/2017**	60 659 430
1978/1977	15 385 500	**1984/1983**	14 603 680	**2002/2001**	19 529 250	**2008/2007**	15 356 665	**2017/2016**	34 778 580
1977/1976	11 425 090	**1983/1982**	12 979 620	**2001/2000**	26 591 760	**2007/2006**	36 019 070		
1976/1975	23 131 860	**1982/1981**	15 231 980	**2000/1999**	9 342 190	**2006/2005**	40 117 450		
1975/1974	26 804 520	**1981/1980**	18 316 560	**1999/1998**	20 205 970	**2005/2004**	35 274 335		

Source: Ministry of Agriculture and Rural Development/ **in Algeria**

- the development of durum wheat production and the industrial production of flour in Algeria

It appears clear with regard to the industrial production of flour production that the time series is more stable and less volatile, as it rises to a time series, then returns to decline in the same time series, then returns to stabilize again, for example, during the years from 1963 to 1970, production records approximately the same pace 10022, 11000, 10559, 11030 ,,, 120,000, to decrease again in 1971 and stabilize until 2002, when production decreases to less than half, and the series stabilizes until recently, when Al-Dawly produces 7 915.1 (quintals10^3) in 2021.

table 2. the development of durum wheat production in Algeria (1960-2020)

yours	durum wheat	yours	durum wheat	yours	durum wheat	yours	durum wheat	yours	durum wheat
1960	10 630 910	**1973**	6 985 100	**1986**	7 846 670	**1999**	9 000 000	**2012**	24 071 180
1961	8 573 050	**1974**	6 309 960	**1987**	7 765 410	**2000**	4 863 340	**2013**	23 323 694
1962	9 139 730	**1975**	11 810 380	**1988**	4 153 720	**2001**	12 388 650	**2014**	18 443 334
1963	12 700 000	**1976**	10 356 390	**1989**	8 133 490	**2002**	9 509 670	**2015**	20 199 390
1964	9 178 180	**1977**	5 733 250	**1990**	5 549 460	**2003**	18 022 930	**2016**	19 376 173
1965	10 031 210	**1978**	7 024 940	**1991**	12 917 890	**2004**	20 017 000	**2017**	19 909 570
1966	4 815 500	**1979**	7 078 070	**1992**	13 455 310	**2005**	15 687 090	**2018**	31 780 207
1967	9 125 130	**1980**	9 265 350	**1993**	7 960 650	**2006**	17 728 000	**2019**	32 087 678
1968	10 630 910	**1981**	7 680 980	**1994**	5 624 280	**2007**	15 289 985	**2020**	8 939 920
1969	8 573 050	**1982**	6 326 080	**1995**	11 886 700	**2008**	8 138 115		
1970	9 139 730	**1983**	4 920 300	**1996**	20 345 700	**2009**	20 010 378		
1971	7 939 920	**1984**	5 859 690	**1997**	4 554 640	**2010**	18 089 739		
1972	9 119 000	**1985**	9 618 590	**1998**	15 000 000	**2011**	21 957 900		

National Bureau of Statistics2023/ quintals

table 3.the development of the industrial production of flour(1959-2021)

10^3 quintals

yours	Sem	yours	sem	yours	sem	yours	sem
1959	6012	**1979**	12507	**1999**	14 073,8	**2019**	7 614,4
1960	6099	**1980**	14 340	**2000**	15 646,5	**2020**	7 915,1
1961	7000	**1981**	15 710	**2001**	13 714,2	**2021**	7 713,3
1962	10000	**1982**	16 210	**2002**	3 794,6		
1963	10022	**1983**	17 790	**2003**	3 881,1		
1964	11000	**1984**	20 530	**2004**	4 454,8		
1965	10559	**1985**	10 302	**2005**	3 060,0		
1966	11030	**1986**	10 246	**2006**	1 999,4		
1967	11600	**1987**	10 467	**2007**	2 151,8		
1968	11800	**1988**	11 346	**2008**	4 137,6		
1969	11952	**1989**	11 846	**2009**	4 054,5		
1970	120000	**1990**	12 350	**2010**	6 439,1		
1971	12200	**1991**	12 139	**2011**	10 162,1		
1972	12500	**1992**	12 451	**2012**	4 206,5		
1973	12501	**1993**	12 491	**2013**	4 049,7		
1974	12502	**1994**	277,8	**2014**	4 239,5		
1975	12503	**1995**	11 804,3	**2015**	5 074,4		
1976	12504	**1996**	10 627,0	**2016**	5 506,6		
1977	13000	**1997**	9 136,0	**2017**	5 882,8		
1978	12506	**1998**	8 568,9	**2018**	7 057,1		

National Bureau of Statistics2023/

- **development of national production of soft wheat and the development of barley production in Algeria**

Table 4. development of national production of soft wheat(1960-2020)

YOURS	SOFT quintals	YOURS	SOFT quintals
1960	1 990 510	1990	8 031 984
1961	3 388 180	1991	6 681 084
1962	1 951 340	1992	6 234 000
1963	5 775 990	1993	2 204 380
1964	4 912 210	1994	1 515 360
1965	2 204 380	1995	3 112 500
1966	1 515 360	1996	9 480 340
1967	3 112 500	1997	2 060 500
1968	9 480 340	1998	7 800 000
1969	2 060 500	1999	5 700 000
1970	7 800 000	2000	2 740 270
1971	5 700 000	2001	8 003 480
1972	2 740 270	2002	5 508 360
1973	8 003 480	2003	11 625 590
1974	5 508 360	2004	7 290 000
1975	11 625 590	2005	8 460 185
1976	7 290 000	2006	9 151 300
1977	8 460 185	2007	7 899 640
1978	9 151 300	2008	2 972 210
1979	7 899 640	2009	9 520 791
1980	2 972 210	2010	7 962 041
1981	9 520 791	2011	7 151 000
1982	7 962 041	2012	10 251 125
1983	7 151 000	2013	9 666 796

1984	10 251 125	2014	5 918 634
1985	9 666 796	2015	6 367 916
1986	5 918 634	2016	5 024 791
1987	6 367 916	2017	4 455 460
1988	5 024 791	2018	8 031 984
1989	4 455 460	2019	6 681 084
		2020	6 234 000

National Bureau of Statistics2023

table 5. the development of barley production in Algeria(1967-2019)

season	barley	season	barley
1968/1967	5 378 520	**1998/1997**	7 000 000
1967/1966	3 396 190	**1997/1996**	1 908 920
1966/1965	1 297 700	**1996/1995**	18 002 220
1965/1964	3 786 430	**1995/1994**	5 849 800
1964/1963	2 780 210	**1994/1993**	2 340 670
1963/1962	6 900 000	**1993/1992**	4 080 230
1974/1973	3 314 220	**2003/2002**	12 219 760
1973/1972	3 738 690	**2002/2001**	4 161 120
1972/1971	6 439 950	**2001/2000**	5 746 540
1971/1970	3 717 680	**2000/1999**	1 632 870
1970/1969	5 714 380	**1999/1998**	5 100 000
1969/1968	4 663 770	**2009/2008**	22 033 586
1980/1979	7 941 900	**2008/2007**	3 959 215
1979/1978	4 565 840	**2007/2006**	11 866 580
1978/1977	3 969 650	**2006/2005**	12 358 800
1977/1976	2 603 090	**2005/2004**	10 328 190
1976/1975	5 886 720	**2004/2003**	12 116 000
1975/1974	7 427 200	**2015/2014**	10 305 564
1986/1985	10 828 290	**2014/2013**	9 394 009
yours	barley	**2013/2012**	14 986 386
1985/1984	13 301 810	**2012/2011**	15 917 150
1984/1983	5 026 520	**2011/2010**	12 580 800
1983/1982	4 467 530	**2010/2009**	13 080 348
1982/1981	4 834 430	**2019/2018**	16 477 463
1981/1980	5 248 040	**2018/2017**	19 573 271
1992/1991	13 982 900	**2017/2016**	9 696 964
1991/1990	18 099 580	**2016/2015**	9 199 064
1990/1989	8 333 560		
1989/1988	7 898 820		
1988/1987	3 896 600		
1987/1986	8 198 940		

The model and variables of the study:

To understand the mechanisms of GMM.

It is very easy for this model to tell us about the four primary measures of dispersion from the data, the variance, the skewness and the kurtosis., and the coefficient of variation using them, the model can immediately set the constraints according to its theory about the location, scale or shape of the distribution without specifying a complete model.

Example 1 – Simple method of moments estimator To show a very simple example, assume that the population distribution has unknown mean μ and variance equal to one. In this case, the population moment condition states that $E[x_i] = \mu$.

If $\{x_i : i = 1,2,\ldots,n\}$ is an independent and identically distributed sample from the distribution described formerly, then the sample average $x = 1/n \sum x_i$ is the sample analogue to the population mean $E(x_i)$. By utilizing this analogy principle, the method of moments (MM) estimator

for $E[x_i] = \mu$ is simply given by $x = 1/n \sum x_i = \mu_n$

Basically we had to work out the first moment, then to replace it with the sample analogue and to solve the equation for the unknown parameter. What remains to be established is whether this approach is the best, or even a good way to use the sample data to infer the characteristics of the population.1 Our intuition suggests that the bet-

Definition 1 – Method of moments estimator

Suppose that we have an observed sample $\{x_i : i = 1,2,\ldots,n\}$ from which we want to estimate an unknown parameter vector $\theta \in R^p$ with true value θ_0 . Let $f(x_i, \theta)$ be a continuous and continuously differentiable $R^p \rightarrow R^q$ function of θ , and let $E[f(x_i, \theta)]$ exist and be finite for all i and θ . Then the population moment conditions are that $E[f(x_i, \theta_0)] = 0$. The corresponding sample moments are given by $f_n(\theta_0) = 1/n \sum f(x_i, \theta_0)$.

The method of moments estimator of θ_0 based on the population moments $E[f(x_i, \theta)]$ is the solution to the system of equations $f_n(\theta) = 0$.
Note that if $q = p$, then for an unknown parameter vector θ the population moment conditions $E[f(x_i, \theta)] = 0$ represent a set of p equations for p unknowns.
Solving these moment equations would give the value of θ which satisfies the population moment conditions and this would be the true value θ_0 . Our intuition suggests that if the sample moments provide good estimates of the population moments, we might expect that the estimator $\hat{\theta}$ that solves the sample moment conditions $f_n(\hat{\theta}) = 0$ would provide a good estimate of the true value θ_0 that solves the population moment conditions $E[f(x_i, \theta_0)] = 0$.
The generalized moment method (GMM) has become a frequently important estimation procedure in Areas of applied economics and finance since Hansen (1982) introduced the two-step GMM (2SGMM). It can be considered a generalization of many other estimation methods such as least squares (LS), mechanism variables (IV) or maximum likelihood (ML). As a result, it is less likely to be misidentified.
As a result of its popularity, most statistical packages such as Matlab, Gauss, or Stata offer toolboxes that use the GMM procedure. This method can now be easily used in R with the new gmm package.
Although GMM has good potential in theory, many applied studies have shown that the properties of 2SGMM may in some cases be poor in small samples. In particular, may Be heavily biased towards certain choices of the circumstances of the moment. In response to this finding, Hansen et al. (1996) proposed two more methods for calculating GMM: iterative GMM (ITGMM) and continuous updated GMM (CUE) 1 .
Moreover, another family of estimation procedures inspired by Owen(2001), which also depends on momentary conditions only, was introduced by Smith (1997). that it In econometrics and statistics, the generalized moment method (GMM) is a general method for estimating parameters in statistical

models. It is usually applied in the context of semi-parametric models, where the parameter in question is of finite dimensions, while the full form of the data distribution function may not be known, and thus the maximum-likelihood estimation is not applicable.
The method requires defining a certain number of intraday conditions for the model. These instantaneous conditions are functions of the model and data parameters, such that their expectation is zero at the real values of the parameters. The GMM method then reduces a given criterion to the sample averages for moment conditions, and can therefore be considered as a special case of estimating the minimum distance. [1] GMM estimators are known to be consistent, asymptotically normal, and most efficient in the class of all estimators who do not use any additional information beyond that present in the present conditions.

Lars Peter Hansen advocated the GMM in 1982 as a generalization of the method of moments, [2] introduced by Karl Pearson in 1894. However, these estimations are mathematically equivalent to those based on "orthogonal conditions" (Sarjan, 1958, 1959) or "estimation equations unbiased" (Huber, 1967; Wang et al., 1997).

Study variables:
The dependent variable: represents the time series data for the industrial production of flour in Algeria.
Explanatory variables: It represents the time series data for plant production of soft and durum wheat, barley, as well as oatmeal and maize in Algeria.

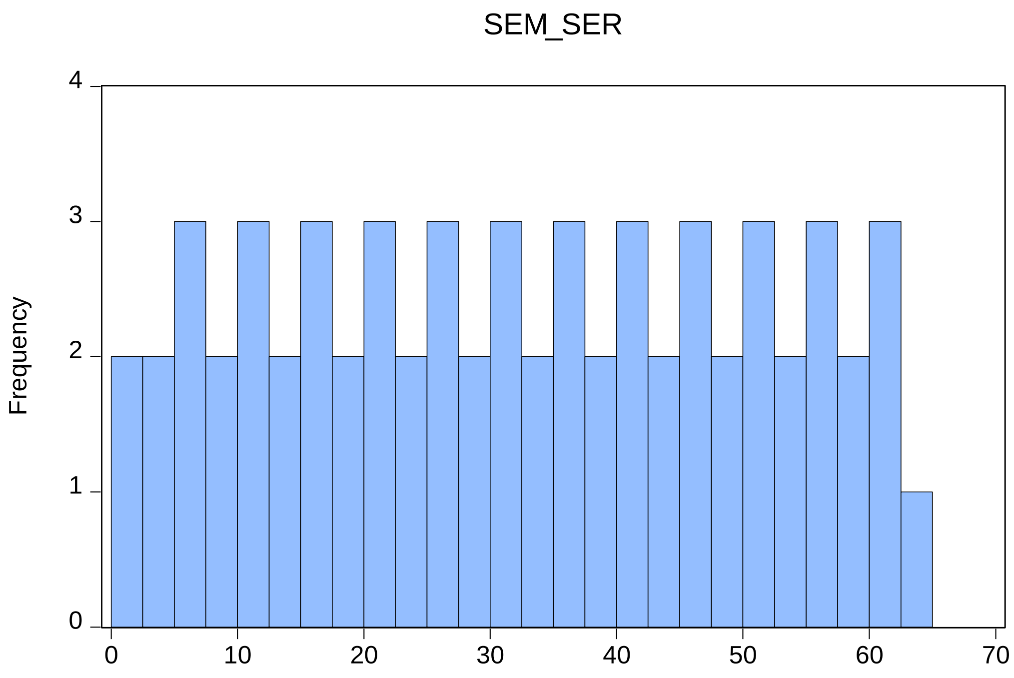
Interpretation and analysis of the results:
The model assumes the independence of the time series for all variables in order to get rid of seasonal changes in the series. Or that the series does not have a general trend, so we conducted static tests for the industrial production chain of semolina, where we found at the beginning the instability of the series and there is no trend (there is no increase or decrease over time), the test was repeated for the series taking the first differences and we found that the series became It is stable at the level of significance of the prob test ≥ 5%, which allows this test to reject the null hypothesis and acknowledge the existence of a significant stability of the series.

BDS Test for SEM_SER
Date: 08/12/23 Time: 10:02
Sample: 1955 2021
Included observations: 67

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.208656	0.005041	41.39451	0.0000
3	0.351329	0.007988	43.97951	0.0000
4	0.451373	0.009481	47.60884	0.0000
5	0.523424	0.009847	53.15556	0.0000
6	0.576795	0.009462	60.95681	0.0000

Raw epsilon	28.56274		
Pairs within epsilon	2779.000	V-Statistic	0.700176
Triples within epsilon	127547.0	V-Statistic	0.510092

Dimension	C(m,n)	c(m,n)	C(1,n-(m-1))	c(1,n-(m-1))	c(1,n-(m-1))^k
2	1330.000	0.703332	1330.000	0.703332	0.494675
3	1302.000	0.711475	1302.000	0.711475	0.360147
4	1274.000	0.719774	1274.000	0.719774	0.268401
5	1246.000	0.728229	1246.000	0.728229	0.204805
6	1218.000	0.736842	1218.000	0.736842	0.160047



Null Hypothesis: KHARTAL_SER has a unit root
Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic
Elliott-Rothenberg-Stock DF-GLS test statistic		-3.433721
Test critical values:	1% level	-3.747200
	5% level	-3.170800
	10% level	-2.872000

*Elliott-Rothenberg-Stock (1996, Table 1)

DF-GLS Test Equation on GLS Detrended Residuals
Dependent Variable: D(GLSRESID)
Method: Least Squares
Date: 08/12/23 Time: 10:14
Sample (adjusted): 1964 2019
Included observations: 56 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GLSRESID(-1)	-0.357670	0.104164	-3.433721	0.0011

R-squared	0.176473	Mean dependent var	-0.002460
Adjusted R-squared	0.176473	S.D. dependent var	0.300972
S.E. of regression	0.273128	Akaike info criterion	0.259941
Sum squared resid	4.102930	Schwarz criterion	0.296108
Log likelihood	-6.278349	Hannan-Quinn criter.	0.273963
Durbin-Watson stat	2.347099		

Null Hypothesis: D(SOFT_WHEAT_SER) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
	Phillips-Perron test statistic	-8.000001	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.984127
HAC corrected variance (Bartlett kernel)	0.983623

***Also shown here are the independence tests for the soft wheat series, the Phillips-Perron test statistiC, and the model acknowledges this at a confidence level not exceeding 5%.

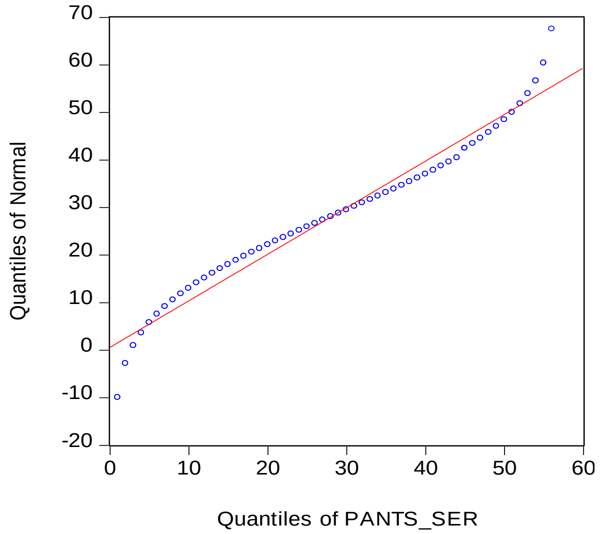
Null Hypothesis: D(DURUM_WHEAT_SER) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
	Phillips-Perron test statistic	-8.000001	0.0000
Test critical values:	1% level	-3.536587	
	5% level	-2.907660	
	10% level	-2.591396	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.984127
HAC corrected variance (Bartlett kernel)	0.983623

***Also, for the independence of the production chain for durum wheat, using the same test, and therefore the model is valid for integration tests with the industrial production of semolina.



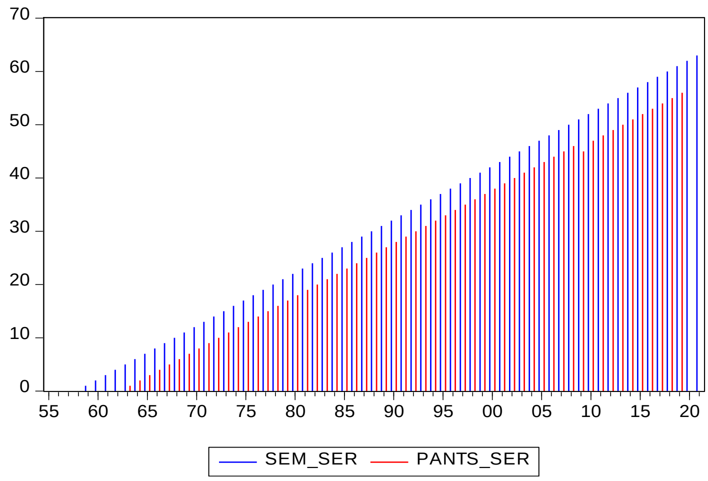
اختبار التكامل للنموذج:

Dependent Variable: SEM_SER
Method: Generalized Method of Moments
Date: 08/12/23 Time: 10:17
Sample (adjusted): 1963 2019
Included observations: 57 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: DURUM_WHEAT_SER
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PANTS_SER	1.017880	0.005049	201.5931	0.0000
C	3.695784	0.112527	32.84339	0.0000

R-squared	0.999549	Mean dependent var	33.00000
Adjusted R-squared	0.999541	S.D. dependent var	16.59819
S.E. of regression	0.355621	Sum squared resid	6.955656
Durbin-Watson stat	0.742115	J-statistic	4.48E-44
Instrument rank	2		

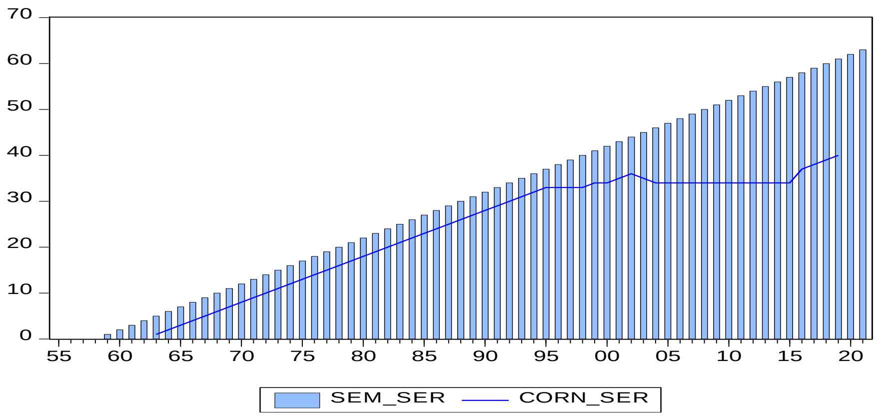
***The integration test of the generalized moments method shows that there is a relationship between the production of vegetable wheat during the time series, as well as the industrial production of flour, when a test with a significance Prob is less than 5%. The null hypothesis that there is no integration relationship in the long run is rejected



Dependent Variable: SEM_SER
Method: Generalized Method of Moments
Date: 08/12/23 Time: 10:25
Sample (adjusted): 1963 2019
Included observations: 57 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: DURUM_WHEAT_SER
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CORN_SER	1.507819	0.127201	11.85379	0.0000
C	-3.928329	3.089091	-1.271678	0.2088

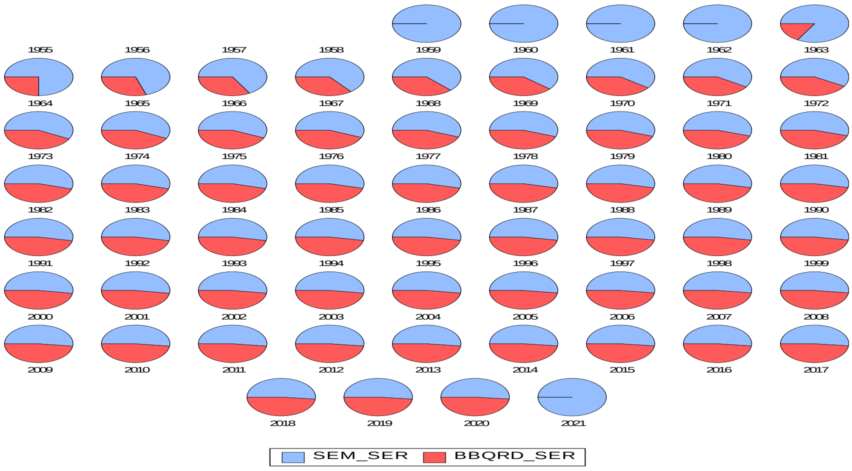
R-squared	0.899162	Mean dependent var	33.00000
Adjusted R-squared	0.897328	S.D. dependent var	16.59819
S.E. of regression	5.318459	Sum squared resid	1555.730
Durbin-Watson stat	0.032006	J-statistic	1.40E-45
Instrument rank	2		



Dependent Variable: SEM_SER
Method: Generalized Method of Moments
Date: 08/12/23 Time: 10:29
Sample (adjusted): 1963 2020
Included observations: 58 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: DURUM_WHEAT_SER
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BBQRD_SER	1.000000	8.98E-17	1.11E+16	0.0000
C	4.000000	3.11E-15	1.29E+15	0.0000

R-squared	1.000000	Mean dependent var	33.50000
Adjusted R-squared	1.000000	S.D. dependent var	16.88688
S.E. of regression	4.52E-16	Sum squared resid	1.14E-29
J-statistic	0.000000	Instrument rank	2



Dependent Variable: SEM_SER
Method: Generalized Method of Moments
Date: 08/12/23 Time: 10:41
Sample (adjusted): 1959 2020
Included observations: 62 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: DURUM_WHEAT_SER
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SOFT_WHEAT_SER	1.037750	0.027742	37.40658	0.0000
C	2.426271	1.155130	2.100430	0.0399

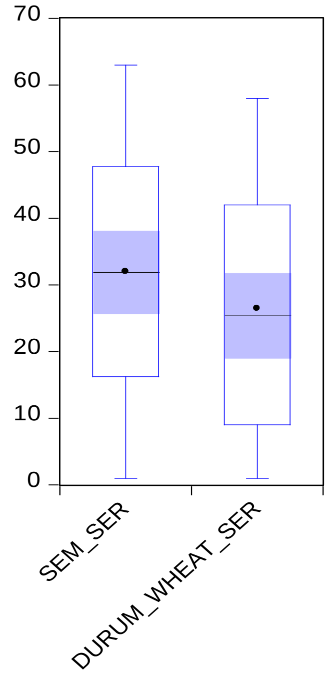
R-squared	0.989248	Mean dependent var	31.50000
Adjusted R-squared	0.989068	S.D. dependent var	18.04162
S.E. of regression	1.886322	Sum squared resid	213.4926
Durbin-Watson stat	0.320308	J-statistic	2.80E-45
Instrument rank	2		

Dependent Variable: SEM_SER
Method: Generalized Method of Moments
Date: 08/13/23 Time: 11:07
Sample (adjusted): 1963 2019
Included observations: 57 after adjustments
Linear estimation with 1 weight update
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)
Standard errors & covariance computed using estimation weighting matrix
Instrument specification: PANTS_SER
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DURUM_WHEAT_SER	1.000000	1.08E-16	9.30E+15	0.0000
C	4.000000	4.32E-15	9.26E+14	0.0000

R-squared	1.000000	Mean dependent var	33.00000
Adjusted R-squared	1.000000	S.D. dependent var	16.59819

S.E. of regression	0.000000	Sum squared resid	0.000000
J-statistic	0.000000	Instrument rank	2



***The same interpretation of the results for soft and hard wheat, as well as barley. The model tests all show the presence of integration at a confidence level of 95%, which has a clear indication. However, this integration appears in the short term only, and all the data show that, whether through the spread or the different and divergent averages. in the box drawing

Algeria has allocated many programs to achieve food security, and despite the achievement of significant results, objectively, they are not reassuring in the field of agricultural production, whose level experienced an important jump from its value in dollars estimated at 5.78 billion dollars in 2003 to 25.6 billion dollars. In 2021 (1) to 35 billion dollars at the present time, a level announced by the President of the Republic during his May 2023 meeting with journalists from the national press.

The official commitment that the President of the Republic took upon himself before the agricultural events held in Algiers in February 2023, to fully achieve this goal (the goal of food security), is distinguished from previous commitments by its rigor, by taking a courageous risk for what was set for the horizon of 2025.

It is a very ambitious bet, but it is also highly recruited, even if it exceeds the ambition of the moderate Minister of Agriculture in his statement to the television in January 2023, who estimated the percentage of soft wheat that Algeria currently imports at 50% of its soft wheat needs, reassuring that Algeria’s needs are from Durum wheat is covered by 90/95% of the national production.

It is clear from the foregoing that the agricultural situation and food security in Algeria is serious, and this is due to the absence of an agricultural policy in the long term: and to improve this, the following must be taken into account:

- Finding a final solution to the agricultural property.
- Provide material, human and water means.
- Protection of natural resources and agricultural wealth.
- Reorganization of administration, networks and agricultural and rural institutions.

- Rehabilitation of agricultural educational institutions.
- Improving the relationship of the agricultural sector with its technical, economic, financial, social and administrative environment.

Some recommendations:

- ✓ Algeria must follow a long-term plan and set future goals, avoid the random operation of the agricultural sector, and also exploit the capabilities available in this field because Algeria possesses what distinguishes it from the rest of the world's countries in the agricultural field, and what is missing is good planning that will put Algeria at the top of the list of developed countries. Agriculturally
- ✓ The best policy for developing industrial production of flour is the optimal use of available resources, taking into account the necessary requirements of raw materials, technology, labor, investment, and the market.
- ✓ It is necessary to enhance the production and processing capabilities of mills in order to ensure the abundance of semolina and pasta

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