

Openness effect and impact measurement on employment and value-added of the industry sector in Algeria

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Abstract :

This paper aims at identifying the effect of import and export flows on job creation and value-added in the Algerian manufacturing sector. Firstly, we analyze based on a range of data and statistics, the situation of the manufacturing sector in Algeria and secondly, we evaluate the impact of trade openness on the net creation of jobs and value-added. To capture this relationship, we employed a panel data model for a period spanning from 1991 To 2011 Our results indicate that openness is not always beneficial in terms of job creation and value-added, as defined and approved by the supporters of the classical theory of international trade, at least for a mono-exporting country such as Algeria

Keywords: Employment, Value-added, Trade openness, Manufacturing sector

Jel Classification Codes : B17, C23, E24, L60

المخلص:

تهدف هذه الورقة إلى تحديد تأثير تدفقات الاستيراد والتصدير على خلق فرص العمل والقيمة المضافة في قطاع الصناعات التحويلية الجزائري. أولاً ، نقوم بتحليل وضع قطاع الصناعات التحويلية في الجزائر استناداً إلى مجموعة من البيانات والإحصائيات ، وثانياً ، نقوم بتقييم تأثير الانفتاح التجاري على صافي خلق الوظائف والقيمة المضافة. وللتعرف على هذه العلاقة ، استخدمنا نموذج بيانات البانل لفترة تمتد من عام 1991 إلى عام 2011 ، تشير نتائجنا إلى أن الانفتاح ليس مفيداً دائماً من حيث خلق فرص العمل والقيمة المضافة ، على النحو المحدد والمعتمد من قبل مؤيدي النظرية الكلاسيكية للتجارة الدولية ، على الأقل بالنسبة لدولة أحادية التصدير مثل الجزائر.

الكلمات المفتاحية: التوظيف ، القيمة المضافة ، الانفتاح التجاري ، قطاع التصنيع

رموز تصنيف جيل: B17, C23, E24, L60

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1.Introduction

Since the 80s, trade liberalization and the reduction of tariff and non-tariff barriers have aroused particular interest in developing economies (Francisco Rodriguez and Dani Rodrik, 2000). For (Blancheton, 2004) and (Kheladi, 2007), this liberalization is associated with a certain number of beliefs mingling to different degrees: openness, growth, competitiveness and performance. The proposals of the Washington consensus¹, popularized under conditionalities of the International Monetary Fund (IMF), have provided developing economies, especially those that have undergone structural adjustment plans (SAP) such as Algeria, a course of action that many of them hastily assimilated to a new development strategy based on the opening of their economy. This new economic context has allowed a proliferation of opening policies, based on integration into free trade zones and on the creation of free zones.

In Algeria, after several decades of socialist and administered management of the economy which resulted in a crisis of the productive system ((Brahimi, 1991); (Kheladi, 2007)), a process of liberalization of economic activities started in particular since 1989 (Daoud, 2012). In this liberalization process, several reforms had been initiated: privatization of public enterprises, promotion of foreign direct investments (FDI), multilateral negotiations of the World Trade Organization (WTO), signing of free trade agreements (EU in 2002, ZALE in 2009 and ZLECA in 2020). These reforms were expected to generate positive effects on economic development through a positive dynamic of job creation and wealth.

This paper aims at identifying the dynamics of employment and wealth in the industrial sector in Algeria and apprehending a sectoral spatialization policy allowing both a better allocation of resources. Using a panel data model, we approach our issue by studying the effects of trade openness on job creation and value-added in the various activities of the industrial sector.

2. Structure of employment and value-added: dominance of the tertiary sector

The various economic reforms of a global or sectoral nature implemented over the past twenty years in Algeria have aimed at the establishment of market economy rules and the reestablishment of major macroeconomic balances. However, the characteristic of Algeria which is a mono-exporting economy of hydrocarbons makes more difficult any attempt to implement a policy which allows both to ensure harmonized economic development and to reduce the level of unemployment.

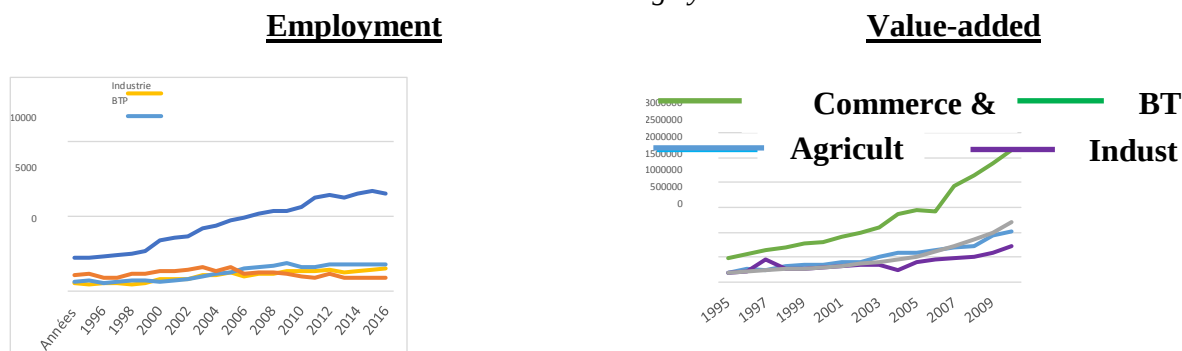
Moreover, the examination of the labor market in Algeria, during the period 1990-2011, revealed that unemployment appears to be a fundamental problem. The public authorities try through policies and programs to absorb as much unemployment as possible by creating jobs, generally financed by bodies created for this purpose (ANEM, DAS). This period was characterized by economic reforms and by profound changes in the labor market. As a consequence, strong job losses under the effect of restructuring, privatization and closure operations affected public enterprises in different sectors and in particular the manufacturing sector during the period from 1990 to 1999. However, an upward of the occupied population, during the period from 2000 to 2011, explained by the implementation of support mechanisms for job creation (ANEM and DAS) and the dynamic experienced by the private sector, in particular the emergence of small and medium-sized enterprises (SMEs) in the service and trade sectors. The current labor market situation and the implications of a national employment policy, geared towards active management, require a support policy for the industrial sector.

¹ The Washington Consensus is a body of standard measures applied at the end of the 80s to economies in difficulty with their debt by international financial institutions based in Washington (World Bank and International Monetary Fund) and supported by the American Treasury Department. The first extensive and academic definition of the concept is attributed to John Williamson (1990) who gave his interpretation to this consensus through 10 Commandments, which served as the basis of the first generation of SAPs.

2.1. Sectoral contribution in job creation and added-value

The capacity of creating jobs differs from one sector to another given the capital intensity and the capacity to generate wealth (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004). In the case of Algeria, the trade and services sector is considered as the tertiary sector that substituted industry and agriculture in terms of job creation during the 1980s and 1990s.

Figure 1. Comparative variation between employment and value-added (1992 - 2011) of the main industrial sectors excluding hydrocarbons.



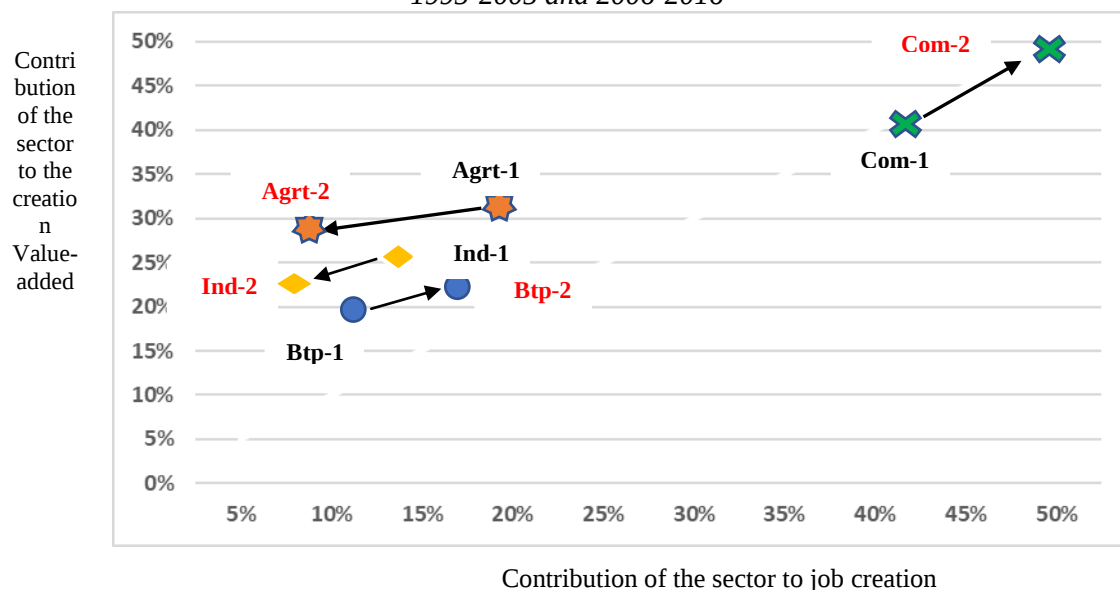
Source : Based on ONS data

These two charts highlight the growing role of the tertiary sector (Commerce and services) in the creation of jobs and wealth. During the entire period under consideration, the value-added generated by the trade and services sector pulls the overall value-added excluding hydrocarbons upwards, while the agriculture, construction and industrial sectors evolve less quickly. From 2001, the trade and services sector recorded a greater rate of growth in value-added than that of all the sectors, mainly driven by the equipment expenditure of the administrative services which experienced a significant growth. During the same period, the gap in terms of employment is more and more important, explained by the implementation of the various aid and support mechanisms for the creation of companies (ANSEJ, CNAC, etc.) and jobs such as ANEM and DAS.

2.2. Sectoral contribution to the change in employment and value-added

The graph below shows the contribution of the different sectors to the creation of wealth and employment during the two sub-periods (1995-2001) and (2002-2011). Indeed, the trade and services sector is marked by a clear increase in terms of jobs and value-added. This can be explained by the reconfiguration of the Algerian economy from 2001, which is increasingly based on the economy of services. On the other hand, the sectors of industry and agriculture recorded a regression in terms of value-added and employment during the two sub-periods. This situation is explained by the difficulty of implementing policies aimed at diversifying the Algerian economy despite the attempts that accompanied the two five-year plans, namely: the economic recovery support plan (2002-2004) and the additional growth support (2005-2009). These two programs were launched with the aim of boosting non-oil economic growth and creating a balanced labor market. Besides, the effects of trade openness and structural adjustment programs which have disrupted the development cycle of sectors such as industry and agriculture.

Figure 2. Sectoral contributions to the variation in employment and value-added during the two sub-periods 1995-2005 and 2006-2016



Source : Authors' calculations based on ONS data.

This situation has enabled the public sector to become the leading employer, especially for young graduates, under job creation assistance schemes such as ANEM and DAS. The trade and services sector has emerged as the driving force for growth and employment. However, agriculture and industry are the sectors that contribute less.

3. Trade openness: effects on employment and value-added

According to the traditional theory of international trade, trade is only possible through the specialization of each country in the production of a good in which it has a comparative advantage. The assumption of the international homogeneity of the factors of production, because of their free movement, allows this type of exchange. In contrast, the new theory of international trade, associated with (Krugman, 1979) and (Lancaster, 1980), indicates that trade can take place even for similar goods belonging to the same industry. Proponents of this line of thought, which are based on the theory of imperfect competition and the theory of increasing returns, show that the preferences and tastes of consumers play a central role in the development of intra-industry trade. Based on this theory, all countries are potentially exporters, because they specialize in horizontally distinct varieties.

3.1. Trade openness and economic development: State of the art

Having as a goal to integrate the international trade, Algeria has engaged in a process of opening up its economy in the mid-1990s. To implement and accelerate this process, a tariff policy was implemented in January 1992. A tariff nomenclature was adopted, going from 18 to 7 (0%, 3%, 7%, 15%, 25%, 40%, 60%), then at 3 rates in 2001 (45 to 40% and 30%). In order to consolidate this tendency, bilateral and multilateral agreements were ratified from 1996, in this case the association agreement with the countries of the European Union, the commercial cooperation agreement with Jordan, the commercial agreement with the Arab countries (ZALE), the agreement with the countries of the Arab Maghreb Union (UMA), the trade and investment agreement with the countries of the West African Economic and Monetary Union (UEMOA) and the WTO.

In a paper entitled "Sectoral dynamics and jobs in Morocco", (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004) indicated that there are three conceptual approaches dealing with the effect of trade openness on the economy. The first approach explains this relationship by the

effects of dynamic growth linked to externalities and the spillover effects of economies. The second approach explains that this relationship involves a mode of integration of the economy into globalization which generally involves an increase in exports of primary products, by the subcontracting of low-tech activities. The last approach is based on the principle of static reallocation of factors of production following the opening up.

In general, the literature on this topic falls under the third approach, based on Ricardian comparative advantage theory (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004). This approach makes it possible to quantitatively measure the gains and losses of jobs and wealth following the opening up. This analysis indicates that increased trade will lead to a significant increase in jobs and value-added in exporting sectors and to a decrease in sectors competing with imports. This will allow the reallocation of production factors such as labor, capital and labor-factor technology in competing sectors towards less competing sectors, which generates a net positive effect on employment and on wealth creation (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004). However, the validity of this result remains nuanced and gives rise to permanent debate. Indeed, (Cortes Olivier et Jean Sébastien, 1995) indicate that this static approach ignores the dynamic interactions between openness and the internal capacities of the economy to generate growth and productivity. Other elements have been added by the new theory of international trade, such as technological progress, economies of scale and negative externalities. Taking these elements into account makes the analysis and interpretation of the results more complex.

Our methodology in this paper, is based on the approach adopted by (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004) and by (Mrabet, 2010) to measure the effects of the opening up of the Algerian economy on job creation and value-added. In our analysis and due to the issue of data availability and measurement difficulty, we opted for a quantitative analysis, on a 20-year statistical series (1992 to 2011), based on the work of (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004); (Mrabet, 2010). The latests, which are empirical in nature, have tried to bring out this relationship by using an econometric analysis of the effects of openness on job creation and on value-added in the industrial sector.

3.2. Model choice

Several authors such as (Wood, 1995); (Mrabet, 2010); (Ben Ayed Mouelhi, 2007) and (Mrabet, 2010); used an econometric approach to explain the effect of opening up an economy on job creation and the development of value-added. (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004) studied the flows of job creation and destruction in the manufacturing sector (IAA, ICPC, IEE, IMM and ITC) compared between two regions: Asia (Indonesia and Malaysia) and Mediterranean (Morocco, Tunisia and Turkey), during the period from 1985 to 2001. The panel data econometric analysis revealed that in the long-term, the trade liberalization of the two groups of countries is destructive of industrial jobs for both Asian and Mediterranean countries. Yet, in the short-term, the overall improvement in industrial employment is based on several sectors such as IEE, ITC and IMM, while for Mediterranean countries, only the textile-clothing sector is the carrier of the total dynamics.

(Cortes Olivier et Jean Sébastien, 1995) studied the impact of foreign trade on sectoral dynamics in three developed countries, namely: France, Germany and the United States. Their findings indicate that for the three countries considered, productivity gains affect employment by generating a compensation effect from the most productive sectors to the less productive. They add that with unchanged production, the loss in terms of employment is observed in the sectors which register a higher productivity gain. They add that with unchanged production, the loss in terms of employment is observed in the sectors that register a higher productivity gain. This productivity gain leads to a fall in prices, an increase in wages, an increase in profits, which causes an increase in the remuneration of wages and capital.

In addition, (Ben Ayed Mouelhi, 2007) produced a more comprehensive study of the effects of trade opening in the Tunisian industrial sector on job creation and productivity growth. The aim of this paper is to establish a comparison concerning the Tunisian manufacturing industry between two periods which involve different trade regimes: protectionism report (1987 - 1995) and liberalization (After 1995). The main results of this study indicate that trade liberalization in Tunisia has had no significant effect on the growth of industrial production or on the growth of employment. The main explanation may be mainly due to a decrease in productivity growth of firms operating in the industrial sector.

3.3. Econometric analysis

3.3.1. Data description

The data used in this paper are taken from statistics provided by the National Statistics Office (ONS). We have a panel of six manufacturing industries observed during the period (1991-2011): The metallurgical, mechanical and electromechanical steel industries (ISMME), construction materials (MCONST), rubber and plastic chemicals (CCP), the agro-food industry (IAA), textiles, clothing and leather (TCC) and finally the cork wood and paper industry (BLID). The dataset relating to each industrial sector includes the following variables: value-added (VA), industrial producer price index (IPPI), number of jobs per sector (L), gross output expressed in base value (2000), exports (X) and imports (M). In addition, our database is made up of a set of heterogeneous industrial activities.

On the other hand, the period from 1991 to 2011 allows us to highlight the effects of the opening up of the Algerian economy on job creation and the level of production expressed in value. Indeed, the period from 1991 to 2011 was characterized by the implementation of the policy of liberalizing the Algerian economy. This period also corresponds to the implementation of the new investment orientation law as well as the signing of the association agreement with the European Union in 2002 and the integration of Algeria into the Arab zone of free exchange.

3.3.2. Specification of models

For a better understanding of the effects of trade openness on employment and on value-added, we econometrically tested the relationship trade exchanges between different industrial sectors and the two main components of the economy. These two components are: value-added (VA) expressed in constant dinars (base 2000), and employment (L) expressed in number of employees in each sector.

To estimate the effect of openness on employment, we used panel data modeling. We opted for a panel data analysis because the structure of the database was poorly suited to econometric requirements (few years). Panel data analysis makes it possible to simultaneously take into account the dynamics of behaviors and their possible heterogeneity observed, which is an advantage over other types of data (time series and cross-sections), because of the double dimension of data (individual and temporal) (Sevestre, 2022). It also makes it possible to increase the number of observations, which will allow increasing in the number of degrees of freedom and the reduction of collinearity between the explanatory variables.

We calculated the variable employment according to two indices of the foreign trade namely; the propensity to export (*prx*) which expresses the share of national production devoted to meeting external demand, the propensity to import of each industrial sector (*prm*) which indicates the capacity of domestic production to satisfy domestic demand with respect to imports. To increase the explanatory degree of the model, we opted for the value-added (VA) generated by each industrial sector and the absorption capacity of each sector (CAPAB) ((Mrabet, 2010); (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004)).

However, the use of unbalanced data leads to problems of heteroscedasticity and / or autocorrelation of errors. In our case, we have a full panel. In this case, the most appropriate model for our case is the panel data model. The standard form of our model is:

$$t \dots \dots \dots (1)$$

We proceeded to put the variables, which are not expressed as a percentage of the equation such as employment, value-added and absorption capacity, in logarithm in order to linearize their changes over time and a harmonization of the units of measurements. The log-log transformation is interesting to reduce the variance and to be able to interpret the coefficients as elasticities. The equation becomes:

$$t \dots \dots \dots (2)$$

The standard form of our model is:

$$t \dots \dots \dots (3)$$

Similarly, we proceed to put the variables, which are not expressed as a percentage of equation (2) in logarithm in order to linearize their changes over time.

The equation becomes:

$$t \dots \dots \dots (4)$$

This form of equation allows us to know the direction of correlation between the variable to be explained and the explanatory variables. A positive correlation between value-added (VA) and one of the explanatory factors used in this equation indicates that an increase recorded in one of the explanatory factors allows a net creation of value-added and vice versa.

Table 1. Summary of the used variables

Used variable	Symbol	Description and calculations	Interpretation
Number of jobs	Lit	The total jobs in sector i in year t.	A dependent variable to express the dynamic of job creation / destruction following openness.
Value-added	VAit	The value-added of sector i in year t (the value-added (deflated by the IPPI base 1989).	A dependent variable that expresses the variation in the creation of wealth following openness.
Absorption capacity	CAPABit	The gross output of the sector + the value of imports - the value of exports (deflated by IPPI base 1989).	Measures the apparent domestic demand of a sector.
Import propensity	PRMit	The value of imports / gross production	The capacity of domestic production to meet domestic demand with respect to imports.
Export propensity	PRXit	The value of exports / gross production (deflated IPPI base 1989).	Measures the export effort of a sector. It also indicates the share of gross output devoted to meeting foreign demand.
Apparent labor productivity	PATit	Value-added / total employees	Value-added / total employees

Source: by the authors

3.3.3. Choice of the estimation method

In panel data studies, it is necessary to ensure the homogeneous or heterogeneous specification of the process generating the data (Doucouré, 2008). The Fisher and Hausman tests can tell us about the specification of our model. In this case, the most appropriate modeling is panel data analysis. The most adequate estimation method remains to be determined. In panel data econometric analysis, two models are possible: the fixed effects model and the random effects model.

However, choosing one or the other is not easy. Each of these methods indeed convey advantages and disadvantages, the relativization of which cannot be done in a simplistic way. (Hausman, 1978) responds to this concern by proposing a test that compares the performance of these two estimators. It is therefore a question of testing the hypothesis H0: "there are no significant differences between the coefficients of the two estimators", one can indifferently choose the model with fixed effects or the model with random effects. The idea is to test for all industrial sectors whether the theoretical model is perfectly identical for all countries or whether there are specificities specific to each sector (Doucouré, 2008). These specification tests as well as the estimates will be done using the stata 11 software.

a. Fisher specification test

This test makes it possible to check the overall homogeneity of the model, it also serves as a test of the overall significance of the model. The difference in terms of the technological level used, the organization and the mode of operation of each industrial activity sector can constitute a source of heterogeneity.

The hypotheses of the test are as follows:

H0: the absence of fixed effects

H1: the presence of fixed effects

The results relating to the statistical Fischer tests are shown in the table below. To this end, the hypothesis of the presence of fixed effects will not be rejected when the calculated statistic is greater than the critical value from the Fisher table. The test results are as follows:

Table 4. Summary of Fisher's Global Significance Test Results

Employment equation (L)				
Fisher test	F (4, 115) = 50,12	P > F = 0,000	R2 = 0,63	R2 ajusté = 0,62
Value-added equation (VA)				
Fisher test	F (5, 115) = 115,54	P > F = 0,000	R2 = 0,80	R2 ajusté = 0,79

Source : Authors' calculations

The results of the estimates for the two models tell us that the probability of the Fischer statistic is below the 10% threshold. In this case, the H1 hypothesis which indicates the presence of the fixed effects. This test allows us to conclude that the chosen model is adopted to analyze the effects of openness on job creation and on value-added for all selected industrial activity sectors.

b. Hausman test

The Hausman test follows a Chi-square law with k-1 degree of freedom and allows the choice between the fixed-effects model and the random-effects model, taking into account the heterogeneity of the data. Tests for the absence of correlation between the individual effect and the explanatory variables. The statistic is obtained by directly comparing the "between" and "within" estimators.

In the first case we assume that the specific effects can be correlated with the explanatory variables of the model, and in the second case we assume that the specific effects which are perpendicular to the explanatory variables of the model.

When the probability of this test is lower than the selected threshold, the fixed effects model is preferred. Otherwise, the random effects model is retained and in this case the GCM method is adopted.

The hypotheses of the test are as follows:

H0: the presence of random effects

H1: the presence of fixed effects

Table 5. Results of the Hausman test for the employment model (L)

CH	Coefficients		Difference (b-B)
	Fixed Effets (b)	Random Effets (B)	
<i>prm</i>	-0,0963273	-0,0512833	0,0110147
<i>pex</i>	0,320896	-0,2577235	0,1225075
<i>logcapab</i>	0,5541677	0,6892908	0,0919737
<i>logva</i>	-0,1488876	-0,1783032	0,0294156

$$CHh2 (4) = (b-B)' [(V_b - V_B)^{-1}] (b-B) = 47,73$$

Prob > Chi-Squared = 0,0000

Source: Authors' calculations

Table 6. Hausman test results for the value-added model (VA)

CH	Coefficients		Difference (b-B)
	Fixed Effets (b)	Random Effets (B)	
<i>logx</i>	0.699327	-0.0769145	0.1468472
<i>logm</i>	-0.1834796	-0.115472	-0.1563502
<i>logcapab</i>	0.6941772	0.8505274	-0.1563502
<i>logpat</i>	0.7194566	0.7629852	-0.0435286

$$CHh2 (4) = (b-B)' [(V_b - V_B)^{-1}] (b-B) = 32,89$$

Prob > Chi-Squared = 0,0000

Source: Authors' calculations

For both models, the Hausman specification test (see table n °5) indicates that the obtained p-value (prob> Chi-Squared = 0.0000) is less than 10%.

This allows us to reject the hypothesis H0 for which random effects are present, so we opt for an econometric analysis with a fixed-effect model.

Table 7. Results of the estimations of the two models

Openness effect on employment				Openness effect on VA			
Variables	Fixed Effect Model		Fixed Effect Model 1	Variables	Fixed Effect Model 2		
/	coefficient	Effect	coefficient	/	coefficient	Effect	
PRM	-0.097**** (- 5.36)	(-)	-0.099**** (7-.41)	LOGX	0.699** (1.86)	(+)	
PRX	- 0. 55 ^{NS}	/	/	LOGM	-0.183**** (-2.27)	(-)	
LOGCAP	0.559****	(+)	0.558****	LOGCAPA	0.719****	(+)	

AB	(4.75)		(6.99)		B	(0.055)	
LOGPAT	-0.14**** (-2.88)	(-)	-0.322**** (-8.58)	(-)	LOGPAT	0.7194**** (0.748)	(+)
C	1.01** (1.58)	(+)	1.00** (0.636)	(+)	C	-2.688**** (0.748)	(-)
R2 Within	0.49		0.49		R2 Within	0.73	
R2 global	0.66		0.65		R2 global	0.73	
N	120		120		N	120	

Source: Authors' calculations

Notes: Statistical T's are in parentheses; **** significant at 1%; *** significant at 5%;

** significant at 10%; NS: not significant.

3.3.4. Discussion

a. Model 1:

For the import propensity coefficient (PRM), it should be noted that it is negative and significant at a threshold of 1%. Its sign is not contrary to the expectations and it conforms to the results obtained by (Mrabet, 2010), (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004) as well as those obtained by (Cortes Olivier et Jean Sébastien, 1995). Indeed, these authors claim that imports destroy industrial jobs. This negative relationship between imports and the dynamics of job creation can be explained by a lack of job security due to imports. This unfavorable situation can be explained by the deindustrialization process that began in the early 1990s with the structural adjustment program (SAP), then aggravated by the implementation of free trade agreements (EU, ZALE). On the other hand, the implementation of infrastructure projects within the framework of the five-year economic recovery plans of (2002-2004) and that of (2005-2009) required huge material and human resources that the national economy cannot satisfy. To reach that goal, the option of importing raw materials as well as the equipment necessary to carry out these projects has become essential.

We observe a non-significant result of the variable (PRX). This result is explained by the fact that the different sectors of activity are not oriented towards export and job creation in the industrial sector is done independently of the export activity, which explains the absence of 'a correlation between job creation and the propensity to export. The variable (CAPAB) has a positive and significant effect on job creation. This sign is in perfect conformity with the theory. Indeed, an industrial sector, which has a significant absorption capacity, can generate jobs in case foreign products are not similar to domestic products, an increase in their penetration rate automatically increases job offer of firms.

The results obtained also indicate that apparent labor productivity has a negative effect on job creation. According to (Cortes Olivier et Jean Sébastien, 1995), With unchanged output, an increase in labor productivity mechanically destroys jobs in the sector concerned. These productivity gains lead to lower prices, higher wages, higher profits, or a combination of the three. It results in an increase in the real remuneration of labor and / or capital, which results in an increase in consumption and / or investment. Demand is increasing, resulting in net job creation.

The econometric analysis of the impact of trade openness on value-added indicates a negative and significant relationship at the 5% threshold (0.183) between the export proposal and value- added. In other words, producers must bear additional transportation costs, modification expenses to adapt to foreign regulations and installation costs to create a distribution network. With all these expenses,

only the most productive producers are able to cover the cost of entering external markets (Raffo Julio , Lhuillery Stéphane and Miotti Luis , 2008); (Haddoud Mohamed Yacine, Nowinski Witold, Jones Paul and Newbery Robert, 2018); (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004)). On the other hand, the results indicate a positive relationship (0.699 at the 10% threshold) between the import proposal and the value-added of the industrial sector. This positive effect is explained by the dependence of the Algerian industrial sector on imports of raw materials and equipment that are necessary to supply the productive apparatus (Crozet Matthieu, Méjean Isabelle and Zignago Soledad, 2011). Finally, our results qualify the traditional conclusions, which most often give a positive impact of openness on employment and on value-added. The particularity of the Algerian economy is a central element, which explains this nuance, particularly with regard to the positive effect of openness on the value-added of the industrial sector.

4. Conclusion

As part of this work, our initial question was to understand how the stock of employment and the value-added created react to the export and import movement. The review of previous theoretical research and the examination of empirical studies allowed us to build and validate our starting model. The results obtained from the econometric analysis clearly show that exports have a positive influence on job creation, while imports destroy it, in all branches of the manufacturing sector. However, the comparison between the level of creation and destruction of jobs, indicates that the opening of the market is destructive to employment during the period studied. This is explained by the very limited capacity of the industrial sector to provide import substitution. The same applies to the variation in value-added, which is significantly sensitive to trade. Moreover, these results also show us that Algeria has not been able to value the potential theoretical benefits of economic openness on employment and on value-added. Two phenomena can be evoked; first, the growing dependence on imports and the increased loss in jobs and value-added in the manufacturing sector are the most plausible consequences of the process of deindustrialization of the Algerian economy; secondly, the specificity of the Algerian economy based on mineral wealth (hydrocarbons) disadvantages all attempts of industrial development. These results are consistent with the existing literature, in particular recent studies conducted in the context of developing countries (Mrabet, 2010); (Menegaldo Fabienne, Palméro Sandra et Roux Nathalie, 2004)). The results of this research reveal relevant policy implications. Political initiatives must aim at improving mechanisms and policies for aid and promotion of export activity in high value-added and job-creating sectors such as industry. Aware of the methodological and empirical limitations of the results of this study. The main methodological limitation of this study lies in the lack of information on other variables such as the industrial producer price index (IPPI) over a long period. In addition, future research work could adopt a comparative approach between countries similar (spatial dimension) to Algeria, over several years (temporal dimension). The elements of comparison will allow a better understanding of the economic and sectoral specificities of each country.

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Appendices

Table A1. Fixed Effects Model Results

Fixed-effects (within) regression					Number of obs	=	120
Group variable: modalit					Number of groups	=	6
R-sq:	within	=	0.1675	obs per group: min	=	20	
	between	=	0.3439	avg	=	20.0	
	overall	=	0.2808	max	=	20	
corr(u_i, xb)					F(5,109)	=	4.39
					Prob > F	=	0.0011
logemplof	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]		
mpova	-.0051123	.0024875	-2.06	0.042	-.0100424	-.0001823	
xpova	.0432239	.0226697	1.91	0.059	-.0017068	.0881546	
logippi	-.5809078	.1577281	-3.68	0.000	-.8935198	-.2682958	
logtxpenet	-.133408	.0561811	-2.37	0.019	-.2447572	-.0220589	
logcapab	.2997994	.0925576	3.24	0.002	.1163533	.4832455	
_cons	4.820065	.254671	18.93	0.000	4.315315	5.324814	
sigma_u	.20345733						
sigma_e	.12355675						
rho	.73056903					(fraction of variance due to u_i)	
F test that all u_i=0:			F(5, 109) =	17.59	Prob > F = 0.0000		
. est stor eq1							
. xtreg logemplof mpova xpova logippi logtxpenet logcapab, re							
Random-effects GLS regression					Number of obs	=	120
Group variable: modalit					Number of groups	=	6

Source : Authors' calculations

Econometric Analysis of Equation (2)

Table A2. Fisher Specification Test

Fisher test	F (5, 114) = 40,98	P > F = 0,000	R2 = 0,8996	R2 ajusté = 0,8952
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Source : Authors' calculations

Table A3. Hausman Test

	Coefficients		(b-B)	sqrt(diag(V_b-V_B))
	(b)	(B)	Difference	S.E.
	eq1	.		
logx	.0463407	-.0189234	.0652641	.0138243
logm	-.353899	-.2630294	-.0908696	.0636076
logtxpenet	-.1087862	-.0394917	-.0692944	.0305259
logcapab	.5417402	.7257127	-.1839724	.0904235
logpat	.7333508	.6044416	.1289091	.
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)				
= 117.63				
Prob>chi2 = 0.0000				
(V_b-V_B is not positive definite)				

Source : Authors' calculations

Table A4. Fixed Effects Model Results (2)

. xtreg logva logx logm logtxpenet logcapab logpat, fe						
Fixed-effects (within) regression			Number of obs		= 120	
Group variable: modalit			Number of groups		= 6	
R-sq:	within	= 0.8639	Obs per group: min		= 20	
	between	= 0.7080	avg		= 20.0	
	overall	= 0.7804	max		= 20	
corr(u_i, xb) = -0.0417			F(5,109)		= 138.34	
			Prob > F		= 0.0000	
logva	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
logx	.0463407	.0270944	1.71	0.090	-.0073594	.1000408
logm	-.353899	.0855669	-4.14	0.000	-.5234898	-.1843081
logtxpenet	-.1087862	.0462716	-2.35	0.021	-.2004949	-.0170774
logcapab	.5417402	.1053185	5.14	0.000	.3330024	.750478
logpat	.7333508	.0408867	17.94	0.000	.6523146	.8143869
_cons	3.480413	.2503524	13.90	0.000	2.984223	3.976603
sigma_u	.16400921					
sigma_e	.10002347					
rho	.72889738	(fraction of variance due to u_i)				
F test that all u_i=0:			F(5, 109) = 12.70		Prob > F = 0.0000	

Source : Authors' calculations