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Attractiveness of foreign direct investment and structural transformation of territories: Comparative study between north African countries and the world's emerging countries

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Abstract

This article examines how emerging countries around the world have managed to develop despite economic and financial crises, while developing countries, notably in North Africa, have been unable to sustain their growth despite significant endowments of production factors. This article posits that successful structural transformation (ST) is indispensable for them. It would constitute the necessary condition for their development if it emphasizes the allure of Foreign Direct Investment (FDI) to complement such absorptive capacities. The primary objective of this article is to analyze the impact of FDI on ST in North African countries compared to emerging countries worldwide. The analysis, grounded in theoretical literature and employing a panel econometric approach with data analysis, seeks to comprehend the role of FDI in the disparities between emerging and developing countries. It scrutinizes not only their impact on growth but also on crucial channels of ST such as innovation, urbanization, institutional quality, and labor migration. The results from the estimated econometric models reveal a negative impact of FDI on ST in North Africa, unlike in emerging countries. In conclusion, the article suggests redirecting FDI towards growth sectors and drivers of change such as innovation, urbanization, and institutional quality to foster ST in developing countries.

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1. Introduction

The analysis of inequalities, observed macro-economically in terms of the creation of national wealth, between different countries has led economists to determine the causes and components of such wealth. The various explanations have led to it being expressed either in terms of economic growth in gross domestic product (GDP), or in terms of growth in gross domestic product per capita (GDPPC). In line with prevailing liberal thinking, it has been accepted that, thanks to this economic growth, the real income of certain countries has increased more than tenfold in the space of a century, as illustrated by the growth in income recorded by Hong Kong.

However, this economic growth is heterogeneous from one country to another, and even worldwide. What's more, it has not erased the inequalities in real incomes observed between countries and at international level. Today, for example, real income in Asian countries is eight times higher than in African countries (Hamadehc, 2023). Similarly, for a smaller sample, the same general observation holds true (Figure 1), if we consider in

particular the case of relative inequalities in economic growth between the countries of Northern Africa (NAC's)[1] and the world's emerging countries (WEC's)[2].

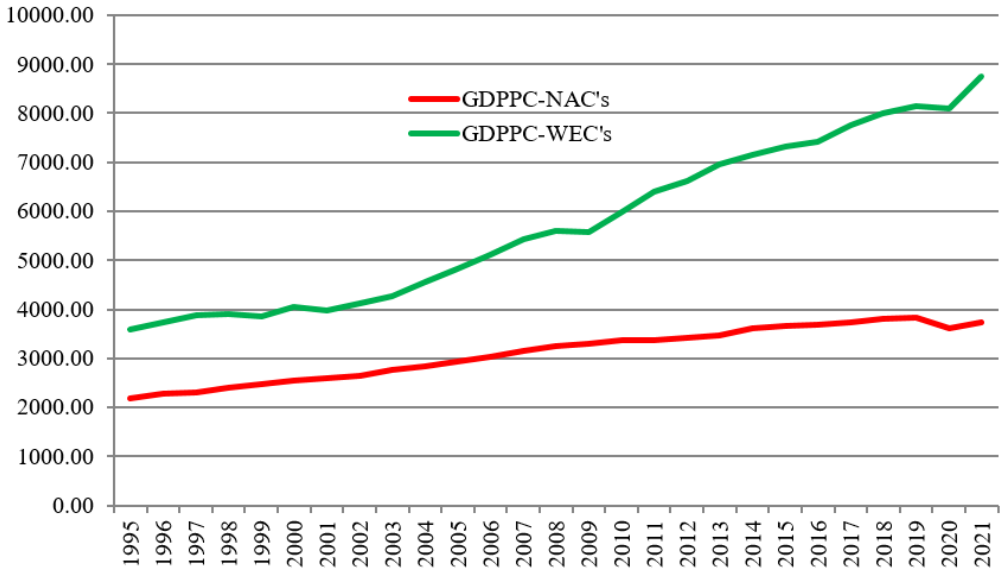

Figure 1. Evolution of average GDPPC inequalities between NAC's and WEC's (1995-2021).
Source: World Bank database.

This major finding is the most striking stylized fact that underpins the central problem of this article. It also chooses to focus on NAC's compared with WEC's. This choice is justified a priori by the burning issue of the BRICS (Brazil, Russia, India, China, and South Africa) opening up to include new emerging countries. So, if Egypt, one of the NAC's, has successfully integrated this grouping of powerful influence from January 2024, the aspirations of Morocco and Algeria, in turn, are clearly evident: a real stake in the new geopolitics of the world for both countries! Hence the question as to the origins and causes of the growth differential observed, and more specifically, why are the NAC's lagging so far behind the WEC's? How can the real income of the former be improved? Are there lessons to be learned from the WEC's experience? How will NAC's make up for this lag, often considered structural, in relation to WEC's?

To determine the factors lowering the GDPPC inequalities recorded between NAC's and WEC's, the researchers analyzed the role of several components of economic growth. In the past, particularly in standard, albeit extended, theoretical schemes of international economic relations, natural resources, physical capital and other factorial and technological endowments have been the main stimulants of strong economic growth. Nevertheless, following the controversial effects of globalization on international economic disparities (Krugman, 2009) economic growth alone would no longer be sufficient to minimize international inequalities, particularly between WEC's and NAC's. The latter would face the challenge of making a success of their structural transformation (ST) process. We are convinced that only this would enable them to achieve solid, continuous and more inclusive growth, with a view to catching up and reducing their development gaps with the WEC's.

So, if the notion of "transformation" brings us back to that of "change" so familiar to development theorists, it's crucial that we first present the conceptual framework and definitional contours of this composite notion of ST[3]. According to the Robert dictionary, the concept of structure, from the Latin "structura", has been used since 1530 to mean the arrangement, composition, construction and even economy of a system. Thus, the concepts of "organization" and "system" are the closest to the term "structure"[4].

[1] The NAC's: are the countries of North Africa (Morocco, Algeria, Tunisia and Libya), including Egypt. In our case, we'll take four countries as a sample, excluding Libya because of its political instability.
[2] WEC's: These are the newly industrialized countries, ranked according to their economic performance. They are China, Brazil, India, Turkey, Indonesia, Thailand, the Philippines, Malaysia, Mexico and South Africa. In our case, for methodological reasons, we will take only the first four countries as our sample.
3 Indeed, the term "structure" originally comes from "construction", since the verb "to construct" is composed of "cum" (con) meaning "with", and "struere" (struire) meaning "to arrange", "assemble", "arrange" or "arrange" the parts of a whole, a system or an "architectural building".
4 In Greek, the concept of "system" dates back to 1552, and means composition and assembly, as well as an organized whole. It should be noted that while the notion of structure originally comes from construction and refers to the arrangement of tangible elements, the term system is used to characterize intangible elements such as systems of government or thought.

While "structuralism"[5] refers to a number of holistic currents of thought[6] that emerged in the humanities and social sciences at the end of the 19th century, institutionally built in the wake of positivism[7], the term structure was first used in linguistics[8]. It was then generalized, enabling structuralist thinking to take hold almost everywhere in the humanities and social sciences and even in mathematics after the Second World War. This was particularly the case with the development of algebraic structures[9] by Nicolas Bourbaki[10]. Similarly, for Durkheim (1897) methodological holism was adopted by structuralist analysis. According to Durkheim, this approach focuses on the study of collective social facts and structures, while neglecting individual acts. For him, the latter are specified more by macro-social facts and institutions. Even the greatest anthropologists[11] of the 20th century, such as Lévi-Strauss (1945) and Lévi-Strauss (1987) were influenced by Durkheim's structuralism[12].

In economics, the neo-classical school is characterized by methodological individualism, which was rejected by structuralist analysis (methodological holism) founded, first, from a sociological point of view by Durkheim, then, from an anthropological point of view by Claude Lévi-Strauss[13]. This structuralist movement, inspired by Ferdinand de Saussure, spread beyond linguistics to other disciplines between 1950 and 1970, particularly the humanities and social sciences, and even to politics, the media and literature. Thus, the structuralist movement in economics, based on methodological structuralism, favors the explanation of collective social facts, institutions, structures or social evolutions over the explanation of individual acts. Generally speaking, this movement, while admitting a certain subjective role for the individual, assumes that the habits, customs and culture of society, through institutions and social norms, determine individual behavior and actions. We take it for granted that these are at the root of any transformation of economic structures and of society as a whole.

Lectard (2017) for example, has defined SC as a virtuous circle of transformation resulting from profound changes in an economy. Similarly, according to the African Development Bank (ADB), structural transformation is defined as the reorganization of a country's economic activities between the primary, secondary and tertiary sectors, through the creation of new industrial sectors and the expansion of exports, to promote the process of economic growth and the search for new markets (ADB, 2013). It would then be a redeployment of economic activity from the primary to the secondary and tertiary sectors. For an economy, this redeployment would represent a fundamental transition to a new phase of economic development, via a process in which the relative importance of the traditional sector continually declines, over time, in favor of other, more productive sectors, notably the secondary and tertiary sectors (McMillan & Rodrik, 2011). Here, this process of structural transformation is linked to a reallocation of production factors, notably the migration or transfer of labor from low value-added sectors to high value-added sectors. At the same time, we need to invest in training that will enable developing countries more specifically to both improve their human capital and promote their capacity to effectively adopt technology particularly that imported from developed countries.

Structural transformation, in this vision of technological change, therefore plays an essential role in catching up with the productivity levels of the most advanced countries. It would also be a lever for the creation of higher-skilled, and therefore higher-paid, jobs. It is also one of the causes of growth and export differentials. For, in effect, a reallocation of labor from the primary sectors to the manufacturing industries is a drain on jobs towards the most productive activities. This would boost exports, consolidating the country's position in the global economy, while posting high growth rates (Duarte & Restuccia, 2010). So, without a successful structural transformation, without profound changes in the various sectors of economic activity, it is impossible for a country to achieve sustainable GDPPC growth rates in real terms (Kuznets, 1979) because real economic growth, which depends on the level of investment and capital accumulation[14], is based on the development of the most productive, high value-added sectors (industrial and service) with the most buoyant markets.

The literature in this field is abundant. Several works (Acemoglu & Robinson, 2015; Ades & Di Tella, 1999; Alemu, 2008; Banga, 2006; Berthélemy*, 2005; Cadot, Carrère, & Strauss-Kahn, 2011; R. E. Caves, 1996;

[5] Structuralism is a current of thought characterized by the consideration of any object of study as a system, explaining its functioning through the arrangement and disposition of its various parts. Any part of the system can only be defined by its relationship to the other parts. This way of thinking gives no autonomy to the part, which cannot be defined without taking into consideration the other parts of the system.

[6] Holism: a current of thought opposed to reductionist thinking, which seeks to explain a phenomenon as an indivisible whole, where defining it by dividing it into parts is not enough.

[7] Positivism: In the 19th century, Auguste Comte founded this philosophical trend, which emphasizes the relationships between phenomena based on scientific laws, without seeking to understand the primary causes of these phenomena.

[8] The structuralist movement originated in linguistics. The founding father of linguistic structuralism was the Swiss Ferdinand de Saussure with his 1916 book "Cours de linguistique générale" (Vol. 1). Otto Harrassowitz Verlag...

[9] Algebraic structure: data concerning one or more laws of composition that are also defined in a set E. This set E has an algebraic structure of a given type, determined by the laws of composition.

[10] Pseudonym Nicolas Bourbaki: a group of French mathematicians at the Ecole Normale Supérieure in Paris.

[11] Anthropology: The science of man that studies all aspects of the human being and human groups, both cultural and physical.

[12] But it should be noted that, on the contrary, Max Weber adopted methodological individualism, which seeks to explain the attachment of individuals to their own facts, rejecting Durkheim's methodological holism in favor of finding diverse motives behind each individual act.

[13] Structuralist anthropology refers to Claude Lévi-Strauss, the French anthropologist and his work around central structuralism in particular, the (Tristes tropiques, 1955) and (Les structures elementaires de la parente, 1949). Lévi-Strauss influenced other authors, starting with Roland Barthes in literature with his work entitled "le degré zéro de l'écriture" in 1953; then Jacques Lacan in psychoanalysis; and finally Louis Althusser and Michel Foucault in philosophy. These four authors have in turn had a major intellectual influence throughout the world on various schools of thought. They are considered the first structuralist and post-structuralist theorists, and even heralds of post-modernism, starting with art and architecture, then literature and philosophy.

[14] Capital accumulation is understood here as the process of transforming savings into financial assets or means of production. Along with technical progress and labor, capital accumulation is one of the factors of production necessary for economic development, according to theorists of classical and neoclassical political economy and their extensions.

Chubarov & Brooker, 2013; Dunning, 1993; T. Harding & Javorcik, 2012; Hausmann, Hwang, & Rodrik, 2007; Henn, Papageorgiou, Romero, & Spatafora, 2020; Hijzen, Jean, & Mayer, 2011; Huynh, 2022; Imbs & Wacziarg, 2003; Jayaweera, 2009; Kang & Qi, 2013; Klinger & Lederman, 2006; Lall, Weiss, & Zhang, 2006; Markusen & Venables, 2000; McMillan & Rodrik, 2011; Rodrik, 2006; Swenson, 2008; Tadesse & Shukralla, 2013; Wu & Chen, 2016; B. Xu & Lu, 2009; Yin & Jiang, 2003; Yulong & Hamnett, 2002) have made substantial theoretical and empirical contributions. As a result of this literature, which is complemented by the present article, FDI has taken on an important role in explaining the process of structural transformation between countries. In this sense, and to catch up with the evolution achieved by WEC's in terms of socio-economic performance, we will show that the success of the structural transformation process, via an active policy of attracting targeted FDI projects, would be indispensable for NAC's seeking to improve their level of development. The latter requires economic growth generated by a major transformation of the economy. Hence the theoretical and practical interest of this article in understanding and analyzing the economic changes and dynamics induced by the attractiveness of FDI, and which underpin such a transformation and its causes. It is in this sense that the concept of structural transformation is considered in order to show that FDI attractiveness would be a fundamental lever for such a transformation of the economies considered.

It is in this sense of investigating the causes and conditions of the real wealth, and more specifically the improvement in real income, of NAC's compared to WEC's, that the present article is set. It aims to explain the reasons for the singular economic boom experienced by certain WEC's (Brazil, China, Turkey and India): a non-stop rise in their incomes since the 1980 (Hamadehc, 2023). To this end, she focuses on both the role of FDI in the structural transformation process of such countries, and the possibilities of extracting lessons of experience for the benefit of NAC's. Therefore, following the context developed above based on the stylized fact and describing the clear and significant inequalities in terms of Average GDPPC between NAC's and WEC's, it raises the problem of apprehending and explaining the impact of FDI on the process of structural transformation in these NAC's compared to WEC's. Using a positive, hypothetico-deductive approach, it examines the FDI-structural transformation relationship through the channels of innovation, urbanization, institutional quality and inter-sector labor migration to explain the divergences in real income trends between NAC's and WEC's.

Its development in response to the problem posed is subdivided into three sections. The first two sections are theoretical, dealing with the theoretical foundations of the structural transformation process and the FDI, while the last section provides empirical validation of the structural transformation process-FDI relationship in a study applied to NAC's compared with WEC's.

2. Structural Transformation in Theories of Economic Development and International Trade

For the pioneering analyses of industrialization, economic development was conditioned by a reallocation of manpower from the primary sector to more productive sectors, based on an improvement in the productive structure, which was more specifically export-oriented. International trade theories, on the other hand, saw development only in terms of export specialization and concentration. They urged countries to focus on the principle of comparative advantage. Cone of diversification theories, on the other hand, would explain the essential role of capital accumulation in the exporting productive structure. The latter is said to change with capital accumulation, leading to successive shifts, especially in capital- and value-added-intensive production. These changes in specialization would in turn accompany those in factor and technological endowments, which would also be affected in the paths of ST. In this context, the latter would take place either through and for development, or through diversified exchange to promote economic growth.

2.1. Structural Transformation Through and For Economic Development

It is often accepted by economic development specialists that the concepts of ST or structural change signify the transformation of the productive structure alone, notably via the process of industrialization and tertiarization of economies where the primary and agrarian sectors were initially dominant (Syrquin, 2010). Early work in development economics showed that ST was a transfer of surplus labor from a less productive sector to a more productive one (Lewis, 1954)[15]. The latter, in developing countries, has often been characterized by specific and uneven trajectories of industrialization and economic modernization over the long term (Chenery & Taylor, 1968; Kuznets & Murphy, 1966).

After 1950, economic development economists such as Lewis (1954) and Rostow (1959) studied the mechanisms by which agriculturally-based economies could develop into modern industrialized economies. They proposed a variety of analytical approaches to economic development as a process of ST. For them, development is originally a process of economic modernization. It is the result of a reallocation of labor from the low-value-added agricultural sector, using traditional technology with diminishing returns, to a high-value-added sector with increasing returns: modern industry (Chenery & Taylor, 1968; Kaldor, 1967). They considered that transformation takes place sequentially in two major phases. Initially, by a migration of resources from agriculture to industry and services. Then, by a simultaneous migration of resources from both agricultural and industrial sectors to services (Kuznets, 1955; Kuznets & Murphy, 1966).

[15] Arthur Lewis won the Nobel Prize in Economics in 1979. In 1957, he was economic advisor to the Ghanaian government. In 1955, he wrote "Theory of economic growth" (Lewis, 1954).

From this perspective, the models of Chenery and Taylor (1968) and Lewis (1954) which highlighted the structural heterogeneity of underdeveloped countries, came to the fore between 1950 and 1960. Indeed, in 1954, Lewis showed that the difference in labor productivity between the traditional and modern sectors was the main driver of resource reallocation in his bi-sectoral model. This movement of labor from the traditional to the modern sector, he argued, depended on capital accumulation and the level of investment. Consequently, the ST in Lewis's founding model consisted of a decrease in the share of the agricultural sector, in the face of a simultaneous increase in the share of the modern sector, in the country's value added and employment. This migratory movement of modernization and the transfer of labor and capital to industry would thus drive economic development.

Another central author in this pioneering literature, Chenery (1961) using an approach that was more empirical than theoretical, explained the different socio-economic factors that a country experiences with the evolution of the different trajectories of its economic development. He focused on the sequential process during which a country's industrial and institutional structure is transformed, allowing industry to replace agriculture as the catalyst for growth and development. Capital accumulation is a necessary condition in this sequential process, but insufficient for economic development. This is because capital accumulation, both physical and human, leads sequentially to a series of changes in a country's domestic and foreign demand, its international trade structure, and the comparative advantages of its territories. All these modifications, beyond their initial divergences from country to country, would, according to the author, condition the growth of the modern sector and the pace of ST in each country. He considered the latter to be both the main determinant and, at the same time, the result of long-term growth, since it would be sequentially, according to the phases of development, at the origin of sectoral diversification based on more productive activities under the effect of capital accumulation. Capital accumulation promotes sectoral productivity, the competitiveness of the indigenous productive fabric and, consequently, overall economic growth.

2.2. Structural Transformation Through Trade and Economic Growth

At the end of the 1980s, modern open-economy theories of international trade and endogenous growth[16] proposed new models of exchange. These linked the three mechanisms of economic growth, the evolution of the productive structure and capital accumulation. In this sense, the Heckscher-Ohlin-Vanek model[17] would enable predictions to be made about the productive structure and its transformations over time and at a high level of aggregation. It would be a standard and explanatory basis for the first determinants of ST. According to this model, a labor- or capital-intensive sector would generate productive specialization based on the principle of comparative advantage. This specialization would optimize scarce resources to bolster the level of public utility, notably through the production of capital and consumer goods essential to economic development. According to this model, the opening up of trade would lead to a consolidation of this development through a reallocation of resources towards those sectors - primary, secondary or tertiary - which have a comparative advantage. It is this reallocation that would determine both the optimal productive structure of such sectors and their evolution and transformation over time.

With this sectoral dynamic in mind, theories of structural change relied on the economic dynamics of innovation (Schumpeter, 1949) and the dynamics of industrialization (Kuznets, 1955; Kuznets & Murphy, 1966) to explain the major stages of development (Rostow, 1959). They evoked the principle of productive diversification in high-value-added sectors, particularly the industrial sector, and its indisputable role in any changes to the overall national innovation system. It is therefore highly admissible that such economic dynamics responsible for changes in an economy (all macroeconomic imbalances in growth, inflation, wages, interest rates, exchange rates, fluctuations in markets and their interdependencies, balance of payments balances, ...), innovation (new technologies and methods), and industrialization (rise of new industries, mechanization, automation, urbanization, new forms of labor employment, productivity, ...) would explain ST.

Other studies, such as Berthélemy* (2005) have shown the possibility of diversified productive specialization when a country's exports include several goods from different sectors of activity. In this scheme, in relation to the number of countries, the possibility of exporting competitive and diversified goods would depend first and foremost on improving the allocation of factor endowments between the most and least productive sectors. The export and production diversification that stems from the principle of comparative advantage, and which would be at the origin of ST, would depend here on the accumulation of factor endowments and their better allocation.

In the same vein, in Leamer (1987) model, updated by Schott (2003) proposed diversification cones to understand changes in the structure of countries' exports. Within the framework of factor specialization theory, the authors explained the relationship between capital accumulation, export diversification and income. They deduced that capital accumulation would modify not only comparative advantages, but also the sequences of successive specializations corresponding to changes in factor endowments. These latter modifications are defined here by the diversification cones that would unquestionably be at the origin of the ST of the economies concerned.

[16] Endogenous growth: from a theoretical point of view, endogenous growth must be explained by the behavior of economic agents, who accumulate different types of capital and benefit from all the positive externalities, favoring the emergence of increasing returns, so that growth can be sustained forever.
[17] Heckscher-Ohlin-Vanek (HOV) model: was designed to predict the pattern of trade between countries. Imports are produced in the foreign country, using their labor and capital inputs. Thus, the import of foreign goods is equivalent to the import of foreign labor and capital.

This model of diversified cones explains how an economy initially exploits its comparative advantage in low-skilled labor to export traditional industrial products, such as textiles and clothing. This places its productive structure and commercial specializations in the first cone. It then moves out of this cone and into the second cone of diversification, which includes more capital-intensive exports such as industrial machinery and transport equipment. This is mainly due to changes in its productive structures and the evolution of its economic development as a result of capital accumulation. The economy then diversifies towards the third cone, where products are more sophisticated, such as the chemical and other more complex processing industries.

In the first cone, the economy specializes in less sophisticated production. Then, in the second cone, it specializes in sophisticated products, before moving on to more sophisticated, capital-, technology- and knowledge-intensive products in the third cone. In this last cone, the economy is characterized by the disappearance of the old, particularly primary, specializations, and by profound changes in the overall productive structure towards a new productive structure that will focus more on the more complex industries. The diversification cones thus foresee an increase in the volumes of exporting production structures, thanks to economic development and internal and external demand. These export capacities will be more concentrated when exports reach a significant degree of sophistication. It is this degree of sophistication that makes ST complete.

Consequently, the theory of diversification cones would constitute a missing link in the work on ST. For, in effect, this theory would link capital accumulation, the diversification process and hence the changes that production and exchange structures might undergo. As a result, it would be intelligible to consider standard international trade theory, which explains changes in specializations by those in factor endowments, as an elementary explanatory framework for apprehending the optimal trajectories of the ST of developing economies in particular, and which have subjected their economies, according to structuralist thinking, to various structural adjustments to cope with the crises of indebtedness and the financing of chronic deficits.

3. Territorial Attractiveness for Foreign Direct Investment and Structural Transformation

It's widely accepted that when a foreign firm invests directly in a host economy, it necessarily brings with it significant new tangible and intangible resources. These can be seen at several levels. In terms of financial resources and capital commitments, given the constraints and scarcity of local financing. In terms of job creation, in the face of unemployment and in favor of improved income and local economic conditions. Or access to foreign markets for local partner firms, which were limited to their domestic markets without any integration into international trade. Technology transfer and innovation in the face of outdated production practices that are no longer competitive. Or know-how and specialized, more advanced knowledge, managerial methods and management techniques to improve indigenous skills.

This FDI is therefore undoubtedly useful for the emergence of new productive activities, reducing dependence on imports, and for the modernization of existing sectors of activity in the face of global competition, by promoting more business infrastructure, innovation and its dissemination, relative and overall factor productivity, the reorganization of industrial fabrics and local innovation systems, and thus stimulating both diversification and overall economic growth. It would therefore be a crucial factor in ST, not least because of its ability to create skilled jobs. This would be all the more true if it were attracted to territories, to professions and to activities that trigger this transformation, in particular by generating labor mobility towards more productive, high value-added sectors. What then are the main theoretical determinants of territorial attractiveness for a given FDI and which could also simultaneously be crucial factors at the origin of ST?

3.1. Foreign Direct Investment and Structural Transformation by Factorial Difference!

Classical theories of international trade formed the basis of early attempts to explain FDI. These theories assumed that the main driving force behind international trade and investment was the difference in factors of production between countries, and thus the perfection of the market.

Indeed, these differences in factors of production between countries were explained by David Ricardo, in what is known as the theory of comparative advantage. Within a framework of perfect competition, this theory suggests that an economy will import goods for which it has a production disadvantage, and export those for which it has a comparative advantage in terms of factor costs.

The model's reasoning is based solely on the labor factor. The latter is considered by Ricardo as a perfectly mobile and homogeneous factor within an economy, but which cannot be transferred to other foreign economies. The capital factor is considered as indirect labor, with the same characteristics.

As a result, it assumes that all companies will specialize in several activities in which they have an absolute or relative advantage over foreign firms, since they share the same profit-maximizing function. It should be noted that comparative advantages can be created at the level of labor productivity between different economies, constituting a source of evolution in world trade.

By integrating the two factors of production, Heckscher-Ohlin's theory is seen as an extension of David Ricardo's theory. Indeed, the model assumes between the two economies perfect market competition, equilibrium in trade, the same technology, the same production function, full employment of production factors, mobility of production factors internally, but not abroad, and zero cost of trade and transport barriers (Bari, 2015).

This model shows that economies with a labor advantage will produce and export labor-intensive goods, while those with a capital advantage will concentrate on capital-intensive goods. In Arrow, Chenery, Minhas, and Solow (1961) criticized the HOS model in terms of differences in factor endowments between economies, showing the model's failure to explain world trade and consequently to explain FDI.

In Casson (1990) also criticized the neoclassical HOS model in explaining FDI, as it fails to take into account the transaction costs that differentiate direct investment from other categories of investment.

3.2. Foreign Direct Investment and Structural Transformation by Technology Gap!

New theories of international trade have attempted to better explain global trade between economies, but these attempts have not been able to explain the complexity of FDI.

With the assumption of factor mobility, a model was developed to explain trade, considering two economies, two goods, two factors of production and the same production function for both economies. However, the use of one factor to produce the same good is higher in one economy than in the other. Indeed, the possibility of complete specialization is ruled out by factor endowments (Mundell, 1950). However, FDI was not explained by Mundell model, even though portfolio investment was taken into account in the analysis.

In Kojima and Ozawa (1984) developed the Mundell model. In fact, the two authors combined macroeconomic variables (industrial and trade policies) with microeconomic variables (intangible assets and factor endowments). Based on the idea that if exports come from an economy that has a comparative advantage over the good, however, FDI emerges in the following two cases: (i) when an economy has no comparative advantage in the productive process; (ii) if there is a cost-minimizing method linked to the allocation or deterioration of this advantage.

A firm can achieve trade-related gains independently of the principle of comparative advantage, by continuing to maintain product differentiation strategies under imperfect competition and exploiting economies of scale (Markusen, 1995). In his study, Markusen based his axes on two elements: (i) the circumstances under which a firm opts to export or make direct investments towards the foreign market; (ii) the reasons why the firm does not choose other forms of foreign participation (licensing agreements or joint ventures), but opts for FDI.

Furthermore, Markusen analysis emphasizes the role of horizontal FDI, given its importance in global flows. This analysis of FDI is based on macro- and micro-economic findings.

3.2.1. Macroeconomic Findings

- From the 1980f onwards, FDI flows became a fast-growing part of global financial exchanges;
- A two-way focus. Developed countries are the main beneficiaries of FDI flows, either as destination or origin: in Hummels and Stern (1994) showed that developed countries represent 75% of FDI host territories, and 97% of FDI origin. Whereas, as of 2018, developing countries have continued to modestly take the place in world trade to the detriment of developed countries;

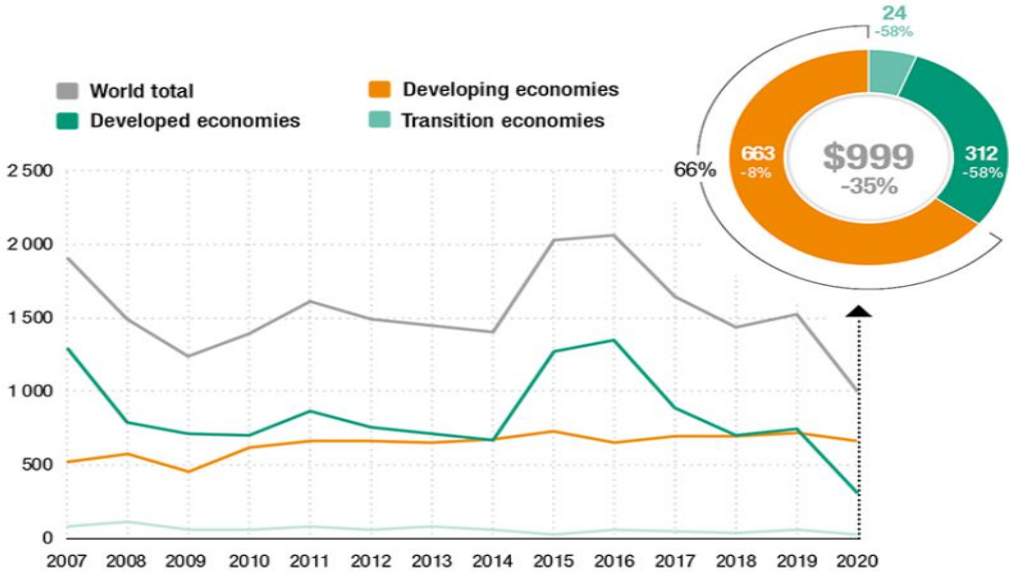

Figure 2. Inward FDI by economic group.

Source: UNCTAD (2021).

Figure 2 shows FDI inflows by economic group between 2007 and 2020.

- FDI has been of the horizontal type, which explains the production aimed at world markets. Moreover, foreign firms in the USA export only 2% of their production to their country of origin, and American foreign subsidiaries export only 13% of their production to the USA (Brainard, 1993b).

- The complementarity between FDI and world trade has become a truism, particularly for developed countries (Mucchielli, 2000).
- FDI is not necessarily explained by factor endowments, which differ from one economy to another (Brainard, 1993a, 1993b). What's more, tax incentives do not encourage firms to internalize. Most IFs relocate even before analyzing ways of lowering taxation (Wheeler & Mody, 1992).

3.2.2. Microeconomic Findings

- There are four advantages that IFs try to gain in an industry: (1) a higher level of research and development than other competitors; (2) highly qualified human capital; (3) innovative, technology-intensive production; (4) productive diversification (Blomström & Zejan, 1991; Brainard, 1993b; D. W. Caves, 1982; Teece, 1986).
- When the value of a firm's intangible assets exceeds its market value, it tries to become a multinational (Morck & Yeung, 1991)[18]. IFs are firms with strong residuals (unnoticed intangible assets), constituting their specific advantages (Markusen, 1995).
- Mixed evidence on the negative link between multinationalization and economies of scale. The age of the firm, which correlates with multinationalization, is more important at the threshold of its size to become an international firm (Blomström & Lipsey, 1991; Morck & Yeung, 1991).
- The link between the existence of transport costs or trade barriers and FDI remains ambiguous. There is a positive correlation between transport costs, trade barriers and the contribution of foreign affiliates to total exports. This is merely a substitution effect of FDI on exports (Brainard, 1993a).
- Finally, the contributions of the new trade theory were criticized for its simplified analysis: a firm produces a single good in a single zone. Thus, the lack of a multitude of production units and the absence of productive diversification prevent this theory from addressing the subject of international firms, the main source of FDI.

4. The Role of Foreign Direct Investment in the Process of Structural Transformation: What Lessons for Northern African Countries Have Been Learned from the World's Emerging Countries?

This section is devoted to an empirical study of the impact of FDI on the ST process in NACs and WECs. It assumes an identical specification of the ST process for both groups of countries. It is based on stacked cylindrical panel data[19]. In fact, the impact of FDI on the ST process is tested here through four channels, innovation[20] (export diversification and sophistication), urbanization, institutional quality and the movement of labor towards the most productive sectors, for both groups of countries, over the period 1995 to 2021.

The ST is approximated by the composite and synthetic indicator of the structural transformation process (the IPTS) constructed by ourselves, and it is this synthetic indicator that will be used in the empirical study of this work. The other variables are defined and measured by data collected from several official sources. Their statistical characteristics in terms of position, dispersion and correlation are studied for the countries in the selected sample (3.1).

We then choose to specify and test a panel model, given its advantages in this kind of comparative study[21]. A panoply of underlying and standard econometric tests is thus undertaken for each country panel, such as tests of the stationarity of the variables, of their causal directions and collinearity, of the specification and of the individual effects of the model (3.2).

The models specified and selected to verify the impact of FDI on the ST process of NACs and WECs over the period 1995-2021 are estimated. Initially, the two Pooled ordinary least squares (OLS) models are tested. Then the two VEC models, based on various tests in the field. After estimating the Pooled OLS models, the short- and long-term relationship between the ST process and FDI is estimated for each country group using two VECMs.

Their optimal lag was specified, and their cointegration relationships were studied in order to choose between a VAR or VEC model (3.3). The results obtained from the models selected for each group of countries are presented (3.4), analyzed and discussed, and compared with the results of previous studies (3.5).

4.1. The Field, The Sample, Structural Transformation Process Measurement and Study Data

4.1.1. Field and Sample for The Empirical Study

In order to legitimize its basic problem, this research empirically tests the link between FDI and the ST process in a comparative framework between NACs and WECs.

[18] Innovation, research and development, scientists and marketing strategies are often seen as proxies for intangible assets (specific advantages) to the firm, which are characterized by an essential correlation with multinationalization. In reality, the value of these assets is obtained by the difference between the firm's market value and the value of its tangible assets. In fact, the firm's specific advantages are considered a residual that is strongly correlated with multinationalization (Morck & Yeung, 1991).
[19] The cylindrical panel: both groups of countries have been observed over the entire study period (1995-2021), so there are no missing observations.
[20] This first channel of innovation remains the most empirically tested in previous scientific works dealing with the same study problem.
[21] Panel data econometrics is chosen because of its advantages for this type of comparative study.

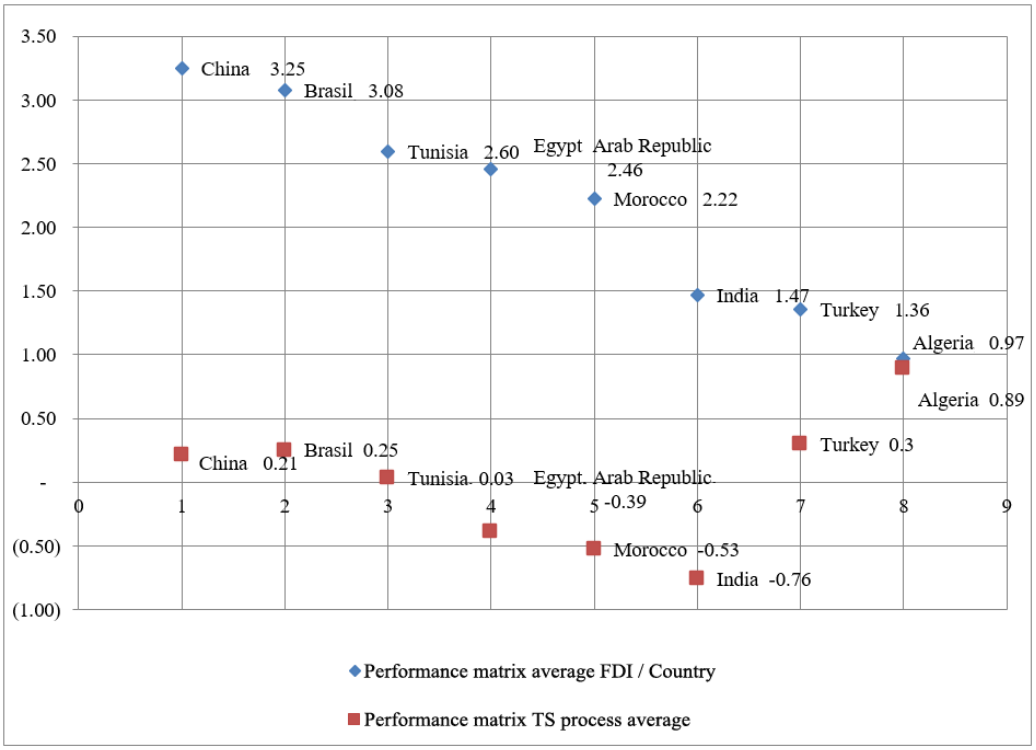

Figure 3. Performance matrix FDI / Process of the ST.
Source: Calculations based on the following databases: WDI, UNCTADSTAT, The Atlas of economic complexity and perspective monde.

Figure 3 shows the performance matrix in terms of FDI and the ST process, calculated on the basis of macroeconomic variables collected via international databases.

4.1.1.1. The NAC's

The specific reason for choosing this group of countries is that this region of the African continent includes Morocco. In addition, and on the basis of fig 3, three countries in this region: Morocco, Tunisia and Egypt have recorded almost the same average FDI of 2.22, 2.60 and 2.46 respectively between 1995 and 2021, with the exception of Algeria, with an average of 0.97. The latter has recorded the highest average of the ST process (0.89) out of the total number of countries. The latter recorded the highest average of the ST process (0.89) out of a total of eight countries. This shows a strong dispersion between FDI and the Algerian SC process. Furthermore, the negative averages recorded for the Egyptian and Moroccan ST processes, which are -0.30 and -0.53 respectively between 1995 and 2021, show that the two countries have similar dysfunctions. However, the Tunisian ST process has improved over the same period, with an average of 0.03. Moreover, there is a scarcity of studies concerning this region, despite the panoply of strategies and socio-economic reforms deployed there. Added to this is the region's potential to become a strong geo-economic union in the future, if its countries seize their common opportunities beyond political constraints. The following Table 1 gives a complete list of NACs according to the World Bank classification.

Table 1. The NAC's group.

Morocco	Alegria	Tunisia	Libya	Egypt Arab Republic

Among the countries in this region, we have selected four for empirical study: Morocco, Algeria, Tunisia and Egypt. Libya's political instability makes it difficult to carry out the study.

4.1.1.2. The WEC's

With regard to the second group of countries, which will be the subject of the empirical study, the choice has been made to focus on WECs for a comparative study with NACs. This choice is justified by the fact that the majority of these WECs began their economic take-off in parallel, and is today major emerging economic powers in the world. The World Bank has pointed out that the economic weight of these countries is set to rise sharply, from 16% in 2001 to over 38% of world GDP in 2025. With the exception of India, the ST process in China, Brazil and Turkey has performed remarkably well, with rates of 0.21, 0.25 and 0.30 respectively. This choice is justified by the average FDI recorded by some WECs between 1995 and 2021, such as China (3.25) and Brazil (3.08) (Fig. n°2). The following Table 2 gives a complete list of WECs according to the World Bank classification:

Table 2. The WEC's group.

China	Brasil	India	Indonesia	Malaysia
Mexico	Philippines	Turkey	Thailand	South Africa

Among the countries in this group, four will be selected empirically: China, India, Turkey and Brazil. The latter belong to the BRICS group, which also includes Russia and South Africa, which joined the group in 2011.

The justification for choosing these four countries is based on statistical and methodological arguments. In fact, the aim of this choice is to maintain a balance between the two groups of countries. Thus, the study sample takes into account four NACs and four WECs for which data are available and accessible on the FDI-ST process relationship in these countries.

4.1.2. Measurement and Analysis of the ST Process

The use of a data analysis method is dictated by the specificity of the study itself, and by the nature and type of data collected. The latter are quantitative data. They are secondary, extracted from official international and national databases.

Our method of analysis depends on the explanatory theories of the ST process and the FDI discussed in the first two sections. It is based on a synthetic and composite indicator specific to the ST process. This indicator contains the main catalysts of this process, i.e. innovation, approximated by the diversification index and the economic complexity index, planned urbanization, approximated by urban population growth and the number of fixed-line telephone subscriptions per 100 inhabitants, labor migration towards the productive sectors, approximated by vulnerable employment, industrial employment and employment in services; and finally, institutional quality, approximated by the degree of freedom from corruption and the degree of freedom of ownership, as two indicators of good governance. This composite indicator of the ST process is constructed using principal components analysis (PCA).

4.1.2.1. Structural Transformation Process Indicator (STPI)

To carry out the empirical study, it is first necessary to construct the ST process indicator, taking into account the recommendations and limitations of its measurement.

Most of the previous studies that have addressed the issue of the ST process have used either the economic complexity index (ECI), the Herfindahl index, the Gini index or the Theil index. The results are often divergent! This shows that these measures of the ST process are neither homogeneous nor identical in their approach to the same phenomenon. Hence the idea of a synthetic measure.

Table 3. Variables used to establish the structural transformation process indicator.

Channels	Variables	Acronyms	Database source	Theoretical base
Innovation	Diversification index	DI	UNCTADSTAT	Banga (2006); Alemu (2008) and Jayaweera (2009).
	Economic complexity (Sophistication) index	ECI	The Atlas of economic complexity	Rodrik (2006) and Wang and Wei (2010).
Urbanization	Urban population growth	UPG	WDI*	Chubarov and Brooker (2013); Kang and Qi (2013) and Wu and Chen (2016).
	Fixed-line telephone subscriptions (for100 inhabitants)	FLTS	WDI*	Ongo Nkoa and Song (2002) and Okopoue (2021)
Institutional quality	Degree of freedom from corruption	DFFC	Perspective Monde	Zhao (2003)
	Degree of freedom to own property	DFOP	Perspective Monde	Du, Lu, and Tao (2008) and X. Xu (2017)
Movement of labor	Vulnerable employment	VE	WDI*	Esteban-Pretel, Nakajima, and Tanaka (2011)
	Industrial employment	IE	WDI*	Yamashita and Fukao (2010)
	Employment in services	SE	WDI*	Simpson (2012)

Note: * World development indicators.

A composite and integrated approach has been chosen to build the STPI. Within this framework, certain variables that make up the ST process are determined. In fact, these components are derived from four dimensions: innovation (export diversification and sophistication), urbanization, institutional quality and labor movement. However, it's important to point out that there aren't many studies that give importance to the labor movement component in analyzing the ST of economies, alongside the other three components, innovation, urbanization and institutional quality. Several studies have used the innovation channel as an indicator of the ST process. The Table 3 presents the variables, their abbreviations, data sources and theoretical-empirical references, according to the different channels:

The STPI is designed to incorporate measurable aspects of the ST process that have been used in previous studies. PCA is used to summarize the components listed in the table above into a single, synthetic, composite indicator.

4.1.2.2. STPI for the NAC's and the WEC's

To establish the STPI of NAC's and WEC's, PCA offers the possibility of reducing a set of variables into a single one, while retaining the maximum amount of information from that set. There are several software packages that can be used for this purpose. Here, SPSS version 20 has been chosen to perform this PCA method. Is it feasible or not for the two country categories?

Yes, indeed, the conditions are right for applying the PCA method. The results of the validity, quality and precision of the sampling undertaken, in particular the Kaiser-Meyer-Olkin (KMO) test, show values of 0.612 for NAC's and 0.589 for WEC's, which are greater than 0.50. Similarly, the results show a significant plus-value for the Bartlett sphericity test, with a value of less than 5% (Table 4, see appendix 1). Similarly, the results show a significant plus-value for Bartlett's sphericity test, with a lower value of 5% (Table 4). In addition, the quality of representation of the variables used to measure the ST process in NAC's and WEC's is good, since the results show values greater than 0.50 for all variables, indicating that they are well represented in the design (Table 5, see appendix 1). Furthermore, to simplify interpretation and facilitate the determination of the STPI for NAC's and WEC's, the first three components are selected because they alone explain more than 80% of the ST process for the two categories of countries. Thus, for NAC's, the first component explains 37.47% of the total variance, the second 29.94% and the third 14.87%, i.e. 82.28% of the information. Similarly, for WEC's, the first three components account for 38.19%, 30.44% and 13.21% respectively of the total variance, i.e. over 81.84% of the total information.

The following two equations, using SPSS 20 software, are used to write the STPI of NAC's and WEC's respectively:

$$STPI_{(NAC's)} = 3.372*FAC1\_1/7.405+2.695*FAC2\_1/7.405+1.338*FAC3\_1/7.405$$

$$STPI_{(WEC's)} = 3.437*FAC1\_1/7.366+2.740*FAC2\_1/7.366+1.189*FAC3\_1/7.366$$

With FAC1, FAC2, FAC3 representing components 1, 2 and 3 respectively.

Table 6 (see appendix 1) shows how each variable is assigned to one of the 3 components. For NAC's, ECI, DI, UPG, FLTS and IE are identified in the first component, while SE, VE and DFOP are identified in the second component. The DFFC variable is found in the third component. FOR WEC's, VE, SE, FLTS, DFFC and IE are identified in the first component, while DI, ECI, DFOP and UPG are identified in the second component. Having established the STPI measure, it is important to subject the data obtained, along with the other variables, to the various descriptive statistical analyses.

4.1.3. Study Data

Table 7 (see appendix 2) presents the study variables, their abbreviations, definitions and data sources. The data are secondary and extracted from official international and national databases. They are stacked in panels of two groups of countries for the period from 1995 to 2011.

Table 8 (see appendix 3) presents the position and dispersion characteristics of the selected country sample, using panel data collected under STATA 15.0. It enables a comparative analysis of STPI, FDI and other explanatory variables, for NAC's and WEC's and between them.

In this framework, it is found that the mean of the dependent variable (STPI) is very far from the maximum value, during the study period 1995-2021. This suggests that the ST process for SSPs is highly heterogeneous. What's more, when we compare the intra-country and inter-country standard deviations of the dependent variable (STPI), it's clear that individual countries are in a superior position to the group as a whole, since the value of the inter-country standard deviation outweighs that of the intra-country one.

Again in the context of NAC's, the average of the variable of interest (FDI) is also far from the maximum value recorded in this group of countries between 1995 and 2021. What's more, individual countries are no better off than the NAC's group as a whole, since the Within standard deviation is higher than Between.

Furthermore, in the case of the NAC's, the variables GFCF, GDPPC, IR, REERI and COR show averages that deviate from the maximum value marked by each variable between 1995 and 2021. Each country alone registers higher values for GFCF, GDPPC and COR than those recorded by the entire group of NAC's.

Furthermore, for the WEC's, the inter-country standard deviation of the endogenous variable (STPI) is higher than the intra-country one, which shows that the variance within a single country is greater than that taken for the WEC's as a whole. For its part, the variable of interest (FDI) shows a total standard deviation for these WEC's, with a high degree of dispersion in relation to the mean. Hence, FDI achievements are heterogeneous across this group of countries. What's more, the inter-country standard deviation (1.01) is higher than the intra-country one (0.95), showing that FDI in each WEC's is higher than in the group as a whole.

Still within the framework of the WEC's, the GFCF control variable shows little dispersion around the mean, making it very close to the maximum values marked between 1995 and 2021. Thus, the inter-country standard deviation is higher than the intra-country one, showing that GFCF within each WEC's represents a good situation compared to that of this group over the period from 1995 to 2021. These findings suggest that WEC's are heterogeneous with regard to this GFCF variable. As for the other control variables, GDPPC and

COR, their Between standard deviation is higher than that of Within, which explains their dispersion around their means. This also shows that these last two variables within each country, taken individually, record higher values than those recorded in the WEC's taken as a group, during 1995-2021. On the contrary, the last two control variables, IR and REERI, show Within standard deviations which are higher than those of Between. Hence the observation that the situation of the WEC's is better than that of the individual countries in this group. Consequently, the WEC's are homogeneous in terms of IR and REERI.

In the same sense as a descriptive reading of the variables in the study, and as imposed by the basic problematic of the present thesis, an analysis of the correlations between these variables for NAC's and WEC's is crucial.

The correlation analysis between the study variables assesses the degree of linkage that may exist between them. In fact, it establishes a presumption of linkage more particularly between the endogenous variable, STPI, and the other independent variables FDI as the variable of interest, and the other control variables, namely GFCF, GDPPC, IR, REERI and COR (Table 9, see appendix 4).

In the case of NAC's, a negative correlation is shown between the dependent variable STPI and the variable of interest FDI, with a negative correlation coefficient of -0.389, showing that the two variables move in opposite directions. Similarly, for the correlation between the dependent variable STPI and the two control variables REERI and COR, their correlation is opposite, with negative coefficients of -0.023 and -0.083 respectively. Whereas the relationship between the dependent variable STPI and the other three control variables GFCF, GDPPC and IR is positive. Their correlation showed positive coefficients of 0.449, 0.423 and 0.027 respectively, leading to the conclusion that these three variables (GFCF, GDPPC and IR) move in the same direction as the dependent variable STPI. Furthermore, a negative correlation is found between FDI and GFCF, with a negative coefficient of -0.179, as well as between FDI and GDPPC, on the one hand, and IR on the other, with negative coefficients of -0.100 and -0.043 respectively. In addition, a positive correlation is highlighted between FDI and IR, as well as between FDI and COR, displaying positive coefficients of 0.081 and 0.247 respectively. This shows that these variables vary in the same direction. In addition, a mixed picture emerges between GFCF and IR, on the one hand, and GFCF and REERI, on the other, with negative coefficients of -0.29 and -0.17 respectively. However, the relationship between GFCF and GDPPC is positive, with a coefficient of 0.219, as is the relationship between GFCF and COR, their correlation showing a positive coefficient of 0.125. Concerning GDPPC, the test shows a weak positive correlation with IR, REERI and COR, showing positive coefficients of 0.147, 0.111 and 0.273 respectively. These variables vary in the same direction, but less proportionally. As for the IR variable, the test shows a positive correlation with REERI and a negative correlation with COR, with mixed coefficients of 0.011 and -0.330 respectively. The correlation test also showed an opposite relationship between REERI and COR, with a negative coefficient of -0.127, indicating that the two variables move in opposite directions.

In the case of WEC's, a weak positive correlation between the dependent variable STPI and the variable of interest FDI was observed. Indeed, the correlation matrix showed a positive coefficient of 0.185. This explains why the two variables move in the same direction. Similarly, a positive correlation was found between the dependent variable STPI and the three control variables: GDPPC, REERI and COR. The test shows positive coefficients of 0.850, 0.336 and 0.224 respectively. These three variables therefore vary in the same direction as the dependent variable STPI. However, the correlation test showed that the relationship between the latter variable and the other two control variables, GFCF and IR, is negative, with negative coefficients of -0.224 and -0.086 respectively. As a result, these two variables move in the opposite direction to the STPI dependent variable. Furthermore, the correlation test showed that the FDI variable of interest is positively correlated with the two control variables GFCF and GDPPC. The test results show positive coefficients of 0.082 and 0.023 respectively. These two variables therefore vary in the same direction as the FDI variable of interest. On the contrary, the test shows a negative correlation between this last variable of interest and the three other control variables: IR, REERI and COR. Their coefficients are negative. They therefore vary in the opposite direction to the dependent variable. Furthermore, the GFCF control variable is negatively correlated with GDPPC and IR, with negative coefficients of -0.27701 and -0.27751 respectively. The two variables therefore move in the opposite direction to GFCF. The opposite is true for the other two variables, REERI and COR. They vary in the same direction as GFCF. Similarly, GDPPC varies in the same direction as IR, REERI and COR. The test shows a weak positive correlation, with coefficients of 0.078, 0.153 and 0.057 respectively. As for the IR variable, the test showed that it varies in the same direction as the COR variable (positive correlation). However, it varies in the opposite direction (negative correlation) to the REERI variable. As for the correlation between REERI and COR, the test shows that it is a positive correlation, with a coefficient of 0.234, meaning that these two variables move in the same direction.

4.2. Modeling Method

The aim of the empirical study in this research work is to analyze, according to the modeling scheme summarized in fig 4, the relationship between FDI and the ST process in a comparative context, for the two groups of countries forming the study sample, NAC's and WEC's.

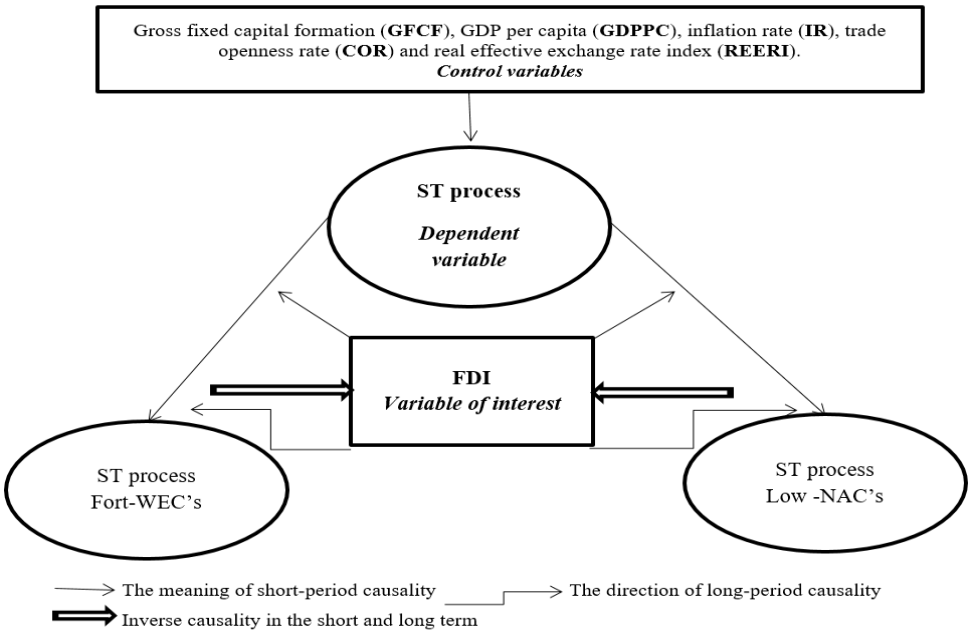

Figure 4. Modeling scheme for the FDI-ST a relationship in NAC's/WEC's.

Figure 4 shows the modeling diagram for the relationship between FDI and ST process. Under this scheme, a multiple regression model is estimated for each separate group of countries, using panel-stacked data for the period from 1995 to 2011. In fact, the aim is to identify the impact of FDI on the ST process, taking into account the cyclical and structural factors of each country. The choice is made between a vector autoregression (VAR) model and a panel data vector error correction (VEC) model. This choice is determined by the results of various specification tests. In this sense, causality between FDI and STPI will be studied in the short and long term (3.2.2). To do this, it is necessary to test the unit root of the series to verify their stationarity (3.2.1) and collinearity (3.2.3), before determining the optimal lags and analyzing the cointegration of the variables in the specified models.

4.2.1. The Stationarity Test

The purpose of the unit root test is to verify the absence of a unit root; in other words, to check the stationarity of time series (statistical reason) in order to analyze them without any possible bias and in compliance with the technical properties of good estimators[22]. The test is carried out for each series in level, then in first difference and, if necessary, in second difference, using the Levin, Lin, and Chu (2002)[23] test. Table 10 shows the order of integration of the variables used for the two groups of NAC's and WEC's.

Table 10. Stationarity test results.

Group	STPI	FDI	GFCF	GDPPC	IR	REERI	COR
NAC's	I(0)	I(0)	I(1)	I(1)	I(0)	I(2)	I(1)
WEC's	I(0)	I(0)	I(1)	I(2)	I(0)	I(1)	I(1)

Let's now look at the FDI-STPI causality in the two groups of countries, before proceeding with the various estimates.

4.2.2. The FDI-STPI Causality Test

Before starting the estimations, it is important to carry out a causality test[24]. This test will determine the direction of causality between FDI and STPI in the two groups of countries. It will also identify endogenous and exogenous variables. The Granger test is used. Its results are summarized in Table 11 (see appendix 5).

On the one hand, they show, for NAC's, that when the STPI variable is taken as endogenous and the FDI variable as exogenous, FDI does not cause the ST process (prob (0.0753) > 5%). Similarly, for these countries, when FDI is endogenous, STPI does not cause FDI (prob (0.2133) >5%). The equation is not bidirectional for these NAC's.

On the other hand, for the WEC's, when the STPI is endogenous and the FDI exogenous, the results of the Granger test show a probability that exceeds the 5% threshold (0.9872), which leads us to accept the null

[22] This is because the existence of the root in a regression would lead us to assume the presence of strong relationships between variables, when in reality they are independent. This is one of the reasons why it is recommended to stationaryize time series before resorting to the various estimates.
[23] This test is most commonly used for panel-stacked data.
[24] Causality testing is recommended, especially for variables that may be mutually causal. It is also essential for making predictions.

hypothesis. In other words, the FDI does not cause the ST process in these WEC's. What's more, in the latter, the ST process does not cause the FDI either (prob (0.8449) > 5%). As in the case of WEC's, the FDI-STPI relationship is not bidirectional in WEC's either. Let's now examine the existence or otherwise of collinearity between the study variables for each country group.

The collinearity test is undertaken before proceeding with the estimations. The aim is to remove collinear variables. In other words, if there is a collinearity value close to 1 between two variables, one of them is removed. Reading Table 12 (see appendix 5), we can see that there is no collinearity between the variables in the study. In fact, the results show values that do not exceed the threshold of 0.8, either for NAC's or WEC's. The econometric models of the panel study can therefore be estimated and analyzed.

4.3. Models

After carrying out the necessary preliminary tests, this section is devoted to estimating the specified econometric models.

4.3.1. Specification

To analyze the impact of FDI on the ST process in NAC's and WEC's between 1995 and 2021, the specification resulted in the following equation:

$$ST_{it} = c + \beta_1 FDI_{it} + \beta_2 GFCF_{it} + \beta_3 GDPPC_{it} + \beta_4 IR_{it} + \beta_5 REERI_{it} + \beta_6 COR_{it} + \alpha_i + \varepsilon_{it}$$

With the STPIit synthetic and composite indicator and proxy of the ST process for country i and in time t. It contains the four dimensions of innovation, urbanization, institutional quality and labor movement. FDIit foreign direct investment as a % of GDP. GFCFit gross fixed capital formation as a % of GDP. GDPPCit GDP per capita expressed in constant 2015 dollars. IRit inflation rate. REERIit real effective exchange rate index (2010=100). CORit trade openness rate. c the model constant. αi the individual effect of each country. βi the coefficients to be estimated. Finally, εit the specification error term.

It is usual in this case of panel data to estimate three alternative models. Either a pooled OLS model, a fixed-effects model or a random-effects model. The first considers each group of countries as a single statistical individual. In other words, the countries in this case are assumed to be homogeneous with regard to the socio-economic policies pursued. However, this assumption is rarely robust, as each country applies its own policies and strategies in a way that is specific to its own characteristics. The second fixed-effects model takes these country-specific (individual) effects into account, assuming that the links between the dependent variable and the independent variables are similar for all the countries in the panel and over the entire study period. The random effects model, or compound error model, takes into account country heterogeneity. It assumes that the specific effects are random, i.e. that the unquantifiable and unremarkable characteristics linked to the specific effects are not only no longer similar for all countries, but also change over time. The choice between these three models in this thesis was made on the basis of the results of the specification and existence test for individual effects.

4.3.2. Homogeneity Test

In principle, panel data comprise several individuals, NAC's and WEC's, and several periods (from 1995 to 2021). It is therefore crucial to test the homogeneity of these countries. Generally speaking, there are several tests to analyze this homogeneity, of which the Breusch Pagan test is the most widely used in this kind of comparative analysis.

Table 13. Individual specification test.

Breusch and Pagan Lagrangian multiplier test for random effects				
TS [id, t] = Xb + u[id] + e[id, t]				
Estimated results				
Elements	VAR sd = sqrt (Var)			
	NAC's		WEC's	
STPI	0.372	0.610	0.382	0.618
E	0.047	0.217	0.062	0.250
U	0	0	0	0
Test: Var (u) = 0				
	Chibar2 (01) = 0.00			
	Prob > chibar2 = 1.000			

Table 13 shows the results of this test in Stata.15, for both groups of countries. According to the results of the Breusch Pagan test, the probability value is greater than 5%, which allows us to reject the presence of specific effects for both the SAPs and the EMPs. Each group of countries is statistically homogeneous.

4.4. Results and Discussion of Estimates

The results show that the first Pooled OLS model explains only 39% of the ST process in NAC's (Table 14, see Appendix 6), while the second Pooled OLS model explains 81% of this process in WEC's (Table 14, see Appendix 6).

On the one hand, for the NA's, the ST process, according to the causality test, is not caused either by the FDI or by the other control variables, either individually or as a group. Similarly, for these NAC's, neither ST nor the other control variables cause the FDI. On the other hand, for WEC's, the causality test showed a non-significant probability of FDI, when the ST process is considered as a dependent variable. On the other hand, GFCF and GDPPC do cause this process in this group of countries, either individually or as a group. On the other hand, neither ST nor the other variables cause FDI, either individually or as a group.

The characteristics determined to represent NAC's are well suited to the needs and the usual econometric tests selected [25](Table 15, see appendix 7). The results of the Pooled OLS model reveal a significant negative role for FDI in the overall NAC's ST process. In this vein, the variation in the share of FDI in GDP by 1% slows down the process of ST, via its four channels of innovation (diversification and sophistication of exports), urbanization (infrastructure and quality of public services ...), institutional quality (good governance...) and labor migration by 9% in these NAC's. Thus, while a majority of previous research Imbs and Wacziarg (2003); Berthélemy* (2005); Crespo and Fontoura (2007); Banga (2006); Klinger and Lederman (2006); Rodrik (2006); Matthee and Naudé (2007); Kamgna (2007); Crespo and Fontoura (2007); T Harding and Javorcik (2007); Chen and Swenson (2007); Alemu (2008); Swenson (2008); Jayaweera (2009); B. Xu and Lu (2009); Jindra, Giroud, and Scott-Kennel (2009); Iacovone and Javorcik (2008); Mayneris and Poncet (2011); T. Harding and Javorcik (2012); Tadesse and Shukralla (2013) and Henn et al. (2020) has found positive effects on the two innovation indicators (diversification and export sophistication), the present paper, on the contrary, shows a negative and significant effect of FDI on the innovation channel in NAC's. This result confirms those of Hausmann and Rodrik (2003); Barrios, Görg, and Strobl (2003); Ruane and Sutherland (2005); Hidalgo and Hausmann (2009); Wang and Wei (2010); Fu (2011); Mayneris and Poncet (2011); Iwamoto and Nabeshima (2012) and Poncet and De Waldemar (2013).

How can we explain this negative effect of FDI on the ST process in NAC's?

NAC's are not attracting the FDI in technological content necessary for their ST. In these countries, there is a particular lack of transfer of new technological capabilities from multinational firms to their host territories. Even where such transfers have taken place, they have not led to any significant increase in diversified, sophisticated exports by local firms. These firms are handicapped by the high cost of discovering new markets. This cost blocks the transfer, despite the presence of all the necessary capacities to undertake it.

What's more, the type of trade that attracts multinational firms to NAC's territories also affects their ST process. In the case of processing trade, the entire supply chain and international marketing activities for processed products are controlled by these multinational firms, which leave no room for uncompetitive indigenous firms destined for programmed extinction.

The negative effect of FDI on the ST of NAC's can also be explained by the structural and geographical disconnection between ordinary activities and those based on imported technology. This disconnection isolates the local industrial ecosystem and innovation system from the rest of the world's value chains, so there is no direct location gains from the complexity of the goods produced, either through processing-trading activities or through the other locations of multinational firms. In this sense, the lever of urbanization, supposed to be a factor of attractiveness for FDI in NAC's, as suggested in the literature (R. E. Caves, 1996; Chubarov & Brooker, 2013; Dunning, 1993; Kang & Qi, 2013; Markusen & Venables, 2000; Wu & Chen, 2016; Yin & Jiang, 2003; Yulong & Hamnett, 2002) on the subject, doesn't work either.

Furthermore, the results suggest that FDI does not contribute to structural change and economic development in host NAC's. The latter are relatively abundant in human resources, notably unskilled labor, coveted by multinational firms, whose activities are concentrated in low value-added sectors and where the strategy of cost minimization is dominant. However, FDI in NAC's is not always conducive to the creation of decent jobs, particularly in countries with a large rural labor surplus. Indeed, FDI in these countries has neither direct nor indirect influences on employment. On the one hand, it does not directly create jobs by hiring labor in multinational firms. On the other hand, it does not create jobs, in an indirect way, thanks to knowledge spillovers to local firms, which does not allow us to respond to rising market demand. Thus, FDI does not necessarily encourage wage increases in these NAC's.

Contrary to some studies[26], FDI also has a negative impact on the institutional quality of NAC's, for several reasons. NAC's attract FDI into activities that are often primary and polluting. As a result, the lack of transfer of best practices and standards from multinational firms to their home territories, where informality and tax evasion are well entrenched, is not conducive to the institutional reforms needed to meet new ST requirements in terms of human rights, ecology and sustainable development.

[25] The usual tests: Error normality test, error autocorrelation test and heteroscedasticity test.
[26] Ades and Di Tella (1999) and Huynh (2022) found a positive effect of FDI on the institutional quality of the host country.

Similarly, FDI has a negative impact on labor migration within NAC's. This result confirms those of Debaere, Lee, and Lee (2010); Edamura, Hering, Inui, and Poncet (2011) and Wagner (2011)[27]. Indeed, multinational firms launching their FDI into NAC's often follow a vertical strategy of cost minimization. They economize on labor and do not necessarily contribute to improving wages and raising individual incomes in host countries.

FDI, via the four ST channels in the NAC's between 1995 and 2021, are not conducive to the success of the latter. They are therefore being asked to revise their territorial attractiveness policies and strategies. As a result, a policy of targeting the FDI contributing to their ST is needed more than ever.

Furthermore, a 1% increase in the share of investment in GDP (GFCF) accelerates the process of ST within NAC's by 2%. Domestic investment would then be a real catalyst and an essential lever for ST. Similarly, GDPPC would have a positive impact. Indeed, a 1% rise in GDPPC accelerates this process by 0.03%. This percentage is positive, but it's still too low to achieve a significant ST. This confirms the results also found by Imbs and Wacziarg (2003). Then, in relation to the other control variables IR, REERI and COR, the results of the Pooled OLS model, for the case of NAC's display insignificant theoretical effects.

As for the WEC's, the results of the Pooled OLS model show the positive and significant role of the FDI in the ST process. In this sense, a variation of 1% in the share of FDI in GDP accelerates the ST process by 8%. This ST process in WEC's also passes through the four channels of innovation, urbanization, institutional quality and labor migration.

So, as other studies have confirmed in different (Alemu, 2008; Banga, 2006; Berthélemy*, 2005; Chen & Swenson, 2007; Crespo & Fontoura, 2007; T Harding & Javorcik, 2007; T. Harding & Javorcik, 2012; Henn et al., 2020; Iacovone & Javorcik, 2008; Imbs & Wacziarg, 2003; Jayaweera, 2009; Jindra et al., 2009; Kamgna, 2007; Klinger & Lederman, 2006; Matthee & Naudé, 2007; Rodrik, 2006; Swenson, 2008; Tadesse & Shukralla, 2013; B. Xu & Lu, 2009) contexts, FDI influences innovation in WEC's, notably through the transfer of new technological capabilities to their host territories. FDI is established in diversified, sophisticated export sectors with high added value. As a result, these multinational firms are more firmly rooted in the local environment. A structural and geographical connection has thus been forged between traditional activities geared to the local market and those based on imported technology and geared primarily to the foreign market, requiring greater complexity in the goods produced and exported.

In addition, the ST of WEC's has been reinforced by their urbanization. This result corroborates those found by Dunning (1993); R. E. Caves (1996); Markusen and Venables (2000); Yulong and Hamnett (2002); Yin and Jiang (2003); Chubarov and Brooker (2013); Kang and Qi (2013) and Wu and Chen (2016). Indeed, the contribution of FDI to structural change in host WEC's with a certain level of development has been significant. This has steered their workforce, particularly the less skilled, towards sectors with high added value and strong potential for direct and indirect employment.

Similarly, as confirmed by other studies, such as those by Ades and Di Tella (1999) and Huynh (2022) for the third channel of institutional quality, and those of Dunning (1993); Kang and Qi (2013) and Wu and Chen (2016) for labor migration, these two factors have been shown to be major causes of WEC's ST. Indeed, the nature of the FDI attracted to the territories of these countries is decisive. WEC's have welcomed FDI projects in export-oriented, diversified and sophisticated activities. They have benefited from technology transfers and many other location advantages, including the fact that they have been forced to adapt to international requirements, regulations and standards, starting with various institutional reforms. These include institutional reforms to improve the climate for business, investment, employment and real income growth.

Furthermore, the results showed that GDPPC, REERI and COR affect ST in WEC's. Indeed, a 1% increase in GDPPC accelerates this process by almost 0.001%. This percentage is positive, but it is also still very low in relation to the ST dynamics of these WEC's. This confirms the findings of Imbs and Wacziarg (2003) who stipulated that the GDPPC must exceed a certain threshold for there to be a positive effect on the ST process. Similarly, the REERI and COR of these countries had a positive impact on their ST. Thus, a 1% increase in REERI and COR accelerated the ST process by 0.08% for each variable. This positive effect favors both exchange rate competitiveness and the integration of these countries' economies into global value chains via the attractiveness of FDI projects. With regard to the other control variables, GFCF and IR, the results show insignificant effects.

In order to deepen the analysis of the empirical study and provide further explanation, the FDI-ST relationship was treated over the short and long term for each group of countries. This analysis was carried out using the Vector Error Correction Model (VECM), after checking its conditions. Thus, for NAC's, in the short term, the cointegration coefficient is statistically negative and significant, lying between 0 and 1, which guarantees an error-correction mechanism, and consequently the existence of a long-term relationship (cointegration) between the study variables of this first group (Table 17, see appendix 8). However, this long-term relationship between FDI and ST proved negative and significant over the study period (Table 16, see appendix 8). In other words, FDI in the NAC's territories has a negative impact on the success of their ST process. This finding confirms the initial results of the Pooled OLS model. Similarly, in these countries, GFCF

[27] There are few studies that have analyzed the impact of FDI on labor migration, of which we cite those by Dunning (1993); Kang and Qi (2013) and Wu and Chen (2016) which found a positive impact of FDI on labor migration to the most productive sectors (the secondary and tertiary sectors).

and REERI have a positive but insignificant short-term effect on the ST process. The other explanatory variables, GDPPC, IR and COR have y an insignificant negative effect.

These short- and long-term results in the case of NAC's can be explained by the ineffectiveness of the cyclical and structural policies pursued, especially in terms of FDI attractiveness. Similarly, these results can be explained by government policies on innovation, urbanization, institutional quality and labor movement.

As for WEC's, and based on the outputs of the VEC model, the short-term results (Table 19, see appendix 8) show that the coefficient of cointegration is negative and statistically significant, ranging between 0 and 1, which guarantees an error correction mechanism, and consequently the existence of a long-term relationship (cointegration) between the variables in the study of this second group. This long-term relationship between FDI and the ST process is positive, but not significant (Table 18, see appendix 8). This finding confirms the positive effect found by the Pooled OLS model for this group of countries. Similarly, IR has a non-significant positive effect on the ST process in these WEC's. On the other hand, GFCF, GDPPC, REERI and COR have a non-significant negative effect on the ST process in long-term WEC's, over the 1995-2021 period.

In addition, FDI has a negative but insignificant effect on the ST process in short-term WEC's. So do the GFCF, IR and REERI variables. On the other hand, GDPPC has a positive and significant effect on the short-term ST process in WEC's. Indeed, a 1% increase in GDPPC accelerates the process of ST in the WEC's by 0.02% in the short term. Thus, the COR has a non-significant positive effect on the ST process in WEC's in the short term.

These short- and long-term results for WEC's can be explained by the effectiveness of the cyclical and structural policies pursued, mainly in terms of FDI attractiveness. In contrast to NAC's, these results can be explained by the very nature of the FDI received, and its sectoral orientation towards productive, export-oriented activities. FDI also has a knock-on effect on the local ecosystem, promoting the four pillars of ST: innovation, urbanization, institutional quality and labor migration to productive sectors.

Generally speaking, the results of the study show that, over the period 1995-2021, FDI has a negative impact on the achievement and success of the ST process in NAC's. On the other hand, it has a positive impact on the process in WEC's. These heterogeneous effects may be due to differences between these countries. More specifically, in terms of the diversification and sophistication of exports, the availability of inputs on the domestic market, investment in high value-added and export-capacity areas, technological intensity, human resource skills, the implementation of economic policies, economic openness, the business climate, integration into global value chains, the existence of inclusive institutions, well-planned urbanization... In short, unlike the NAC's, FDI has a positive impact on all four channels of the WEC's ST process. A real experience for the latter, which could serve as a lesson for the NAC's.

5. Conclusion

This article is part of the new political economy of territories. It is based on key facts and statistical findings concerning a fundamental issue of economic development: the process of structural transformation. In his vision of technological change, this would play a crucial role in catching up development levels, and in reducing economic growth and relative factor productivity differentials between countries. Hence the importance of understanding the determining factors and essential causes of this structural transformation as a process of development for countries in transition, especially when it comes to producing and exporting more complex, sophisticated and high value-added goods, and in the logic of integration into a more competitive global value chain. From this perspective, the strategies of multinational firms combine with public policies to shape the spatial and sectoral composition of the overall economic system, in particular through the process of so-called structural transformation. FDI is decisive in this process. This is indeed the main objective and problem of this article. To analyze the impact of FDI on the structural transformation process in developing countries.

A comparative and hypothetico-deductive approach was used to study this issue. It has been delimited to the countries of northern Africa, in relation to the other emerging countries of the world. This comparative delimitation was dictated by the concern and interest to explain and understand the divergences in the evolution of the real income differential between these two categories of countries: why are the WEC's doing better? The aim is to learn from the experience of NAC's, where structural transformation is clearly struggling to get off the ground. Why some WEC have's been relatively successful in structural transformation? This article has highlighted the substantial role of FDI in the structural transformation of these countries, but not in the other NAC's!

Indeed, after clarifying the theoretical basis of the structural transformation process and FDI. Four essential channels of structural transformation have been identified: the innovation channel, the urbanization channel, the institutional quality channel and the labor migration channel. Their activation would be essential for NAC's aiming to catch up, on the one hand, in terms of productivity and competitiveness, and on the other, in terms of technology and inclusive, sustainable economic growth.

In these NAC's, the transition from a primary and agrarian economy to a more productive industrial and service economy would then be due to the interaction between these supply and demand mechanisms. In this sense, innovation through the diversification and sophistication of products and production and export structures, on the one hand, and the improvement of institutional quality ensuring good governance of various political and economic structures (institutions), on the other, would be indispensable for the NAC's. The role of

planned urbanization (urban clusters, competitiveness clusters, economic activity zones, new towns and specialized districts), conditioned by solid infrastructures (connectivity, logistics facilities, new digital applications), inclusive public services, the creation of skilled jobs and the reorientation of the workforce towards more productive and competitive sectors and trades, is also essential.

Numerous theoretical approaches, starting with theories of economic growth and development, have explained the role of FDI in structural transformation. However, other theories, such as international trade theories, see structural transformation only in terms of specialization and export concentration. Thus, to catch up, NAC's should promote economic growth based on the principle of relative advantage. In addition, diversification cone theories have shown a link between capital accumulation and productive structure. The latter is said to change with capital accumulation, leading to successive shifts towards capital- and value-added-intensive production. These changes in specialization, accompanied by changes in factor endowments, could be an optimal structural transformation path for NAC's if they master the risks and constraints of free trade while exploiting its advantages.

For this reason, we must not lose sight of the fact that a monistic theoretical explanatory framework of the channels and approaches of structural transformation would only be reducible to understanding the phenomenon. The success of the structural transformation process in NAC's would depend, beyond the four channels mentioned, on the improvement of many other economic, socio-cultural and political conditions and structures.

However, the literature shows that FDI can play a significant role in the structural transformation of host countries, if it fosters innovation, by developing productive and export structures, if it contributes to the achievement of planned urbanization by supporting public services and creating skilled employment, if it influences reforms and the quality of institutions and regulations, and if it drains surplus rural labor into industrialized and service-providing urban areas, improving real wages and overall income. Thus, the attractiveness of FDI would be an important solution for NAC's to succeed in their structural transformation.

Indeed, after constructing a synthetic and composite indicator of the structural transformation process, using data analysis, and taking into consideration the four essential channels of structural transformation, and after a descriptive comparison of FDI and structural transformation statistics between NAC's and WEC's, a major result was noticed: an uneven and heterogeneous attractiveness for FDI, and two different dynamics of structural transformation, between NAC's and WEC's. During the study period, the results of the empirical study confirmed the same finding. They highlighted the heterogeneity of structural transformation processes in both NAC's and WEC's. On the other hand, the homogeneity criterion for the study variables showed the similarity of the policies pursued in each group of countries. Similarly, the variable of interest, FDI, is heterogeneous for both groups of countries. FDI does not cause the structural transformation process. Conversely, the latter does not cause FDI. In short, the empirical study undertaken showed the positive and significant effect of FDI on the process of structural transformation in the WEC's. Indeed, a variation of 1% in the share of FDI in GDP accelerates the process of structural transformation in the WEC's by 8%. Whereas this effect, at different time horizons, proved significant but negative, and therefore counter-theoretical, in the NAC's! Thus, a variation of 1% in the share of FDI in GDP slows down the process of structural transformation in NAC's by 9%! This finding confirms the results found in a number of previous studies, which are complemented by the present article.

The short- and long-term results found for NAC's can be explained by the inefficiency of the cyclical and structural policies pursued in these countries, particularly in terms of FDI attractiveness. Similarly, these results would be influenced by the expectations and actions of the economic agents concerned, more specifically governments and multinational firms, by innovation, urbanization, institutional quality and the movement of labor. Moreover, these results can be explained by the very nature of the FDI attracted by these NAC's, by the strategic orientation of their production and export activities, and by the knock-on effects exerted on the local industrial ecosystem.

The economies of NAC's would gain in structural transformation if they encouraged greater export diversification and sophistication, the availability of strategic inputs on the domestic market, investment in knowledge-intensive and technology-intensive fields, the qualification of human resources, and the implementation of more pragmatic economic policies, particularly with regard to trade agreements and economic openness, the business climate, and the integration of territorial skills into global value chains.

In the final analysis, it is important to point out and acknowledge that the empirical results of this article should be treated with caution. Firstly, because the macroeconomic measures of the structural transformation process are only approximate. Even if the synthetic index approach, rather than taking into account a single structural transformation variable, is interesting, the problem of measuring this phenomenon persists. What's more, the lack of fine, detailed data means that the FDI- structural transformation relationship cannot now be addressed at more local territorial levels. Finally, it is regrettable that Libya was not included in the study sample, even though it is an important NAC's country. May the reconciliation efforts underway lead to a successful structural transformation and an eternal Libya of peace and prosperity.

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Appendix 1

Table 4. The KMO index and the Bartlett test.

Tests		NAC's	WEC's
Precision measurement of KMO sampling		0.612	0.589
Bartlett's sphericity test	Approximate chi-square	819.674	868.725
	Ddl	36	36
	Meaning of Bartlett	0.000	0.000

Table 5. Representation quality.

Acronyms	Initial	Extraction	
		NAC's	WEC's
DI	10.000	0.905	0.860
ECI	10.000	0.898	0.766
UPG	10.000	0.891	0.887
FLTS	10.000	0.593	0.887
VE	10.000	0.832	0.934
IE	10.000	0.809	0.602
SE	10.000	0.960	0.900
DFFC	10.000	0.872	0.817
DFOP	10.000	0.645	0.713

Table 6. Total variance explained.

C	Initial eigenvalues						Extraction sum of squares of selected factors					
	Total		% of variance		% cumulative		Total		% of variance		% cumulative	
	NAC's	WEC's	NAC's	WEC's	NAC's	WEC's	NAC's	WEC's	NAC's	WEC's	NAC's	WEC's
1	3.372	3.437	37.469	38.188	37.469	38.188	3.372	3.437	37.469	38.188	37.469	38.188
2	2.695	2.740	29.940	30.444	67.409	68.632	2.695	2.740	29.940	30.444	67.409	68.632
3	1.338	1.189	14.867	13.207	82.277	81.839	1.338	1.189	14.867	13.207	82.277	81.839
4	0.624	0.701	6.939	7.791	89.215	89.630	-	-	-	-	-	-
5	0.456	0.348	5.062	3.867	94.278	93.498	-	-	-	-	-	-
6	0.260	0.247	2.888	2.749	97.166	96.247	-	-	-	-	-	-
7	0.121	0.181	1.340	2.010	98.505	98.257	-	-	-	-	-	-
8	0.103	0.144	1.141	1.605	99.646	99.861	-	-	-	-	-	-
9	0.032	0.012	0.354	0.139	100.000	100.000	-	-	-	-	-	-

Appendix 2

Table 7. Variables, abbreviations, definitions and data sources.

Variables	Abbreviations	Definitions	Data sources
Structural transformation process	ST_{it*}	The ST process is defined as: "The evolution of diversification indices, economic complexity, urban population growth, the number of fixed-line telephone subscriptions (per 100 inhabitants), vulnerable employment, industrial employment, service employment, the degree of freedom from corruption and, finally, the degree of freedom of ownership". Based on this definition, we have constructed an indicator to measure the SC process in the countries in the selected sample.	• UNCTAD STAT • The Atlas of economic complexity • World development indicators • Perspective monde
Foreign direct investment	FDI_{it*}	These are net inflows of investments made to achieve a lasting interest in a company operating in an economy other than that of the investor (at least 10% of voting shares). These investments include reinvested earnings, the sum of shareholders' equity and other short- and long-term capital recorded in the balance of payments.	• World development indicators
GDP per capita	$GDPPC_{it*}$	GDP per capita in constant 2015 dollars is GDP divided by annual population.	• World development indicators
Gross fixed capital formation	$GFCF_{it*}$	It includes investment in factories, land improvement (drains, ditches, fences, etc.), acquisition of equipment, machinery, construction of railroads, roads, schools, hospitals, offices, industrial and commercial buildings and private residential units. Added to this are net acquisitions of high-value goods, which form part of this variable according to the 1993 System of National Accounts.	• World development indicators
Inflation rate	IR_{it*}	Inflation is measured by the consumer price index (CPI), which reflects changes in the price of a basket of goods and services purchased by the average consumer.	• World development indicators
Commercial opening rate	COR_{it*}	Is the sum of the volume of imports and exports of Goods and Services as a % of GDP. It measures a country's degree of openness to the rest of the world.	• Our world in data
Real effective exchange rate index (2010=100)	$REERI_{it*}$	Is the nominal exchange rate divided by a cost index or price deflator. In other words, it's the measure of a currency's value against a weighted average of other foreign currencies.	• World development indicators

Note: Indices of individual and temporal dimensions of statistical series [28].

[28] The databases used sometimes present discontinuous or incomplete statistical series. In the event of missing data, we call on the national public institutions of each country in the study to fill in the missing data on the basis of official sources.

Appendix 3

Table 8. Position and dispersion characteristics of the data used.

Variables		Mean		Std. dev.		Min.		Max.		Observations
		NAC's	WEC's	NAC's	WEC's	NAC's	WEC's	NAC'S	WEC's	
STPI	Overall	-0.000	-0.000	0.610	0.618	-0.95	-1.7	1.17	1.04	N = 108
	Between			0.641	0.504	-0.532	-0.755	0.892	0.298	n = 4
	Within			0.247	0.434	-0.512	-1.048	0.609	0.831	T = 27
FDI	Overall	2.142	2.287	1.728	1.298	0.295	0.305	9.424	5.033	N = 108
	Between			0.712	1.014	1.083	1.355	2.595	3.245	n = 4
	Within			1.613	.951	-.0876	-0.162	8.971	4.554	T = 27
GFCF	Overall	26.920	29.638	8.866	9.244	12.229	14.625	50.780	46.660	N = 108
	Between			8.340	9.661	17.545	18.250	36.531	41.100	n = 4
	Within			5.093	3.846	12.836	19.719	41.170	38.911	T = 27
GDPPC	Overall	3113.162	5742.788	744.035	3527.548	1477.323	618.139	4246.244	13341.6	N = 108
	Between			580.262	3354.836	2354.405	1189.238	3690.111	8662.644	n = 4
	Within			546.534	1980.785	1992.369	1962.133	4114.387	11630.41	T = 27
IR	Overall	5.104	11.651	5.005	18.500	.303	.347	29.779	89.113	N = 108
	Between			3.091	11.313	1.712	3.001	9.087	28.246	n = 4
	Within			4.221	15.664	-1.714	-10.344	29.324	72.517	T = 27
REERI	Overall	9954.517	90.336	92142.04	14.802	78.392	53.783	952234	130.047	N = 108
	Between			19697.51	9.234	103.981	80.660	39500.78	102.895	n = 4
	Within			90534.2	12.431	-29467.87	63.459	922687.7	119.555	T = 27
COR	Overall	68.396	39.680	20.018	12.570	30.25	15.61	114.34	64.47	N = 108
	Between			19.571	10.618	47.394	25.178	93.7822	49.371	n = 4
	Within			10.525	8.523	45.764	22.869	92.6815	60.061	T = 27

Appendix 4

Table 9. The correlation matrix.

	NAC's						
Variables	**STPI**	**FDI**	**GFCF**	**GDPPC**	**IR**	**REERI**	**COR**
STPI	1	-0.389	0.449	0.423	0.027	-0.023	-0.083
FDI	-0.389	1	-0.179	-0.100	0.081	-0.043	0.247
GFCF	0.449	-0.179	1	0.219	-0.293	-0.171	0.125
GDPPC	0.423	-0.100	0.219	1	0.147	0.111	0.273
IR	0.027	0.081	-0.293	0.147	1	0.011	-0.330
REERI	-0.023	-0.043	-0.171	0.111	0.011	1	-0.127
COR	-0.083	0.247	0.125	0.273	-0.330	-0.127	1
	WEC's						
STPI	1	0.185	-0.010	0.850	-0.086	0.336	0.224
FDI	0.185	1	0.082	0.023	-0.440	-0.082	-0.071
GFCF	-0.010	0.082	1	-0.277	-0.277	0.625	0.566
GDPPC	0.850	0.023	-0.277	1	0.078	0.153	0.057
IR	-0.086	-0.440	-0.277	0.078	1	-0.217	0.065
REERI	0.336	-0.082	0.625	0.153	-0.217	1	0.234
COR	0.224	-0.071	0.566	0.057	0.065	0.234	1

Appendix 5

Table 11. The FDI-STPI causality test for NAC's and WEC's.

VAR granger causality/Block exogeneity Wald tests											
Sample: 1995 2021											
Included observations: 104											
Dependent variable (DV) respectivement : IPTS – IDE											
WEC's						**NAC's**					
Excluded	**Chi-sq**		**Df**	**Prob.**		**Excluded**	**Chi-sq**		**Df**	**Prob.**	
	DV=IPTS	**DV=IDE**	**DV=IPTS, IDE**	**DV=IPTS**	**DV=IDE**		**DV=IPTS**	**DV=IDE**	**DV=IPTS, IDE**	**DV=IPTS**	**DV=IDE**
FDI/STPI	0.000	0.038	1	0.987	0.844	IDE/IPTS	3.162	1.548	1	0.075	0.213
GFCF	3.843	0.376	1	0.049	0.539	FBCF	1.169	1.435	1	0.279	0.230
GDPPC	5.584	0.076	1	0.018	0.782	PIBH	1.923	0.368	1	0.165	0.544
IR	0.009	1.774	1	0.923	0.182	TINF	1.834	0.044	1	0.175	0.832
REERI	0.685	0.420	1	0.407	0.516	ITCEFR	0.597	0.409	1	0.439	0.522
COR	0.007	0.208	1	0.932	0.647	TOUVT	0.031	0.732	1	0.858	0.392
All	9.504	4.113	6	0.147	0.661	All	9.477	8.616	6	0.148	0.196

Table 12. The collinearity test.

		FDI		**GFCF**		**GDPPC**		**IR**		**REERI**		**COR**	
		NAC's	**WEC's**	**NAC's**	**WEC's**	**NAC's**	**WEC's**	**NAC's**	**WEC's**	**NAC's**	**WEC's**	**NAC's**	**WEC's**
FDI	NAC's	1		-0.179		-0.100		0.081		-0.043		0.247	
	WEC's		1		0.082		0.023		-0.440		-0.082		-0.071
GFCF	NAC's	-0.179		1		0.219		-0.293		-0.171		0.125	
	WEC's		0.082		1		-0.277		-0.277		0.625		0.566
GDPPC	NAC's	-0.100		0.219		1		0.147		0.111		0.273	
	WEC's		0.023		-0.27		1		0.078		0.153		0.057
IR	NAC's	0.081		-0.293		0.147		1		0.011		-0.330	
	WEC's		-0.440		-0.27		0.078		1		-0.217		0.065
REERI	NAC's	-0.043		-0.171		0.111		0.011		1		-0.127	
	WEC's		-0.082		0.625		0.153		-0.217		1		0.234
COR	NAC's	0.247		0.125		0.273		-0.330		-0.127		1	
	WEC's		-0.071		0.566		0.057		0.065		0.234		1

Appendix 6

Table 14. Pooled OLS model estimation.

Dependent variable : STPI								
Method : Panel least squares								
Sample : 1995 2021								
Periods included : 27								
Cross-sections included : 4								
Total panel (Balanced) observations : 108								
Cross-section weights (PCSE) standard errors & covariance (d.f. corrected)								
Variable	**Coefficient**		**Std. error**		**t-statistic**		**Prob.**	
	NAC's	**WEC's**	**NAC's**	**WEC's**	**NAC's**	**WEC's**	**NAC's**	**WEC's**
FDI	-0.091	0.084	0.026	0.023	-3.429	3.616	0.000	0.000
GFCF	0.024	-0.002	0.006	0.005	3.976	-0.498	0.000	0.619
GDPPC	0.000	0.000	7.40e-05	9.63e-06	3.954	14.501	0.000	0.000
IR	0.006	-0.001	0.011	0.001	0.535	-1.090	0.593	0.278
REERI	-2.23e-07	0.008	4.45e-07	0.003	-0.502	2.710	0.616	0.007
COR	-0.004	0.008	0.002	0.002	-1.649	3.044	0.102	0.003
C	-1.086	-1.995	0.265	0.234	-4.085	-8.513	0.000	0.000
Root MSE	0.460	0.259	R-squared				0.424	0.822
Mean dependent var	-9.26e-05	0.000	Adjusted R-squared				0.390	0.811
S.D. dependent var	0.610	0.618	S.E. of regression				0.476	0.268
Akaike info criterion	1.417	0.267	Sum squared resid				22.919	7.256
Schwarz criterion	1.591	0.441	Log likelihood				-69.537	-7.435
Hannan-Quinn criter.	1.487	0.337	F-statistic				12.417	78.019
Durbin-Watson stat	0.234	0.317	Prob (F-statistic)				0.000	0.000

Appendix 7

Table 15. Estimation robustness tests.

Tests	**NAC's**	**WEC's**
Contemporary error correlation (Pesaran CD)	0.060	0.140
Error normality	0.059	0.410
Heteroscedasticity	1.000	1.000

Appendix 8

Table 16. Long-term estimation, VEC-NAC's model.

Vector error correction estimates	
Sample (adjusted): 1998 2021	
Included obs: 96 after adjustments	
Standard errors in () & t-statistics in []	
Cointegrating Eq:	**CointEq1**
ST(-1)	1.000
FDI(-1)	1.894 (0.265) [7.147]
GFCF(-1)	-0.106 (0.040) [-2.655]
GDPPC-1)	0.001 (0.000) [2.519]
IR(-1)	-0.780 (0.125) [-6.221]
REERI(-1)	0.003 (0.014) [0.227]
COR(-1)	-0.073 (0.021) [-3.408]
C	-1.280

Table 17. Short-term estimation, VEC-NAC's model.

Dependent variable D(ST)		
Variables	**Coefficients**	
CointEq1	-0.009	[-1.975]
D(ST (-1))	-0.065	[-0.594]
D(ST (-2))	-0.272	[-2.739]
D(FDI (-1))	0.004	[0.343]
D(FDI(-2))	0.011	[1.151]
D(GFCF (-1))	-0.007	[-1.256]
D(GFCF(-2))	0.004	[0.711]
D(GDPPC(-1))	0.000	[1.269]
D(GDPPC-2))	-0.000	[-0.576]
D(IR (-1))	-0.000	[0.098]
D(IR(-2))	-0.001	[-0.383]
D(REERI (-1))	3.30e-05	[1.566]
D(REERI(-2))	3.37e-05	[1.588]
D(COR (-1))	-0.001	[-0.461]
D(COR(-2))	-0.001	[-0.446]
C	-0.058	[-1.525]

Table 18. Long-term estimation, VEC-WEC's model.

Vector error correction estimates	
Sample (Adjusted): 1997 2021	
Included observations: 100 after adjustments	
Standard errors in () & t-statistics in []	
Cointegrating Eq:	**CointEq1**
ST(-1)	1.000
FDI(-1)	-0.004 (0.091) [-0.051]
GFCF(-1)	0.030 (0.026) [1.137]
GDPPC-1)	8.41e-05 (4.5e-05) [1.878]
IR(-1)	-0.0240 (0.007) [-3.265]
REERI(-1)	0.005 (0.013) [0.447]
COR(-1)	0.008 (0.011) [0.739]
C	-2.008

Table 19. Short-term estimation, VEC-WEC's model.

Dependent variable D(ST)		
Variables	**Coefficients**	
CointEq1	-0.037	[-2.876]
D(ST (-1))	-0.100	[-1.011]
D(FDI (-1))	-0.015	[-0.955]
D(GFCF (-1))	-0.008	[-1.503]
D(GDPPC(-1))	0.000	[3.297]
D(IR(-1))	-0.002	[-0.909]
D(REERI(-1))	-0.004	[-2.450]
D(COR (-1))	0.003	[1.164]
C	0.012	[0.790]

Appendix 9

Table 20. VCEM-NAC's error normality test.

VEC residual normality tests				
Orthogonalization: Cholesky (Lutkepohl)				
Null Hyp.: Residuals are multivariate normal sample: 1995 2021				
Included obs : 96				
Component	**Skewness**	**Chi-sq**	**df**	**Prob.***
1	-1.277	26.092	1	0.000
2	1.879	56.528	1	0.000
3	0.404	2.615	1	0.105
4	-0.267	1.144	1	0.284
5	2.889	133.576	1	0.000
6	2.302	84.800	1	0.000
7	-0.185	0.551	1	0.457
Joint		305.310	7	0.000
Component	Kurtosis	Chi-sq	df	Prob.
1	8.186	107.598	1	0.000
2	10.185	206.536	1	0.000
3	4.276	6.515	1	0.010
4	11.836	312.299	1	0.000
5	18.515	962.906	1	0.140
6	20.192	1182.327	1	0.270
7	3.928	3.445	1	0.063
Joint		2781.630	7	0.090
Component	Jarque-Bera	df	Prob.	
1	133.691	2	0.000	
2	263.065	2	0.000	
3	9.131	2	0.010	
4	313.444	2	0.000	
5	1096.483	2	0.000	
6	1267.127	2	0.678	
7	3.997	2	0.135	
Joint	3086.941	14	0.152	

Note *: The signification.

Table 21. VECM-NAC's error autocorrelation test.

VEC residual serial correlation LM tests						
Sample : 1995 2021						
Null hypothesis: No serial correlation at lag h						
Included observations : 96						
Lag	**LRE* stat**	**df**	**Prob.**	**Rao F-stat**	**Df**	**Prob.**
1	47.782	49	0.522	0.974	(49, 344)	0.525
2	46.098	49	0.591	0.938	(49, 344)	0.594

Note *: The signification.

Table 22. VECM-NAC's error heteroscedasticity test.

VEC residual heteroskedasticity tests (Levels and squares)		
Sample : 1995 2021		
Included observations : 96		
Joint test :		
Chi-sq	**df**	**Prob.**
858.890	840	0.317

Table 23. VCEM-WEC's error normality test.

VEC residual normality tests				
Orthogonalization : Cholesky (Lutkepohl)				
Null Hyp.: Residuals are multivariate normal				
Sample: 1995 2021 included obs : 100				
Component	**Skewness**	**Chi-sq**	**Df**	**Prob.***
1	0.957	15.293	1	0.000
2	0.446	3.319	1	0.068
3	-0.212	0.753	1	0.385
4	0.059	0.059	1	0.807
5	-1.875	58.651	1	0.000
6	-1.323	29.1966	1	0.000
7	-0.645	6.954	1	0.008
Joint		114.229	7	0.000
Component	Kurtosis	Chi-sq	Df	Prob.
1	6.479	50.454	1	0.000
2	3.205	0.176	1	0.674
3	3.214	0.192	1	0.660
4	5.112	18.589	1	0.000
5	10.203	216.223	1	0.000
6	8.313	117.624	1	0.000
7	4.570	10.270	1	0.001
Joint		413.532	7	0.000
Component	Jarque-Bera	df	Prob.	
1	65.747	2	0.000	
2	3.496	2	0.174	
3	0.945	2	0.623	
4	18.649	2	0.000	
5	274.875	2	0.000	
6	146.821	2	0.000	
7	17.225	2	0.000	
Joint	527.761	14	0.103	

Note *: The signification.

Table 24. VECM-WEC's error autocorrelation test.

VEC residual serial correlation LM tests						
Sample: 1995 2021						
Null hypothesis: No serial correlation at lag h						
Included observations: 100						
Lag	**LRE* stat**	**df**	**Prob.**	**Rao F-stat**	**df**	**Prob.**
1	58.232	49	0.172	1.203	(49, 400)	0.173

Note *: The signification.

Table 25. VECM-WEC's error heteroscedasticity test.

VEC residual heteroskedasticity tests (Levels and squares)		
Sample: 1995 2021		
Included observations: 100		
Joint test:		
Chi-sq	**df**	**Prob.**
441.484	448	0.577

Normality is tested using the Skewness, Kurtosis and Jarque-Bera tests, under the usual assumptions. The software outputs in Table 20 and 23 show mixed results. For NAC's, the first Skewness test rejects the null hypothesis of residual normality, as the probability (0.0000) is less than 5%. On the other hand, the other two tests, Kurtosis and Jarque-Bera, accept the null hypothesis, arguing for normality of the error distribution. The results for WEC's are similarly mixed. The first two Skewness and Kurtosis tests reject H0 and accept H1, as the probability (0.0000) is less than 5%. On the other hand, the third Jarque-Bera test accepts H0 and rejects H1, as the probability (0.1032) is greater than 5%, showing that the errors are normally distributed. As for the error autocorrelation test (Table 21 and 24), the Breusch-Godfrey LM test is used. Its results show probabilities above the 5% threshold for NAC's and WEC's, enabling us to accept H0 and reject H1. As a result, the errors are not auto-correlated for the two country models. Similarly, the results of the joint tests show the absence of heteroscedasticity problems (Table 22 and 25).

Appendix 10

Table 26. Optimal delay test.

VAR lag order selection criteria												
Endogenous variables : STPI FDI GFCF GDPPC IR REERI COR												
Exogenous variables : C												
Sample : 1995 2021												
Included observations : 76												
Lag	**NAC's**						**WEC's**					
	LogL	**sequential modified LR test statistic (LR)**	**Final predictionerro r (FPE)**	**AKAIKE (AIC)**	**SCHWARZ (SC)**	**HANNAN-QUINN (HQ)**	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-2549.562	NA	3.90e+20	67.277	67.492	67.363	-1848.130	NA	3.75e+12	48.819	49.033	48.904
1	-2099.930	804.605	1.03e+16	56.734	58.452	57.421	-1245.942	1077.599	1797614.*	34.261	35.979*	34.947*
2	-1886.935	341.911	1.43e+14	52.419	55.639*	53.706	-1215.722	48.511	3040200.	34.755	37.975	36.042
3	-1840.772	65.600	1.67e+14	52.494	57.216	54.381	-1185.215	43.351	5371445.	35.242	39.965	37.129
4	-1804.969	44.282	2.79e+14	52.841	59.066	55.329	-1130.926	67.146	5513803.	35.103	41.328	37.591
5	-1739.301	69.124	2.40e+14	52.402	60.130	55.491	-1097.928	34.735	11240449	35.524	43.252	38.612
6	-1667.908	61.998	2.16e+14	51.813	61.044	55.502	-1032.216	57.065	11719302	35.084	44.315	38.773
7	-1527.919	95.782*	4.29e+13*	49.418	60.152	53.708	-975.366	38.896	20784253	34.878	45.611	39.167
8	-1437.390	45.264	5.20e+13	48.326*	60.562	53.216*	-835.103	70.131*	6801401.	32.476*	44.712	37.366

Note *: The signification and e is exponential.

Table 26 shows that the SC criterion defined delay 2, while the LR and FPE criteria defined delay 7, and the other two criteria, AIC and HQ, defined delay 8 for the study variables in the NAC's case. In the same way, for the WEC's case, the test to determine the optimal delay simultaneously defined delay 1, by the FPE, SC and HQ criteria, and delay 8 by the other two criteria LR and AIC. With the optimal lag thus defined, the choice of a VAR or VEC model also requires recourse to the cointegration test.

Table 27. Cointegration test.

Sample (Adjusted): 1998 2021								
Included observations : 96 after adjustments								
Trend assumption: Linear deterministic trend								
Series: STPI FDI GFCF GDPPC IR REERI COR								
Lags interval (In first differences): 1 to 2								
Unrestricted cointegration rank test (Trace)								
Hypothesized	**NAC's**				**WEC's**			
		Trace	**0.05**			**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical value**	**Prob.****	**Eigenvalue**	**Statistic**	**Critical value**	**Prob.****
None *	0.469	159.299	125.615	0.000	0.460	171.725	125.615	0.000
At most 1 *	0.367	98.370	95.753	0.032	0.339	110.069	95.753	0.073
At most 2	0.242	54.419	69.818	0.443	0.318	68.640	69.818	0.061
At most 3	0.172	27.696	47.856	0.826	0.141	30.298	47.856	0.703
At most 4	0.089	9.492	29.797	0.986	0.107	15.020	29.797	0.778
At most 5	0.005	0.517	15.494	1.000	0.033	3.664	15.494	0.928
At most 6	9.04E-06	0.000	3.841	0.977	0.002	0.255	3.841	0.613

Note *: The signification.

Cointegration is verified using the Johansen test. Table 27 shows the results. Its outputs reject the null hypothesis, for NAC's, as the probability is less than 5%. In other words, the study variables in this first group are cointegrated of order 2 at most. Indeed, second-order cointegration has a probability greater than 5%, based on trace and maximum eigenvalue analysis. Similarly, the study variables in the second group, WEC's, are cointegrated of order 1 at most. Here, 1st-order cointegration shows a probability that exceeds the 5% threshold, based on trace and maximum eigenvalue analysis. As a result, it is possible to analyze the relationships between the study variables, in the short and long term, for the two sample groups (NAC's and WEC's), using a VEC model.