



Morocco's External Performance: An Empirical Assessment Of Export Competitiveness Determinants

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ABSTRACT

The objective of this article is to study the external competitiveness of Morocco. To do so, we first make a sectoral analysis of Moroccan international trade. This analysis reveals the sectors and products in which Morocco should specialize, as well as the products in which Morocco has a strong export potential. Then, we study the impact of the introduction of price and cost competitiveness indicators in the export's equations of Armington (1969). Using a Vector Error Correction Model (VECM) estimated over the period 1988-2017. The principal results confirm that Moroccan external competitiveness can't be measured only by the price factor. We also show that the competitiveness is also reflected with other factors like cost of production and quality.

Keywords: Competitiveness, VECM model, exports, Armington, Morocco.

JEL classifications: C22, F14, F13, O55.

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1. Introduction

Today, globalization, the surge in international trade flows and the emergence of new challengers highlight the inequalities in economic development among countries. As a result, countries are forced to adopt new production strategies to cope with the impact of low-cost competitors and stand out through highly innovative activities. National competitiveness is at the core of this debate, so that to remain competitive, the economy must be able to maintain market share in the international market in the face of foreign competition.

In this context, in order to enhance competitiveness and market share abroad, Morocco has adopted a series of measures, possibly by opening up the international market to initiate the structural transformation of its economy. Several sector strategies have been adopted, the impact of which is reflected in the emergence of new growth drivers in industries with high export value-added, shifting to high-end markets and positioning as a quality advantage.

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It therefore appears that, despite the trend of increasing exports and the efforts made in international trade, Morocco is still suffering from a chronic trade deficit, given the importance of imports.

In particular, this work aims to explore the evolution of Moroccan exports in connection with the new challenges of globalization. That is why we propose to examine the sensitivity of Moroccan exports to the criteria characterizing competitiveness. The following question arises: «What effect do competitiveness factors have on Morocco's export performance? ».

On the other hand, international competition is also associated with challenges related to the restructuring of the world market in favor of new competitors and the reallocation of production resources that hit major holders and cause losses to some of them³. In other words, the question is: «How has international competitive pressure changed the composition of the Moroccan export? ».

This paper is organized as follows, the first part introduces a literature review on the competitiveness of nations, the second part presents a sectoral analysis to discover sectors and products that Morocco must specialize in. The last part introduces the results and main conclusions of econometric research.

2. Literature review

Based on the globalization phenomenon, which is particularly characterized by the opening of trade, the intensification of world trade flows, the constant change in the competitive environment, and the acceleration of lifestyles and consumption, we think it is useful to return to the main theoretical basis of competitiveness of countries. Indeed, some countries seem to benefit greatly from globalization. On the other hand, it seems that other countries are doing better than the rest in international trade. This globalization context does not pose the same challenges for developed countries as for developing countries: while the former are trying to effectively change their position in the face of growing competitive pressure, the latter are now intending to find a place on the international scene next to established leaders. Indeed, each country has developed its own economic policy to promote entrepreneur's efforts to find products suitable for export, and thus change the portfolio of exported products in favor of those with high potential. This means that no unified policy applies to every country.

The first part reviews economic literature from the 1980s to the present day regarding the competitiveness of countries, highlighting the unique context of current globalization. Although this concept has become ubiquitous in economic debates. However, it lacks a strict definition and a solid theoretical anchor. Basically, the theory of comparative advantages (Ricardo, 1817) suggests that two countries participating in a joint exchange flow do not compete with each other because their profits are not to the detriment of others to the extent that international exchange brings mutual benefits between different stakeholders. Whether from the perspective of absolute advantage theory or from the perspective of comparative advantage theory, the country's specialization mechanism is crucial to international trade. Despite the static nature of absolute advantage and comparative advantage, Ricard's theory is still the main reference for international trade flows between countries.

Recently, "New Theory of International Trade" (Krugman, 1981; 1991; Melitz, 2003; Baldwin and Okubo, 2006; Ottaviano, 2011)⁴ undermines this theoretical consensus, stating that international openness or regional integration may trigger agglomeration processes with winning regions and losers (Krugman, 1991). In addition, this theoretical consensus relating to the non-competition of territories is opposed by economic policy practice, which puts the concept of competitiveness at the core of its system. Therefore, a paradox exists both within theory and between theory and practice.

In addition to the new theory of international trade, Hausmann and Rodrik (2003) proposed a new concept of the national economic development process based on the self-discovery mechanism, that is, countries have discovered the products for which they will be performant in the long run. They believe that the success of the country's economic development is not only a question of market discipline that encourages efficiency, but also an issue of industrial policy and active promotion of

³ Cyrielle Gaglio (2017), "Compétitivité, sophistication et espace-produit. Une application aux exportations françaises". Economies et finances. Thèse de doctorat. Université Côte d'Azur.

⁴ Articles Cited in Chiappini, R. (2011). "Comment mesurer la compétitivité structurelle des pays dans les équations d'exportation ? ", L'Actualité économique, 31-57.

exports, which is conducive to the redistribution of production resources and the discovery of products with high growth potential.

To be competitive means to face competition. However, competitiveness is not understood in the same way according to the scale of the analysis to which we refer: the competitiveness of enterprises, industries or countries. Below, we will discuss the details of each of these three analysis scales from the perspective of competitiveness.

First, at the company level, competitiveness refers to the ability of each of them to gain and maintain market share, but also to regain market share of its main competitors, whether on the national market. and / or international. Therefore, the company adapts immediately, more or less, to its competitive environment through non-price competitiveness or structural competitiveness (this depends on the company's ability to differentiate it from its competitors by formulating product differentiation strategies in terms of quality, for example), or through price competitiveness (based on the company's ability to respond to domestic or international competition by proposing a similar product price reduction policy). This traditional subdivision of competitiveness of companies between structural competitiveness on the one hand and price competitiveness on the other, constitutes a strong consensus in economic thought. In addition, uncompetitive company, that is, companies that cannot respond quickly to strong or even unexpected competitive pressures, will withdraw from national or international markets and be replaced by another, more competitive company⁵.

Secondly, at the industry level, competitiveness also refers to the sum of the individual competitiveness of the companies that make up an industry, as well as the redistribution of production resources among companies that belong to the same industry.

At the national level, competitiveness is more complex for economists to define. In fact, the latter seems reluctant to the concept of national competitiveness. Moreover, this reluctance is not unfounded: we present the following two main arguments behind this suspicion: The first argument reminds us that economic thought is based on the general conviction that countries are not competing with each other. This conviction is especially based on comparative advantage theory. The theory of comparative advantages stated by Ricardo (1817) eliminates conditions for the specialization of countries intervening in international trade flows. In other words, exchange reflects a mutual benefit, which means that there is no competition among stakeholders, because each country specializes in producing goods that have a comparative advantage over other countries. Since the profits of one do not result from the cost of the other, two countries participating in the exchange will not compete with each other, whether from absolute advantage theory or comparative advantage theory. The second view reviews the two strongest criticisms of national competitiveness: on the one hand, Porter (1990), and on the other, Krugman (1994). Porter (1990) believes that national competitiveness is an indefinite concept, and only economic prosperity is meaningful at the national level. Krugman (1994; 1996a) described the country's competitiveness as a « dangerous obsession ». Krugman emphasized that this concept lacks a concrete and consistent definition.

Many tools have been used in empirical work to measure competitiveness. However, these metrics have changed from one analysis level to another. At the national level, the assessment of competitiveness mainly focuses on indicators related to international trade and the growth of national factor productivity. At the sector level, trade indicators are the most commonly used indicators in empirical studies⁶. Finally, at the microeconomic level, two types of tools are the center of company competitiveness analysis. We cite measures related to market share and measures related to profit⁷. In the following, the focus will be on measurement tools related to international, national, and sectoral levels.

Competitiveness lies in taking advantage of the advantages brought about by globalization. This is due to the intensification of world trade flows and the emergence of new competitors who can quickly drive established leaders out of the world market. Therefore, each country needs to defend its competitiveness in the domestic or international market in order to restore new market share, attract

⁵ Krugman (1994), "Competitiveness: A dangerous obsession". Foreign Affairs.

⁶ Trade-related measures are also based on comparative advantage theory. Indeed, the existence of comparative advantage leads to cost advantage, therefore a specialization in this product, which can explain its important share in exports.

⁷ Considering the limitations of these two performance indicators of company, they are not common in the literature. Lachal, L. " La compétitivité: Concepts, définitions et applications ", 2001, PP :29-36

more investment, help its companies and its industries to generate more income, stimulate innovation and create jobs opportunities to enhance its competitiveness and increase its overall wealth. These improvements in competitiveness have driven stronger economic growth in the future and promoted the integration of countries into the world market. In this regard, the OECD (1992) suggested: "A country's competitiveness must simultaneously translate into income growth, the same level of employment as the direct competitors, and acceptable status in terms of the balance of payments."

Regarding these definitions, we conclude that national competitiveness is a complex, dynamic and relative concept. Although this is a topic that some economists are concerned about, it is still not really clear today. However, competitiveness is more of a measure of results: it means more or less competitive than the other party in order to respond to increasing competitive pressure in a changing environment.

3. International trade in morocco: A sectoral analysis

In a process of reorganization on a global scale, Morocco has been involved in the process of integration into the international trading system for several years. In order to successfully integrate, Morocco has signed a number of sector strategies to pursue economic diversification policy and open to the north and south. We can foresee that this opening will have an impact on the structural transformation of the production structure and the have of resources and geographical factors. Therefore, Morocco will be required to accept the major challenge of accelerating its structural transformation process, which involves the development of productive, competitive and job creation structure.

Over the past two decades, the evolution of Morocco 's international trade began with major changes in the export structure and the improvement of its quality and technological content, which affected their competitiveness. In fact, Morocco has an open economic system, and foreign trade in goods accounted for 67% of GDP in 2018. In addition, the export structure has undergone major changes, shifting to emerging industrial branches with high added value, and better adapted to the scale of world demand. As for the traditional sectors, they have declined, this change can be explained by the focus of the Moroccan industry to the global trade, such as the automotive sector, aeronautic, offshoring.

Indeed, the automotive industry was Morocco 's largest export industry in 2018, and exports increased by 10% between 2017 and 2018. As for agriculture and the agri-food industry, this flagship export supply sector remains on the export podium in 2018 with a share of 21% as well as a significant contribution to economic growth, the textile sector as well as the aeronautic sector are respectively 13, 75% and 5.35% of Moroccan exports. On the other hand, an analysis of the flow of Moroccan goods shows that despite Morocco's growing openness to the world economy, they remain concentrated in the European Union, which accounts for two-thirds of its exports. Spain and France are still major partners, with a share of 23% and 21% in 2018. At the same time, Moroccan commodities are supplied to multiple markets outside Europe, especially India, Brazil and the United States, with export value shares of approximately 3%, 2% and 4% in 2018.

Morocco has taken a number of actions in various sectors to diversify and strengthen its competitive potential in exports. The combined results of these efforts are remarkable, except that the development speed and added value of each sector are different, otherwise it is necessary to find the root of this significant progress, and therefore need to analyze the competitiveness of Moroccan economy in order to detect the flagship sectors with a large contribution in exports.

Understanding national competitiveness requires analysis of trade specialization to determine branches or sectors where Morocco has a comparative advantage in trade with other countries in the world. Through this specialization, the country's potential can be revealed, enabling it to direct its strategic direction to promising industries with high added value.

The data used in this analysis comes from the United Nations database (UN Comtrade Database). Balassa 's comparative index is calculated for different parts of Morocco based on the Standard International Trade Classification (SITC)⁸ Revision3. Then, apply this global approach to each competitive sector and break it down to show competing products.

⁸ The application of the SITC revision3 is justified by the harmonization of its sections and the unification of the products of each section between Morocco and partner countries.

In order to understand the potential of Moroccan products in the world market, we use the export potential value indicator of products that Morocco has regularly exported and whose export potential is at least US \$ 200,000 (see Appendix 2). Therefore, the export potential of Morocco lies in the families of several products, as shown in Figure 1 below:

Table 1.

Sectors and products with comparative advantage for Morocco

Sector	Products	Revealed Comparative Advantage Index ⁹ (Year 2018)
Food and live animals	Fish, crustaceans, molluscs and preparations thereof.	9,85
	Vegetables and fruits.	7,19
	Sugar, sugar preparations and honey.	2,83
	Feedstuff for animals (excluding unmilled cereals).	1,16
Crude materials, inedible, except fuels	Crude fertilizers and crude minerals.	17,92
	Crude animal and vegetable materials.	1,07
Animal and vegetable oils, fats and waxes	Animal oils and fats.	8,61
	Fixed vegetable oils and fats, crude, refined or fractionated.	1,35
Chemicals and related products	Inorganic chemicals.	8,99
	Fertilizers other than group 272.	37,31
	Articles of apparel & clothing accessories.	5,09
Miscellaneous manufactured articles	Footwear.	1,67
	Furniture and parts thereof.	1,14

Source: UN-Comtrade data, author's calculation

⁹«The revealed comparative advantage (RCA) is based on Ricardian trade theory, according to which trade flows between countries are regulated by their relative differences in productivity. Although these performance differences are difficult to observe, the RCA measure can easily be calculated using commercial data to "reveal" these differences. This measure can be used to provide a general indication and first approximation of the competitive strength of a country's export. It should be noted that national measures affecting competitiveness, such as customs duties, non-tariff measures, subsidies and others are not taken into account». ONU

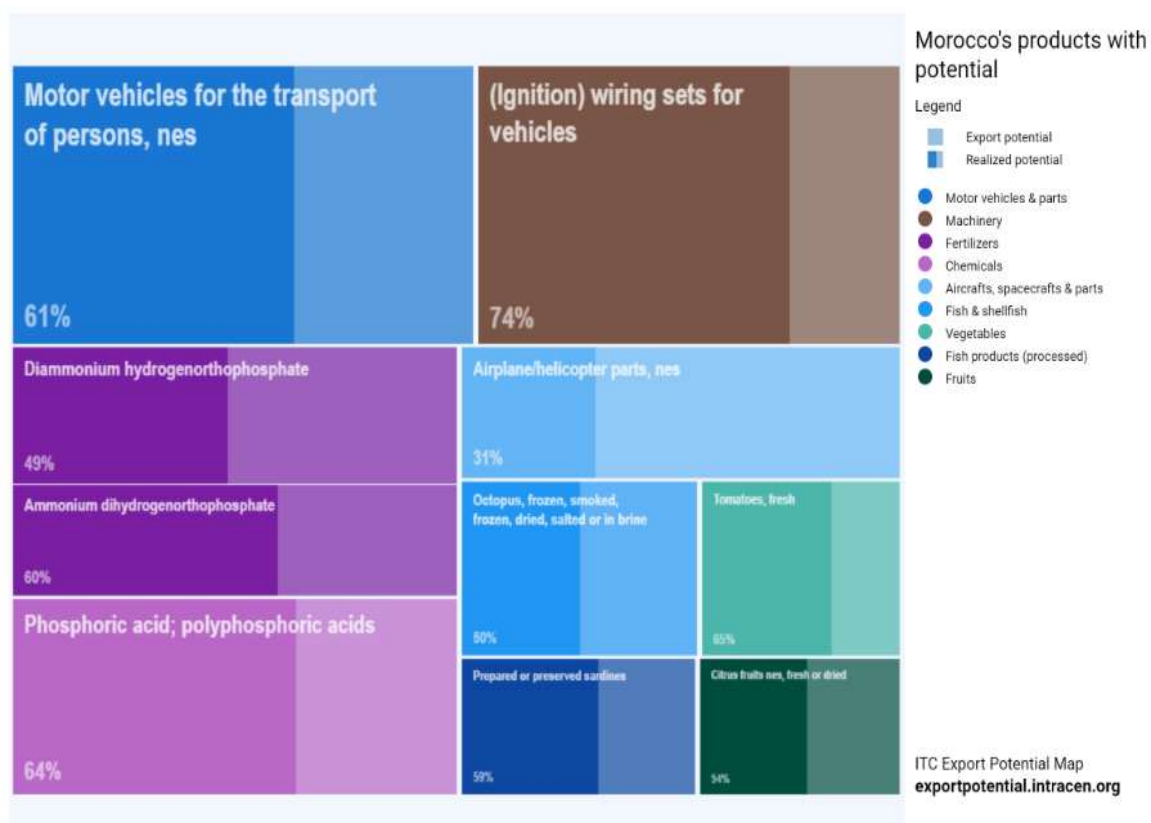


Figure 1. The top 10 Morocco's products with high potential. Source: Export potential map

The table below shows Morocco's export potential, current export and untapped potential, sorted by market and descending order.

Table 2.

Morocco's export potential by market

Market	Regional market	Export potential	Current exports	Unexploited Potential
France	Developed countries	\$6 Mds	\$5.4 Mds	\$2.2Mds
Spain	Developed countries	\$5.5Mds	\$6.2Mds	\$1.4Mds
United States of America	Developed countries	\$1.5Mds	\$1.0Mds	\$1.0Mds
Germany	Developed countries	\$1.3Mds	\$920.7Mns	\$654.8Mns
India	Developing countries	\$1.3Mds	\$716.3Mns	\$588.2Mns
Italia	Developed countries	\$1.3Mds	\$1.0Mds	\$662.0Mns
Brazil	Developing countries	\$1.1Mds	683.3Mns	\$485.6Mns
United Kingdom	Developed countries	\$1.1Mds	771.1Mns	\$507.1Mns
Turkey	Developing countries	\$877.0Mns	587.1Mns	\$497.0Mns
Netherlands	Developed countries	\$767.7Mns	493.8Mns	\$451.1Mns
Russian Federation	Developing countries	\$663.1Mns	374.4Mns	\$309.2Mns
China	Developing countries	\$609.1Mns	253.1Mns	\$495.8Mns

Source: Export Potential Map

4. Estimated models, results and discussions

4.1 Estimated models

In empirical literature, the most common models for modeling export volume are variants of the imperfect substitute model, whose theoretical basis goes back to Armington (1969).

This model combines export trends with a number of variables. These variables are of two types. The one reflecting the price effect and the one reflecting the volume effect. The price effect is a variable which takes into account price differences between the local economy and the economy of the partner countries. In fact, prices affect choices, so to understand the export volume, prices must be considered. As for the quantity effect, it illustrates the quantity of demand in the Moroccan market.

Conceptually, the model is based on two main assumptions:

H1: Homogeneity and incomplete substitution of products from the same sector in the same country.

H2: independence of choice between product categories, which means that the choice of product by the consumer in a given market did not follow purchases in third markets.

The resulting demand functions can be explained by the total income, the foreign price of the traded commodity, and its domestic price equivalent. In addition, consumers will never suffer from the illusion of currency, which will lead to the homogeneity of the demand function. Therefore, the function is modeled by the following equation:

$$P_X X = g(wd, p_x, p^*), \text{ avec } \frac{\partial g}{\partial wd} + \frac{\partial g}{\partial p_x} + \frac{\partial g}{\partial p^*} = 1 \quad \text{Eq. (01)}$$

X represents the export demand in terms of volume, wd the demand for the rest of the world directed to the country concerned, p_x the price of the exported product, and p^* its price abroad. The homogeneity of grade 1 allows to specify the volume export function in the following form:

$$X = g(wdr, rpr_x) \quad \text{Eq. (01.A)}$$

WDR represents real-world demand for the country concerned and rpr_x the term of price competitiveness, i.e. the relative price index. The model of imperfect substitutes assumes a multiplicative link of this type:

$$X = A_x (wdr)^\alpha (rpr)^\beta \quad \text{Eq. (01.B)}$$

The log-linearization of this relationship makes it possible to obtain the long-term export equation of a country, which directly correlates the export volume with the global demand addressed and the relative price of exports. The formula is as follows:

$$\log(X) = A_x + \alpha \ln(wDr) + \beta \ln(rPr) + \varepsilon \quad \text{Eq. (01.C)}$$

Where α and β represent the demand elasticity and price elasticity of exports, respectively. This equation represents the traditional "Armington" export equation, which will form the basis of our future estimates.

Following the Amington model, several models have been developed with the latest changes in the global goods and services market. Most of these models are used in specific environments according to the purpose of economic analysis. Within this framework, some studies aimed at studying export competitiveness use the Amington model and add other explanatory variables to the model.

Indeed, we have seen that with the intensification of economic opening and the resulting fierce competition, exports are not just explained by demand and price effects. Other factors also play a role and are used in new international trade theories. These are variables of quality, difference, proximity and other commodities. These models are called Armington models augmented.

Consistent with previous work¹⁰ on the differences in trade performance of countries, we evaluated the development of Moroccan exports using traditional augmented trade equations, and we focused on the measurement of price competitiveness and cost competitiveness.

Therefore, we will estimate Armington's export equation and gradually enrich it with traditional price and cost competitiveness measures.

The global equation in log-linear form is as follows:

¹⁰ In this work, we mainly use Raphaël Chiappini's article. (2011). "Comment mesurer la compétitivité structurelle des pays dans les équations d'exportation ?" Economic news, Volume 87, Issue 1, pages 31-57.

Price competitiveness:

$$\ln(\text{EXP}) = \ln(A) + \alpha \ln(\text{WD}) + \beta \ln(\text{REER}) + \gamma \ln(\text{TE}) + \delta \ln(\text{WO}) + \varphi \ln(\text{RINV}) + \varepsilon \quad \text{Eq. (02.)}$$

Cost competitiveness:

$$\ln(\text{EXP}) = \ln(A) + \alpha \ln(\text{WD}) + \beta \ln(\text{ULC}) + \delta \ln(\text{WO}) + \varphi \ln(\text{RINV}) + \varepsilon \quad \text{Eq. (03.)}$$

With:

EXP, Moroccan exports;

WD, The index of world demand for Morocco;

REER, The real effective exchange rate;

TE, Terms of exchange;

WO, Morocco's openness index;

RINV, The rate of Investment;

ULC, Unit labor cost¹¹.

In this section, we propose an empirical estimation of the determinants of Moroccan external competitiveness using augmented export equations, the variables used are selected based on their importance in Morocco's foreign trade and the availability of data needed to test the model. The data refer to the period 1988-2017. Before the estimation, we applied log transformation to all series. Indeed, our explained variable exports are expressed in quantities, while our explanatory variables are rates or indices.

Therefore, there is a difference between the explained values and the explanatory values. Logarithm helps reduce these differences. In addition, since the logarithm will be based on the percentage, the logarithm is helpful for interpretations.

4.2 Results and discussions

4.2.1 Price competitiveness

The following introduces our estimate of the price competitiveness of R software. It should be remembered that we must estimate VECM with the specification "Absence of a linear trend in the series, but there are constants in the cointegration relationship" and two cointegration relationships.

Since the aim of this research is to study the determinants of Morocco's external competitiveness, we will focus only on the export equation. The VECM model allows us to analyze short- and long-term relationships at the same time. The full VECM equation for our research variable (Export) is therefore as follows¹²:

$$\begin{aligned} \Delta \text{EXP} = & -0,29((\text{EXP}.13) + (8,62 * \text{TE}.13) - (16,32 * \text{WO}.13) + (18,05 * \text{RINV}.13) + (0,32 * \text{WD}.13) \\ & - 29,73) - 4,03((\text{REER}.13) - (0,55 * \text{TE}.13) + (0,5 * \text{WO}.13) - (0,11 * \text{RINV}.13) \\ & + (0,05 * \text{WD}.13) - 1,57) - 1,73(\Delta \text{TE}.11) + 2,05(\Delta \text{WO}.11) - 4,85(\Delta \text{REER}.12) \\ & + 2,98(\Delta \text{WO}.12) - 2,665(\Delta \text{RINV}.12) - 0,29(\Delta \text{WD}.12) \end{aligned}$$

4.2.1.1 Validity of model

We start with the coefficient of determination. In fact, it allows us to assess the quality of our model. The coefficient of determination of the VECM model for exports is 0.65. This means that 65% of the total variance was explained by our model. Our model can be considered effective.

Therefore, our variables are globally significant. The coefficients of the two co-integration relationships are significant and negative (ect1 = -0.29; ect2 = -4.03). Therefore, the short-term and long-term relationship is confirmed.

We will rely on another test Ljung-Box to verify the validity of our model. By using Ljung-Box's Q statistic, the test can verify that the residue generated by each of the two equations is white noise. In fact, the Ljung-Box Q statistic with a delay of h = 15 confirms that there is no autocorrelation, and the test probability of h = 15 is 0.97 > 0.05, thus accepting the null hypothesis of white noise.

¹¹ For a detailed presentation of the variables, see Appendix 3.

¹² The long-term relationship is represented by the level variables, as long as the short-term relationship is represented by the difference variables.

Table 3.
Results of estimates with price competitiveness indicators

Long term equations	
Cointegration Eq 1	Cointegration Eq 2
$EXP.I3 = -8,62 * (TE.I3) + 16,32 * (WO.I3) - 18,05 * (RINV.I3) - 0,32 * (WD.I3) + 29,73$	$REER.I3 = 0,55 * (TE.I3) - 0,5 * (WO.I3) + (0,11 * (RINV.I3) - 0,05 * (WD.I3) + 1,57$
Short term equation	
Variables	Estimated coefficients
Error correction term 1	-0,2956**
Error correction term 2	-4,0365**
$\Delta EXP.I1$	-0,3680
$\Delta REER.I1$	0,8019
$\Delta TE.I1$	-1,7343**
$\Delta WO.I1$	2,0522**
$\Delta RINV.I1$	-0,6528
$\Delta WD.I1$	-0,0614
$\Delta EXP.I2$	0,2814
$\Delta REER.I2$	-4,8530**
$\Delta TE.I2$	0,5043
$\Delta WO.I2$	2,9841**
$\Delta RINV.I2$	-2,6637*
$\Delta WD.I2$	-0,2977***
Number of observations	30
R ² Adjusted	0,65
Box-pierce test	0,974

4.2.1.2 Price effect

According to the traditional results and considering the results of the VECM model, the variable real effective exchange rate showed significant and negative changes. In the short term, a 1% increase in the real effective exchange rate will cause exports to fall by -4.85% in the next period. The effective exchange rate has a negative impact on exports. This result is consistent with economic theory. Indeed, an increase in the exchange rate may have a dual impact on the economy, firstly, exported goods and services become relatively more expensive, which makes it difficult for Morocco to maintain its competitive gains, which is why consumers of partner countries will consume less and the volume of exports will decrease. Then, as exports fell, national supply increased in the subsequent period, so prices fell relatively, which may increase exports. As a result, Morocco's external competitiveness is relatively sensitive to variations in prices and exchange rates.

On the other hand, estimates show that the variable terms of trade¹³ is negative and significant, which means that in the short term, a change of 1% in the terms of trade leads to a 1.73% decrease in exports. In other words, an improvement in terms of trade by 1% also means a deterioration in the price competitiveness of Moroccan exports on international markets by 1.73%. On the contrary, a decline in terms of trade means an increase in price competitiveness. In the long run, exports are more sensitive to changes in terms of trade. The results obtained from this variable are consistent with theoretical and empirical contributions found in previous studies.

¹³ « Terms of trade are the ratio for a given product between the export price index and the import price index, with these indices expressed in relation to the same base year. A 1% improvement in the terms of trade means that the growth in export prices is 1% higher than that of import prices. It also signifies a deterioration in price-competitiveness. Conversely, a drop in the terms of trade indicates an improvement in price-competitiveness. This ratio can be calculated by product, for a set of products, or globally. ». INSEE

4.2.2 Cost competitiveness

The following table lists the results of R software's estimation of our cost competitiveness. As with previous estimates, VECM's estimation specification is "Absence of a linear trend in the series, but there is a constant in the cointegration relationship" and two cointegration relationships.

Table 4.

Results of estimates with cost competitiveness indicator

Long term equations	
Cointegration Eq 1	Cointegration Eq 2
EXP.12 = 4,53 * (RINV.12) + 4,05 * (ULC.12) - 0,12 * (RINV.13) - 2,99	WO.12 = -7,41 * (RINV.12) - 7,39 * (ULC.12) + 0,22 * (WD.12) + 20,68
Short term equation	
Variables	Estimated coefficients
Error correction term 1	-0,3504**
Error correction term 2	-0,2176**
ΔEXP.11	-1,3444
ΔWO.11	-0,2690
ΔRINV.11	0,1110**
ΔULC.11	0,0774**
ΔWD.11	0,0090***
R² Adjusted	0,69
Test de Box-pierce	0,968

Note : *, **, *** : significant to 10 %, 5 %, 1 %

The full VECM equation for our research variable (Export) is as follows:

$$\begin{aligned} \Delta \text{EXP} = & -0,35((\text{EXP.12}) - (4,53 * \text{RINV.12}) - (4,05 * \text{ULC.12}) + (0,12 * \text{RINV.13}) + 2,99) \\ & - 0,21((\text{WO.12}) + (7,41 * \text{WINV.12}) + (7,39 * \text{ULC.12}) - (0,22 * \text{WD.12}) - 20,68) \\ & - 1,34(\Delta \text{EXP.11}) - 0,26(\Delta \text{WO.11}) + 0,11(\Delta \text{RINV.11}) + 0,07(\Delta \text{ULC.11}) \end{aligned}$$

4.2.2.1 Validity of model

We start with the coefficient of determination. In fact, it allows us to assess the quality of our model's. The coefficient of determination of the VECM model for exports is 0.69. Our model can be considered effective.

Therefore, our variables are globally significant. The coefficients of the two cointegration relationships are significant and negative (ect1 = -0.35; ect2 = -0.21). Therefore, the short-term and long-term relationship is confirmed.

On the other hand, the Ljung-Box Q statistic with delay h = 10 confirms that there is no autocorrelation. In fact, the test probability of h = 10 is 0.96 > 0.05, so the null hypothesis of white noise is accepted.

4.2.2.2 Production cost and quality effect

In explaining exports, unit labor cost is also important. In the short term, a unit labor cost increase of 1% will increase the export growth rate slightly by 0.07% over the next period of time. This result is not in line with the theory that the higher the unit labor cost, the higher will be the cost of goods production, and therefore the prices charged by producers will be high, and therefore locally exported products will be lower competitive on the international market.

The variable that captures quality is the investment rate. We note that this variable is significant in our VECM model. It can be seen that the investment rate will affect exports in the short term. As we expected, the 1% increase in the investment rate results in a 0.11% increase in exports in the next period. Therefore, Morocco's exports are not very sensitive to changes in short-term investment rates. However,

in the long term, investments have a much larger impact on exports, in fact a 1% increase means a 4.53% increase in exports, which is in line with the theory.

5. Conclusion

The study attempts to examine the impact of competitive factors on exports. To this end, we estimate the Armington model plus prices, cost and quality variables. We used two models, the first captures the price effect and the second captures the cost and quality effect. Indeed, the results of these estimates allow us to clarify certain aspects. On the one hand, Morocco's exports are sensitive to price factors (real effective exchange rate, terms of trade) and competition effect. However, they are less sensitive to short-term investments than to long-term ones. Indeed, an increase in the real effective exchange rate will delay exports. As for investment, it has a positive impact, but in small proportions.

On the other hand, according to the comparative advantage indicator, we note that Morocco has an advantage especially with regard to chemicals and related products, clothing and food products compared to other countries. However, the potential of our export on the world market lies mainly in the following product families: Fertilizers, machines, chemicals as well as vehicles and car parts. The opening of Morocco and the signing of a series of free trade agreements have changed the export structure in recent years in favor of emerging industrial branches with high value-added and better positioned to the scale of global demand. The positioning of the Moroccan industry in global professional fields such as automobile manufacturing and aviation can explain this change.

In addition, the use of disaggregated data may lead better results in modeling. In fact, Morocco's export sectors is positioned differently globally, so we can assume that trade liberalization will not have the same impact on all sectors¹⁴, then the external competitiveness of different sectors will be different. In addition, the use of non-price competitive indicators such as human capital and institutional quality is one of the ways to conduct further research on this topic, which will allow us to highlight other variables explaining the trade performance of Morocco in the recent period.

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APPENDICES

Appendix A: Detailed methodology of the Balassa Revealed Comparative Advantage Index

The calculation of the BRCA indicator is mainly based on the share of exports:

- i. Share in the export market (EXP_p): $EXP_p = \left(\frac{X_{ik}}{X_{iw}}\right)$, with : X_{ik} = value of export from country k for sector i ; X_{iw} = value of global sector exports.
- ii. Balassa Revealed Comparative Advantage Index: $IACRB_{ik} = \left(\frac{X_{ik}}{X_{iw}}\right) / \left(\frac{X_k}{X_w}\right)$.

with: X_k = value of exports from all sectors of country k; X_w = value of world exports from all sectors. The share of exports from country k in world exports is used to normalize this index. If the index is greater than 1, the country is considered to be specialized in the industry (comparative advantage in the industry) because it is relatively more exporting than the reference area. Of course, the country's specialization is even stronger because the index is higher than 1. On the contrary, if the indicator is less than 1, the country is not specialized in the branch (comparative disadvantage). The disadvantage is all the greater when the indicator approaches 0.

Appendix B : Detailed methodology of the Export Potential Indicator ¹⁵

The export potential indicator is the export value of the potential, for products already regularly exported by Morocco, for which the export potential is at least \$ 200,000. Export potential is not the maximum value but a reasonable export value to the market, taking into account the performance of the country and domestic demand as well as market access conditions.

Estimating export potential includes first forecasting the demand for imports of each product on each market based on current demand, population growth and expected GDP per capita growth. Current trade may be lower than potential, which indicates that it is possible to increase exports to related markets, but it may also be higher than this potential, which means that new competitors may threaten the current position of exporters in these markets.

$$EPI_{ijk} = Exp. Supply_{ik} \times \frac{x_{ij}}{\sum_k Supply_{ik} \times MA_{ijk} \times m_{jk}} \times MA_{ijk} \times Exp. m_{jk} \quad \text{Eq. (B1.1)}$$

- x = exports (m = imports) of the country i (market j) for the product k .
- $Supply_{ik}$: world market share; customs duties on the world market; $Exp.$: + expected growth of the exporter.
- $Easiness_{ij} = \frac{x_{ij}}{\sum_k MShare_{ik} \times m_{jk}}$ is the ratio between the current value exported to the market j and what it would be if the country i had the same market share in this market as in globally.
- $\frac{x_{ij}}{\sum_k Supply_{ik} \times MA_{ijk} \times m_{jk}}$ Adjustment of bilateral trade to take into account the complementarity between supply and demand.
- MA_{ijk} : market access : price preference and product sensitivity over distance;
- m_{jk} : value demand; $Exp.$: + + demographic growth and expected growth of GDP per capita (taking into account income elasticity).

By combining export performance, ease of export and demand, we obtain:

- **Export potential:**

$$EPI_{ijk} = Supply_{ik} \times Easiness_{ij} \times Demand_{ijk} \quad \text{Eq. (B1.2)}$$

- **Unrealized export potential :**

$$Unused\ potential_{ijk} = \max(EPI_{ijk} - x_{ijk} ; 0) \quad \text{Eq. (B1.3)}$$

The existence of an unrealized export potential can be the consequence of several reasons:

- Non-tariff barriers;
- Positioning in quality or price that does not correspond to market demand;
- Sector made up of a small number of large companies with their own strategy;
- Export potential too low to justify the establishment of a commercial relationship;
- Absence of market analysis: commercial transaction controlled by the buyer.

¹⁵ Export Potential Map, International Trade Centre.

Appendix C: Data source**Table C.1: Results of estimates with price competitiveness indicators**

Variable	Source
Exports / Imports	WTO
Real Effective Exchange Rate	World Bank
World demand index addressed to Morocco	Ministry of Economy and Finance
Terms of trade	Calculated on World Bank data
Openness rate	Calculated on World Bank data
Investment rate	World Bank
Unit labor cost	Calculated on data from the Ministry of Economy and Finance