

# Export Diversification and Economic Growth in Morocco: An Econometric Analysis

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## Abstract

Since the work of Imbs and Wacziarg (2003), most recent studies confirm a positive relationship between export diversification and income per capita (Cadot et al., 2011; Agosin et al., 2012). Therefore, export diversification appears as an important lever for economic growth. This type of export strategy contradicts the conventional theories of international trade, such as ricardien model, which considers that countries should specialize in the production of goods for which they have a comparative advantage. However, recent literature and international experience have shown that more diversified countries tend to have faster and inclusive economic growth (Hesse, 2009). Thereby, export diversification can also help to improve international competitiveness, especially in developing countries. For the case of Morocco, this conclusion suggests that greater stage of export diversification would lead to a higher level of economic development.

**Keywords:** export diversification, economic growth, VECM

## 1. Introduction

After obtaining independence, most African countries have embarked on a process of diversifying their economic structures through industrial policies. These development strategies has led to a high rate of investment and employment in manufacturing sectors. An increase in productivity is also registered following the intra-industry transfer of new technologies. In this context, several authors have highlighted the important role of economic diversification in the development process. Indeed, the most diversified economies are less sensitive to cyclical fluctuations.

The choice of Morocco as a country of study is perfectly adapted to this problem. Despite many trade policies which aim to diversify the national export basket, the Moroccan economy still recorded a significant delay in export diversification degree compared to other countries. In this context, Morocco exports around 42 products per million inhabitants, compared to 55 for Turkey and 160 for Malaysia. Moreover, the manufacturing exports represent only about 13 % of Morocco's GDP, while the average for middle-income countries exceeds 25% (World Bank, 2008). In addition, the share of high-technology in Moroccan exports (as a percentage of manufacturing exports) has declined significantly in the last few years, from 11.3 % in 2000 to less than 3.5 % in 2015<sup>1</sup>. Conversely, the share of high technology in manufacturing exports exceeds 18 % in middle-income countries and 10 % in lower-middle-income countries<sup>2</sup> in 2015<sup>3</sup>. For these reasons, we will try in this paper to analyze the impact of export diversification on the growth process of the Moroccan economy. Thus, the focus will be on the results of the most recent studies

## 2. Literature Review

### 2.1 Definition

Generally, the export diversification consists in changing the structure of exported products. Indeed, export diversification process consists to include new products in export basket or by improving gradually the quality of exported products without changing the national productivity level. Therefore, the structural transformation is the process by which countries engage in new economic activities that raise productivity levels, offer higher wages and improve the level of population's prosperity. Thereby, countries that export new and complex products tend to develop more rapidly (Hausmann and Rodrik, 2003; Hausmann, Hwang and Rodrik, 2007).

From another point of view, export diversification is the process of migration from a productive structure dominated by

primary sectors to another concentrated on secondary and tertiary sectors. However, this dynamic and normative process does not lead necessarily to the disappearance of primary sectors, but its characterized only by the reduction of their share in export basket structure. It is in this sense that export diversification can allow the Moroccan economy to get out of what Watkins baptized *traps of staple commodities* for the Canadian case. Therefore, diversification of exported products leads to identify promising sectors that can generate higher added value level.

## 2.2 Export Diversification Strategies

After defining export diversification in its macroeconomic dimensions, it should be noted that it's have also a large applications in development strategy in microeconomic level. Several authors have attempted to explain the different ways in which a company or a country can diversify its production structure. These strategies depend to the axis to which they relate :

- *Product-oriented strategy*: This strategy consists in reusing all or parts of the components of a particular product in order to develop a new product. This innovative model reinforces the company's business skills and increases its competitive advantage. The product-oriented strategy consist also to expanding the quality of products in the reason to access to new consumers or markets, but by reusing the existing functional skills;
- *Production Methods Strategy*: this type of strategy refers to Salter and Weinhold (1979) works. It consists on the production of new products that are not related to existing products. Production factors must therefore be developed at the structural and operational levels. This also applies to diversification strategies that rely on a changes in marketing policy;
- *Strategy for Financial resources*: The importance of such strategies is to limit the risks that can be incurred by companies' funds. Some analysts are still talking about the important of such diversification strategies in the financial security of countries and enterprises.

## 2.3 Export Diversification and Economic Growth

Several empirical studies have shown that export diversification contributes to the growth of country's income per capita and have a positive impact on economic growth. Love (1986), for example, indicated that export diversification is a good strategy to reduce instability because it diminishes the impact of cyclical fluctuations in some export sectors. Love (1986) concluded that it is very important to avoid being heavily dependent on the export of a limited number of products. In addition, in their study of Latin American countries, Guti érez de Pi ñeres and Ferrantino (2000) found that there was a positive interaction between export diversification and economic growth. Greenaway, Morgan and Wright (1999) also showed that not only the growth in the value of exports contribute to a higher level of economic growth, but exports composition is also important. In this context, Feenstra and Kee (2004) studied the relationship between a country's productivity and the sectoral variety of its exports in a sample of 34 countries over the period 1984-1997. They found that an increase of 10% in the exports diversity across all industries leads to an increase of 1.3 % in the country's productivity. In addition, Herzer and Nowak-Lehmann (2006) found that both product-oriented strategy and production methods strategy had a positive effect on economic growth through the learning-by-doing and learning through export in the case of Chile. However, this relationship between export diversification and growth does not always positive. Michaely (1977) found that a minimum of economic development was necessary in order to have a positive impact of export diversification on economic growth. He found a close relationship between export diversification and economic growth only in developed countries.

## 2.4 Diversification Indices

Several methodologies and indicators have been developed to measure diversification phenomenon. Therefore, many diversification coefficients is proposed. In this paper, we attempt to determine diversification indicators, which appear to be particularly adapted to analyze and synthesis the concentration phenomenon. Among the most widely used indicators, we can cite the Hirschman indicator and the Theil entropy indices. These different methods are complementary.

### 2.4.1 Herfindahl-Hirschman Indice

The Herfindahl-Hirschman indice is used to measure the degree of diversification/concentration. MacBean and Nguyen (1980), for example, used this indice to measure the concentration level of trade and products. They found that the higher value of this indice means that exports are concentrated on a small number of products and vice versa. The Herfindahl-Hirschman indice is formulated as follows:

$$HHI = \sqrt{\sum_{i=1}^n \left(\frac{x_i}{X}\right)^2} \quad (1)$$

With  $x_i$  represent the value of the  $i^{th}$ -exported product X is the total value of exports and n is the number of exported products. However, the normalized Herfindahl-Hirschman indice can be used as a relative measure of export diversification. It takes values between 0 and 1 and have the following formula:

$$NHHI = \frac{HHI - \frac{1}{\sqrt{n}}}{1 - \frac{1}{\sqrt{n}}} \tag{2}$$

The *NHHI* indice can be used to compare export structure of two countries. The values closest to 1 represents a high level of exports divesification. Similarly, a low value of this indice indicates a relatively diversified economy.

2.4.2 Theil Indice

The Theil indice (Theil, 1972) is a measure of inequality. This indice can be formulated as follows:

$$T = \frac{1}{n} \sum_{k=1}^n \left(\frac{x_k}{\mu}\right) \ln\left(\frac{x_k}{\mu}\right) \tag{3}$$

With n is the number of potential export lines,  $x_k$  is the value of the  $k^{th}$  export line and  $\mu$  is the average of exports value ( $\mu = \frac{\sum_{k=1}^n x_k}{n}$ ). By referring to Cadot et al. (2011) works<sup>4</sup>, one of the Theil indice properties is that it can be decomposed into intra-group component and inter-group component. They defined inter-group component of the Theil indice by:

$$T^B = \sum_{j=0}^J \frac{n_j \mu_j}{n \mu} \ln\left(\frac{\mu_j}{\mu}\right) \tag{4}$$

And the intra-group component is defined by:

$$T^w = \sum_{j=0}^J \frac{n_j \mu_j}{n \mu} T_j = \sum_{j=0}^J \frac{n_j \mu_j}{n \mu} \left[ \frac{1}{n_j} \sum_{k \in G_j} \frac{x_k}{\mu_j} \ln\left(\frac{x_k}{\mu_j}\right) \right] \tag{5}$$

With  $G_j$  represent potential exports groups,  $j = 0, \dots, J$ ,  $n_j$  the number of export lines in group  $j$ ,  $\mu_j$  their average value and  $T_j$  represent the Theil indice for the  $j^{th}$  potential exports group.

According to Cadot et al. (2011), the theil indice inter-group component reflects an increase in the number of export industries or the emergence of new markets. The theil indice intra-group component measures the inequality between the shares of the active export branches, which reflects an increase in volume but not in the number of exports lines.

**3. Methodology**

As mentioned above, several quantitative indicators can be used to examine the dynamic relationship between export diversification and economic growth. In this paper, we have chosen to use a dynamic time series model for the case of Morocco, during the period 1980-2015. This model allows us to analyze the short and long run relationship between export diversification and economic growth. The use of such econometric tools allows also examining the indirect effects of this relationship. For this reason, we will use a vector error correction model (VECM) to analyze the impact of an export diversification on economic growth in morocco. Two types of specification will be used: a stationary vector autoregressive (VAR) model that will analyze the causality between selected variables and a VECM model for the analysis of long-run relationships.

The proposed model is based on the neoclassical theory of growth. The difficulty in any growth model is to identify the appropriate explanatory variables. Indeed, the economic theory does not provide a sufficiently generalized framework to be able to identify them. The risk is therefore to use a purely empirical approach which can lead to a bias related to the omitted variables. This problem can be solved partially by using a VAR model or VECM. These models identifies statistically the appropriate variables by testing the stability of the model over the long run. Thereby, we have we formulated our econometric model as follows:

$$\Delta \text{Log (GDP)}_t = \delta \begin{pmatrix} 1 \\ -\beta_0 \\ -\beta_1 \end{pmatrix}' \begin{pmatrix} \text{Log (GDP)}_{t-1} \\ 1 \\ \text{Div}_{t-1} \end{pmatrix} + \begin{pmatrix} \gamma_{11} \\ \gamma_{21} \end{pmatrix}' \begin{pmatrix} \Delta \text{Log (GDP)}_{t-i} \\ \Delta \text{Div}_{t-i} \end{pmatrix} + \varepsilon_0 \tag{6}$$

With GDP is the Gross Domestic Product and  $Div_{it}$  represents export diversification level. In order to make sure of the results robustness, several indices are used (a) the Herfindahl-Hirschman indice (HHI) and (b) Theil indice composed in to intra and inter components. The variable noted by “Log (GDP)<sub>t-1</sub>” represents the initial income (expressed in logarithmic) and  $\Delta$  is de difference operator. According to neoclassical theory, a negative sign of  $\delta$  indicates a convergence of economies towards their level of balanced growth.

**4. Results**

*4.1 Unit Root Test*

A preliminary analysis of stationarity of the selected variables aforementioned is crucial, because it will allow us to know the behavior of our series over the time. Therefore, the augmented Dickey-Fuller strategy (ADF) can be used to stationarize these variables.

By using ADF test, it has been shown that these four series are integrated at the first order, and they must be differentiated once to give stationary variables. We will thereafter have stationary variables at the threshold of 5%, namely  $\Delta\_GDP$  series  $\Delta HHI$ ,  $\Delta T\_Inter$  and  $\Delta T\_intra$ . The analysis of these results is presented in the following table:

Table 1. DFA Test of Unit Root<sup>5</sup>

Variables <sup>6</sup>	lags	Model [3] <sup>7</sup>		Model [2] <sup>8</sup>		Model [1] <sup>9</sup>		Rank
		p-value	Sig Trend <sup>10</sup>	p-value	Sig Cons <sup>11</sup>	t-stat	C.V <sup>12</sup> at 5%	
$\Delta\_GDP$	1	0.000	0.763	0.002	0.000	3.98	-1.95	I(0)
$\Delta HHI$	2	0.001	0.849	0.000	0.000	3.26	-1.95	I(0)
$\Delta T\_Inter$	1	0.002	0.068	0.041	0.016	2.73	-1.95	I(0)
$\Delta T\_intra$	1	1 E-04	0.971	0.000	0.021	-5.32	-1.95	I(0)

*4.2 Cointegration Test*

*4.2.1 Determination of Lags Order*

The determination of the number of lags is an important step to ensure that the model residuals are white noises. Several criteria can be used for this purpose: AIC, HQIC, FPE or SBIC. Using these criterions, the test result of the applied to the stationary variables  $\Delta\_GDP$ ,  $\Delta HHI$ ,  $\Delta T\_Inter$ ,  $\Delta T\_intra$ , gives three (3) as the optimal order of lags of the corresponding standard VAR model. Indeed, we could have chosen three according to the criteria AIC and HQIC, but after estimation of the three models and validation of the order of lags selected, it turned out that the fourth order led to the best model.

Table 2. The lag order Selected<sup>13</sup>

Lags	LR	FPE	AIC	HQIC	SBIC
0		2.2 E-09	-5.76394	-5.69633	-5.52017*
1	32.629	4.5 E-09	-5.06911	-4.66344	-3.60646
2	63.415	3.1 E-09	-5.62571	-4.86197	-2.92418
3	142.81*	2.0 E-10	-9.31801*	-8.2362*	-5.4176
4	.	-2.3 E-26*	.	.	.

In order to validate the selected number of lags, we test the coefficients significance of each lags for each equation and for all the equations of the standard VAR model (table 3). Indeed, the modeling of all equations confirms the persistence of the influence of the selected variables history during four years. In other words, a shock in at least one of the selected export diversification indice, will affect morocco's economic growth for three consecutive years.

Table 3. Testing lags significance<sup>14</sup>

Variables	Lags	chi2	prob > chi2
Δ_GDP	1	59.874	0.000
	2	123.371	0.000
	3	43.258	0.000
	4	16.903	0.005
ΔHHI	1	122.699	0.000
	2	166.439	0.000
	3	200.159	0.000
	4	73.231	0.000
ΔT_intra	1	105.786	0.000
	2	177.870	0.000
	3	117.141	0.000
	4	36.135	0.000
ΔT_Inter	1	21.897	0.001
	2	29.022	0.000
	3	56.175	0.000
	4	18.696	0.002
Var-Model <sup>15</sup>	1	4243.980	0.000
	2	9085.111	0.000
	3	6197.071	0.000
	4	2510.875	0.000

4.2.2 Choice of the Best Model

By referring to the lags order Selected, several specifications can be considered: presence of a trend at the level of the variable, at the first difference, all in the presence or not of a constant. In all we can have five different specifications.

Since the determination of the number of cointegration depends on the chosen specification, we will estimate the five models and deduce the best model by comparing the AIC criterion. Table 4 shows the results of the Johansen's test for the best model.

Table 4. Johansen's test of cointegration of the model<sup>16</sup>

Hypothesis on the Number of E.C. <sup>17</sup>	Log likelihood	Eigen value	Trace Statistic <sup>18</sup>	Critical value at 5%
None	78.735770	.	62.9368	69.65
At most 1	89.476415	0.76041	47.0021*	44.97
At most 2	113.650592	0.54025	32.8521	39.13
At most 3	125.463521	0.47113	19.9562	21.84
At most 4	138.608211	0.29731	5.3264	4.01
At most 5	141.543465	0.13532		

By analyzing these results, the number of cointegration of the selected model is equal to one at the 5% threshold. We can now pass to estimating the VECM model.

4.3 Model Estimation

The existence of a cointegration relationship between model variables suggests that there is a long-run economic relationship between export diversification and economic growth in the case of Moroccan economy. Thus, we estimate the interdependencies between selected variables, as shown in the following equation:

$$\Delta \log(\text{GDP})_t = \begin{bmatrix} -3.27 \\ (-2.59) \end{bmatrix} + \begin{bmatrix} 1 \\ 38.82 \\ 2.76 \\ (-6.34) \\ 0.71 \\ (3.13) \\ 0.02 \\ (4.51) \\ -0.03 \end{bmatrix} \begin{bmatrix} \log(\text{GDP})_{t-1} \\ 1 \\ \Delta \text{HH}_{t-1} \\ \Delta \text{T\_Inter}_{t-1} \\ \Delta \text{T\_Intra}_{t-1} \\ t \end{bmatrix} + \begin{bmatrix} 1.52 \\ (2.59) \\ 6.73 \\ (-2.28) \\ 0.17 \\ (2.56) \\ 0.64 \\ (-0.3) \end{bmatrix} \begin{bmatrix} \Delta \log(\text{GDP})_{t-1} \\ \Delta \text{HH}_{t-1} \\ \Delta \text{T\_Inter}_{t-1} \\ \Delta \text{T\_Intra}_{t-1} \end{bmatrix} + \begin{bmatrix} 0.79 \\ (2.44) \\ 9.86 \\ (-2.26) \\ 0.13 \\ (2.68) \\ 1.29 \\ (-0.83) \end{bmatrix} \begin{bmatrix} \Delta \log(\text{GDP})_{t-2} \\ \Delta \text{HH}_{t-2} \\ \Delta \text{T\_Inter}_{t-2} \\ \Delta \text{T\_Intra}_{t-2} \end{bmatrix} + \begin{bmatrix} 0.56 \\ (2.92) \\ 12.14 \\ (-2.81) \\ 1.07 \\ (2.05) \\ 1.35 \\ (-3.93) \end{bmatrix} \begin{bmatrix} \Delta \log(\text{GDP})_{t-3} \\ \Delta \text{HH}_{t-3} \\ \Delta \text{T\_Inter}_{t-3} \\ \Delta \text{T\_Intra}_{t-3} \end{bmatrix} + \begin{bmatrix} -0.007 \\ (-1.24) \end{bmatrix} \begin{bmatrix} t \end{bmatrix} + \begin{bmatrix} 0.28 \\ (1.9) \end{bmatrix}$$

The estimation of the error correction specification indicates that coefficients of all explained variables are generally significant at 5% threshold. The most interesting result is that the error correction coefficient, denoted " $\delta$ ", is negative and significant. It is equal to -3.27 in the case of this model. Thus, it can be confirmed that whatever the shocks in the export diversification level, Moroccan economic growth will eventually reach to the long-run equilibrium due to stable behavior of the economic development model.

In general, all coefficients variables are significant at the 5% threshold. These results suggests that export diversification impacts positively and significantly Moroccan economic growth. Indeed, this result is confirmed by the significance of the lags coefficients of the first, the second and de third order of delayed variables. In other words, a shock in export diversification affects economic growth for three successive coming years.

By analyzing the Theil indice decomposition in the case of Moroccan exports, the Theil's inter group component have a significant coefficients at the threshold of 5% at just the third lags order. This indicates that the multiplication of export lines in the t-3 year provides favorable conditions in the t-2 and t-1-years for economic growth in the current year. Thereby, export diversification seems to play its full role on economic growth, in the case of Moroccan economy, if only it is linked to an orientation of exports to new markets or goods.

In brief, the impact of the chosen explanatory variables is consistent. An increase in one or in all of these indices, namely the Herfindhal-Hirschman indice, Theil inter-group indice and Theil intra-group indice, will have a positive and significant impact on the acceleration of the development of the Moroccan economy. According to our estimate, a one-unit increase in one of the above-mentioned indices will lead to consequences similar to those described by export diversification theory. In the case of the Morocco, this increase will lead to the following induced effects:

- An increase of 0.1 unit of the Herfindahl-Hirschman indice contribute to an economic growth improvement by 0.6 %, 0.9 % and 1.2 % respectively in the first, the second and the third coming years;
- An increase of one unit of the Theil inter-group indice leads to an economic growth improvement by 0.13 %, 0.17 % and 1 % respectively in the first, the second and the third coming years;
- As mentioned above, an increase of one unit of the Theil intra-group indice leads to an economic growth improvement by 1.3% in the third coming years.

These results tend to clarify quantitatively that export diversification strategy is associated to a higher levels of economic development in the case of the Moroccan economy. This result are in line with results highlighted by several authors (P éridy and Roux, 2012; Ben Hammouda et al., 2009).

## 5. Discussion

As shown previously, the diversification of Moroccan exports can lead to a higher level of economic development. But some barriers can limits this structural transformation and then blocs the economic growth process such as (a) infrastructure quality (b) lack of financing (c) bureaucracy and (d) weakness of public institutions. These elements highlight clearly the important role that government can play in adopting appropriate policies to promote export diversification. By using the endogenous growth model, Gutierrez de Pi ñeres and Ferrantino (1997), for example, have shown that it is possible to diversify exports structure by applying *learning by doing* and by adopting the practices of developed countries.

Furthermore, Hammouda et al. (2006) argued that application of export diversification policies can help public authorities to overcome the obstacles relative to economic growth. They showed that adoption of such policies will contribute to an increase of the contribution of factor productivity on economic growth. Under these conditions. They concluded that African countries must adopt a non-conservative budgetary policies which increase their levels of investment and improve governance.

In addition, export diversification is fairly price sensitive. It is also possible to diversify exports through incentives wich aimed to reduce costs and facilitate trade.Finally, Government must encourage investments in research and development activities, which are able to develop the potential of Moroccan exporting companies. However, this public policy must be reinforced by accompanying measures such as fiscal and financial incentives. In short, the positive relationship between the export diversification and economic growth in Morocco, studied in this paper, constitutes a major incentive for public authorities to adopt more diversification strategies of the existing production structure.

## 6. Conclusion

The main objective of this paper was to evaluet the impact of export diversification to generate a higher level of economic growth, in the case of Moroccan economy. In such analysis, it seemed necessary to analyze both theoretical and practical aspects separately.

The literature review highlighted the points of view of several recent theoretical and empirical studies on the

contribution of export diversification to the development process and its benefits in terms of diluting macroeconomic risks. In the same point of view, a good oriented structural transformation of export is essential to generate high and inclusive growth, which allows dealing with social problems such as unemployment and poverty. Thus, Morocco's growth model, based on domestic demand, has serious limitations for promoting strong and sustainable economic growth in the few coming years. The solution is therefore to diversify further the Moroccan export basket. This diversification process must be directed towards more sophisticated products that can generate higher levels of economic development. The products that need to be firstly targeted are those that require only minimal change in the existing production structure. These sophisticated products can be determined by using *Product Space* method developed by Hidalgo et al. (2007).

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**Notes**

Note 1. World Development Indicators (WDI)

Note 2. The GDP per capita in morocco is approximately 2850 \$.

Lower middle-income countries are countries with GDP per capita between \$ 996 and \$ 3,945 in 2009, and middle-income countries are countries with GDP per capita between \$ 996 and \$ 12,195 in 2009 (World Bank definition).

Note 3. World Development Indicators (WDI)

Note 4. Cadot, O., Carrère, C., & Strauss-Kahn, V. (2011). Export diversification: What's behind the hump? Review of Economics and Statistics, 93(2), 590-605.

Note 5. Author's calculations

Note 6.  $\Delta\_GDP$ : The first difference of the GDP series expressed in logarithm.

$\Delta HHI$ : The first difference of the series HHI.

$\Delta T\_Inter$ : The first difference of the series T\_Inter (the indice Theil Intra group).

$\Delta T\_intra$ : The first difference of the series T\_intra (the indice of Theil Inter group).

Note 7. The most general model, including a trend and a constant.

Note 8. The model including just a constant.

Note 9. The more constrained model, with neither trend nor constant

Note 10. The significance of the trend coefficient

Note 11. The significance of the constant coefficient

Note 12. Critical Value at 5%

Note 13. Author's calculations.

Note 14. Author's calculations.

Note 15. Var-Model: All model variables taken together.

Note 16. Author's calculations.

Note 17. Co-integrating equation

Note 18. The test statistic is the statistical trace that is defined as:

$$Q_r = -T \sum_{i=r+1}^k \log(1-\lambda_i)$$

With T = number of observations;  $\lambda$  = eigen value

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