Structural change in Morocco: Rethinking Industrial Policies

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Abstract

This article examines Morocco's structural transformation from 1960 to 2018, utilizing a longer time frame and a more detailed sectoral breakdown than previous studies. Our methodology combines the decomposition of labor productivity growth and structural decomposition analysis to assess the intensity and efficiency of sectoral shifts. Our findings indicate a significant increase in productivity from 2000 onward, primarily driven by within-sector productivity, unlike earlier decades where between-sector changes played a larger role. Since 2010, the manufacturing sector has emerged as the main driver of structural change. Additionally, both approaches highlight the overall slow pace of structural transformation in Morocco, predominantly due to the negative impact of foreign trade. In contrast, domestic demand and technological change have positively impacted sectoral growth. While sectors like automotive, aerospace, and service subsectors have shown growth potential, industries such as textiles, and agriculture remain vulnerable to external shocks and global competition.

Keywords: Structural change, Input–Output Tables and Analysis, Industrial policy, Trade policy, North Africa.
JEL: O10, D57, O25, F13, O47.

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1. Introduction

Structural transformation has long been considered a key driver of economic development. This process typically begins with a shift of production factors from agriculture to industry and services, followed by a relative decline in industrial activities, so that the labor force ends up in the service sector [25, 6].

African nations have adopted various sectoral policies[1] to promote industrialization, which is considered critical to their development. In general, these policies have been implemented in three phases: nationalization and import substitution (1960–1985), structural adjustment programs (1985-2000), and investment climate reforms (since 2000). Despite some scholars questioning the claim that these economies have prematurely deindustrialized [10, 16, 34, 30], it is undeniable that many African countries did not achieve significant levels of industrialization with only a few exceptions in East Africa [23].

The inability of the African nations to succeed in their industrialization process has raised questions about the effectiveness of these strategies. In fact, the import substitution had left the African industry ill-prepared for international competition and highly import-dependent. In addition, the state management of manufacturing companies has often been inefficient. Also, although investment climate reforms have improved macroeconomic management, the adjustment costs in terms of growth losses were high, with rapid trade liberalizations leading to a more severe contraction of the industry. Moreover, Africa's investment climate reforms were not well-conceived and executed, with a narrow focus on business regulation at the expense of more fundamental issues such as macroeconomic management, infrastructure, and skills[33].

This paper examines the case of Morocco for several reasons. First, Morocco's policy history closely mirrors that of many other developing nations, making it a representative example for studying the challenges and strategies involved in industrialization efforts. Second, the country offers a wealth of data, enabling a comprehensive analysis of structural changes over an extended period. Third, its notable progress in sectors like automotive and aerospace provides valuable insights into effective strategies for economic development, which can serve as a model for other African countries.

Since the 1990s, Morocco has pursued ambitious structural policies to promote industrialization. These policies can be classified into three distinct phases. After the period of structural adjustment, the first phase occurred in the 1990s and focused mainly on privatization and trade liberalization. The second phase, between 2002 and 2007, provided measures to encourage investment and tax exemptions. Finally, the third phase was marked by the introduction of two programs, first, the emergence program, initiated in 2009, focuses on specific sectors such as automotive, aeronautics, textiles, and the agri-food industry. Then, the industrial acceleration plan (PAI), initiated in 2014, aims to increase the competitiveness of Moroccan companies by improving their access to finance, developing skills, and modernizing industrial infrastructure.

Regarding the agricultural sector, Morocco introduced the Green Morocco Plan in 2008 to modernize the sector. It is based on six major axes that aim to enhance productivity, competitiveness, and sustainability of the sector while reducing poverty in rural areas and strengthening food security. The plan has an agricultural strategy based on two major pillars. The first aims to develop modern productive agriculture, while the second consists of solidarity support for small-scale agriculture, particularly in isolated areas, by improving the incomes of the most precarious farmers [37].

Such policies enabled Morocco to diversify away from agriculture and develop new industries such as automotive and aerospace. Notably, the automotive sector has become the leading export sector, accounting for 26% of national exports in 2018 and contributing 27% of total industrial employment [15]. Furthermore, in 2019, Morocco held the 5th position among the most dynamic countries in the aerospace sector, and first on the African continent.

[1]In this paper, the term "sectoral policies" refers to specific strategies designed to stimulate economic growth, enhance productivity, and encourage the development of key sectors within the country (ex: trade policies, the Green Morocco Plan and the Industrial Acceleration Plan).

Despite numerous policy reforms aimed at liberalizing trade and promoting industrialization, much of the existing literature on the Middle East and North Africa (MENA) region, particularly Morocco, highlights persistent challenges in achieving sustainable economic growth and sectoral diversification. Studies such as Achy [1] have evaluated the effectiveness of Morocco's industrial policies in driving structural change and identified barriers to economic diversification, noting the limited success of these efforts in fostering a strong manufacturing sector, which has instead declined since the 1990s. Similarly, Ait Ali and Msadfa [2] point out that despite increasing participation in Global Value Chains (GVCs) in Morocco, Tunisia, and Egypt, transitioning from low-value-added to high-value-added activities remains challenging.

Research on labor productivity growth and structural transformation in MENA countries, such as Moussir and Chatri [32], has highlighted the slow and incomplete pattern of the structural change process. Productivity growth was primarily driven by within-sector productivity improvements rather than between-sector productivity. This is consistent with findings from Mouelhi and Ghazali [31], who argue that deindustrialization in Tunisia, Morocco, and Egypt occurred at an early stage of development, unlike the patterns observed in developed and emergent countries. These studies emphasize the critical role of investing in education and human capital, as their quality and availability significantly contribute to structural transformation. Additionally, while trade openness can promote structural change, labor market rigidity remains a significant obstacle [7].

This article contributes to the emerging literature on structural change in Africa that assesses the industrial or sectoral policies adopted by these countries [21, 29, 1, 2, 42]. It particularly contributes to the recent literature on structural change in Morocco, which has generally focused on the analysis of labor productivity and its macroeconomic determinants [32, 31].

Our study differs from the existing literature on the Morocco context in two major aspects. First, we use the shift-share decomposition of labor productivity similarly to McMillan et al. [28] to analyze labor productivity, drawing on more disaggregated sectoral data, which covers a longer period than the existing literature (from 1960 to 2018). This database allows us to cover the post-2010 period, which was considered the most prosperous for the manufacturing sector in Morocco [31].

Second, we quantify the magnitude of factors responsible for changes in the production structure through the adoption of Chenery et al. [5]'s approach to Morocco's Input-Output (IO) tables for the period 1998-2018. However, Morocco's IO tables have different base years and encounter certain database challenges. Therefore, to facilitate an analysis covering a sufficiently extended period, this study initially adapts the database to facilitate the examination of this question over an extended timeframe.

The combination of these approaches is particularly relevant for a comprehensive understanding of structural change, as they capture different dimensions of the process. Chenery et al.,[5]'s approach highlights the intensity of sectoral shifts and resource reallocation, while labor productivity decomposition assesses the efficiency of these reallocations, determining whether they lead to productivity gains or losses. Additionally, Chenery et al.[5]'s decomposition allows us to identify the strengths and weaknesses of each sector. The level of disaggregation employed in this research, along with the decomposition of the periods under consideration, provides insights into the specific industrial policies or broader sectoral strategies implemented during the timeframe covered[2].

While this approach has been largely used in the literature on industrialized economies, it has been

[2]It is important to highlight that the methodology employed in this study does not directly assess the causality between sectoral policies and structural changes in Morocco. However, it provides an in-depth overview of stylized facts within the subsectors of the economy, potentially linked to the influence of the policies under consideration.

applied very little to developing economies. To the best of our knowledge, in the African context, only Tregenna [39]'s study decomposed sectoral growth using this approach for South Africa. The results of the study underline the importance of competitiveness and integration of the economy for rapid growth.

Our results indicate a significant increase in productivity from 2000 onward, primarily driven by within-sector productivity, unlike the 1960-1989 period, marked by between-sector productivity changes. Since 2010, the manufacturing sector has emerged as the main driver of structural change. However, both approaches highlight the overall slow pace of structural transformation in Morocco, predominantly due to the negative impact of foreign trade, which has been the main factor contributing to this sluggish process. In contrast, domestic demand and technological change have had a positive impact on sectoral growth. Moreover, the industry and agriculture sectors exhibit negative effects due to their vulnerability to foreign trade, whereas the service sector shows promising performance, partly driven by domestic demand. The study highlights the pressing need to strengthen intersectoral linkage to reduce reliance on imports.

The remainder of the article is organized as follows: Section 2 analyses the sectoral composition of the Moroccan economy. Section 3 describes the methodology and data. Section 4 reviews the results and Section 5 provides concluding remarks.

2. Stylized facts: the sectoral composition of the Moroccan economy

This section investigates the structure of the Moroccan economy. Its purpose is to carry out a joint analysis of the structure of the economy and labor productivity. While previous studies, such as those conducted by Ait Ali and Msadfa [2], Moussir and Chatri [32], and Mouelhi and Ghazali [31], have addressed this issue, the reconstruction of historical data on developing economies by UNU/WIDER researchers will enable a deeper analysis of the structural change process in Morocco.

The Economic Transformation Database (ETD) is the upgrade to the GGDC 10-sector database [36], with better coverage of developing countries and a finer classification of industries into 12 sectors according to revision 4 of the International Standard Industrial Classification [9]. This database comprises data on employment and gross value added (both in real and nominal terms), as reported by national statistical institutes. Value-added by sector is compiled following the United Nations System of National Accounts (SNA), which accounts for income from both formal and informal activities[3]. Similarly, employment data encompass both formal and informal sectors [22]. This aspect is particularly relevant for the Moroccan context, where informal employment accounted for over 36.7% of total employment and 11.5% of GDP in 2014[4], and must be considered to fully understand the structural transformation process.

However, the disadvantage is that the coverage period of the ETD is limited to 1990-2018. In this study, we use linked series published by GGDC/UNU-WIDER that combines the two databases to study structural transformation in Morocco over the period 1960 to 2018. In figure A.11, we show that the results of the decomposition remain unchanged whether using the linked series or the Economic Transformation Database[5].

[3] According to [19], Morocco's national accounts encompass economic aggregates, including informal production units.

[4] According to the latest wave of the National Survey on the Informal Sector 2013/2014 conducted by the High-Commission for Planning (The official statistical institute of Morocco) [18]

[5] Detailed sectoral analysis indicates that sector contributions are similar across both databases, except for the first sub-period where the within effect exceeds the between effect, contrary to Figure (5) (tables available upon request)

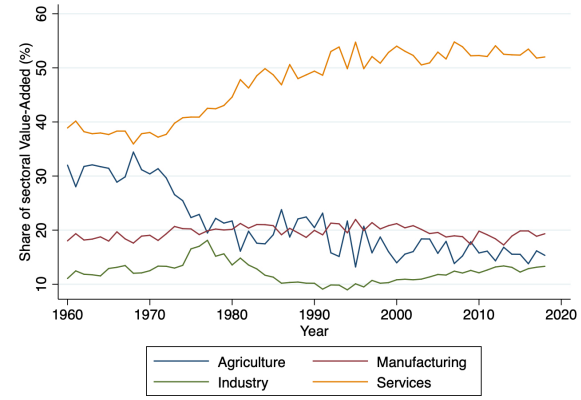
Our analysis will focus on 11 sectors, excluding the real estate sector, since its value-added, which includes imputations of owner-occupied housing, forms a part of the official GDP estimates and does not have an employment counterpart [23]. This therefore implies that the structural change shifts in this sector only arise as a result of price changes in the real estate market.

2.1. The structure of Value-added and employment in Morocco

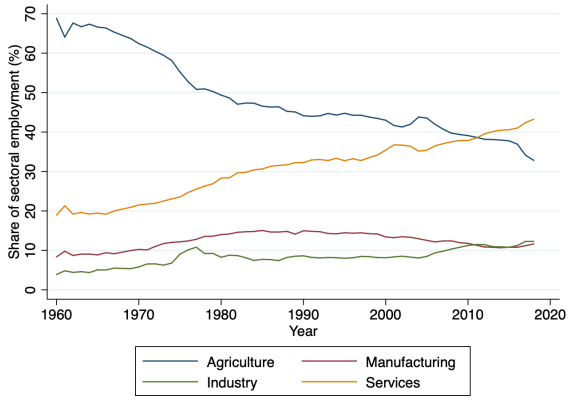
Figure (1a,1b) highlights the process of tertiarization of the Moroccan economy between 1960 and 2018. It shows that the decline of the share of the agrarian value-added, particularly in the 1960s and 1970s, was accompanied by the increase in the share of services' value-added, which exceeded 50% from 1981. Throughout the entire period, the manufacturing sector's share was constant at around 20%. Similarly, the industrial sector[6] remained stable except during 1975-1980, when it increased due to the expansion of the construction sector (as shown in Figure 2).

Figure 1: The shares of Morocco's sectoral value-added and employment

(a) Shares of value added



(b) Shares of sectoral employment



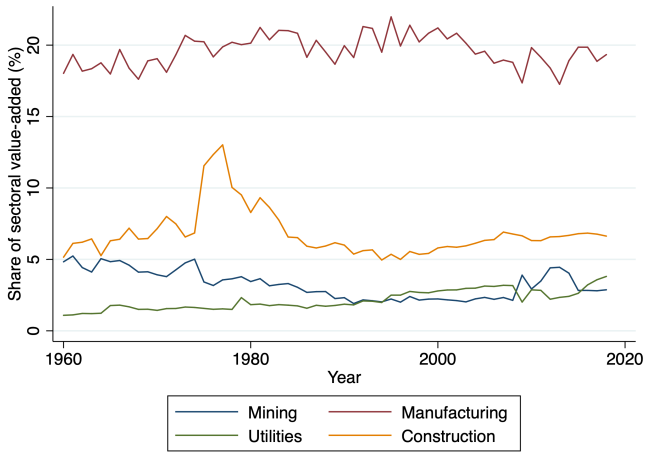
Authors' calculations based on the GGDC/UNU-WIDER Economic Transformation Database.

Regarding the sectoral distribution of employment in Morocco, Figure (1b) shows that the service sector absorbs the bulk of agricultural employment. Indeed, the share of employment in services has exceeded that of the decrease in agriculture since 2010. On the other hand, the industry sector, which includes manufacturing and industry, employs fewer workers than other sectors. Although the share of agricultural employment has declined from 68.7% in 1960 to 32.7% in 2018, it still constitutes a substantial portion of the national workforce, especially in rural areas.

The structure of value-added and employment discussed above can be attributed to the characteristics of each sector. First, the agricultural sector in Morocco is particularly vulnerable to climate shocks, which explains the volatility of its value-added. Second, the large share of employment in this sector can be explained by the traditional nature of agriculture in Morocco, which requires a large and low-skilled workforce. In addition, the meager contribution of the manufacturing sector to both value-added and employment can be attributed to its limited diversification in Morocco. It is oriented mainly toward industries requiring low-skilled labor or that rely on the exploitation of natural resources [1]. Lastly,

[6]See Table A.3 for sectors classification

Figure 2: The value-added distribution across the disaggregated industries



Authors' calculations based on the GGDC/UNU-WIDER Economic Transformation Database.

the increase in the share of value-added and employment in the service sector raises questions about the category of labor-intensive services.

Figures (3a, 3b) show the distribution of value-added and employment in the service sector, indicating that a sizable proportion of the workforce in this sector is centralized in trade, public administration, and transport. Since trade and transport do not require high technical skills, they are therefore the most suitable sectors to absorb unskilled labor from agriculture. Sectors such as finance, and business services are the most productive since they contribute significantly to the creation of value-added while having a low labor intensity.

Indeed, the expansion of the financial sector and business services is explained by the implementation of several policies to encourage foreign direct investment, including the creation of free zones. These policies have led to an increase in the demand for financial services, such as banking and insurance, thereby spurring growth in these sectors. Foreign direct investment in Morocco has also had a significant impact on the business sector, particularly in the areas of technology, renewable energy, and tourism.

2.2. The analysis of labor productivity in Morocco

This subsection aims to analyze labor productivity in different sectors of Morocco using the Economic Transformation Database (ETD). First, we introduce the shift-share decomposition of labor productivity. Then, we analyze labor productivity followed by the decomposition results.

2.2.1. The decomposition of labor productivity: methodology

The decomposition of labor productivity developed by Fabricant et al. [12] was used by McMillan et al. [28]. It considers that labor productivity growth can be decomposed into two effects: (i) the within effect, and (ii) the between effect or the structural change effect.

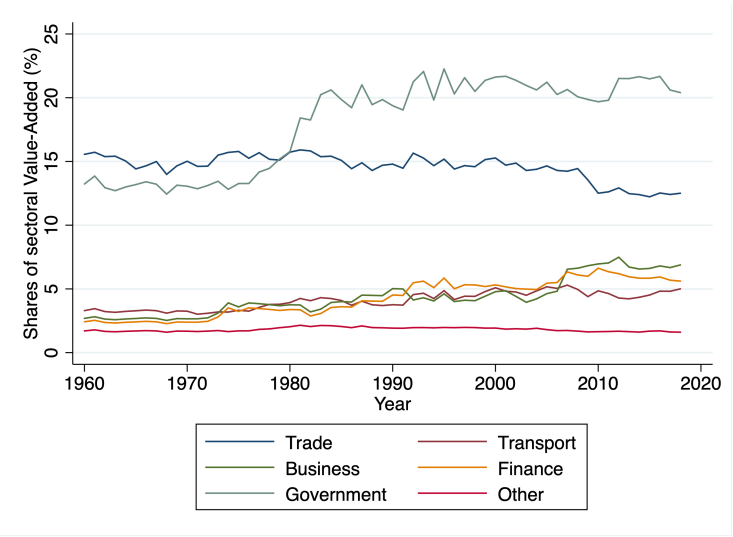
It is given by :

$$\Delta P = \sum_i (P_i^T - P_i^0) S_i^0 + \sum_i (S_i^T - S_i^0) P_i^T \tag{1}$$

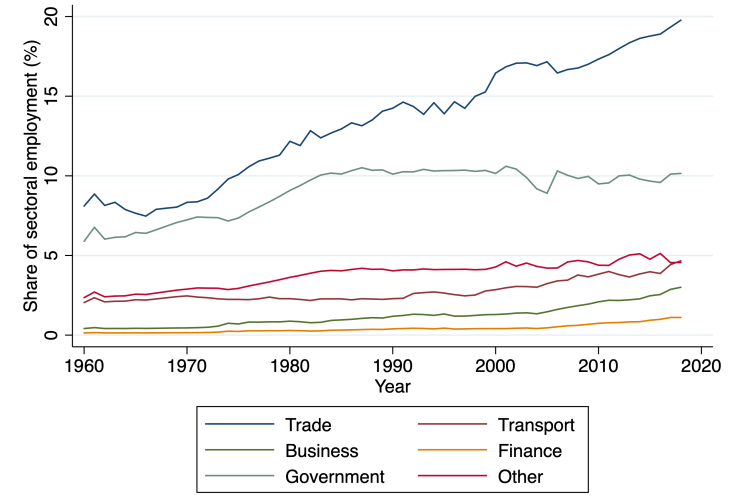
- S_i: the share of sector i in total employment;
- P_i: the level of labor productivity in sector i;

Figure 3: The shares of Morocco's services value added and employment

(a) Shares of value added



(b) Shares of sectoral employment



Authors' calculations based on the GGDC/UNU-WIDER Economic Transformation Database.

- 0 and T refer to the initial and final periods.

The first component of the equation 1 is the weighted sum of productivity growth in sector i during the reference period. It reflects productivity levels within sectors. The second component, known as the "between effect," captures the movement of workers across sectors. If there is a positive correlation between the number of workers and productivity levels, the structural changes will be growth-enhancing.

De Vries et al. [8] used the same decomposition but divided the between effect into static and dynamic components. However, we will not conduct this analysis since it is largely criticized in the literature. McMillan et al. [29] show that this disaggregation is confusing since structural change is by definition a dynamic concept. Additionally, the third term alone is difficult to interpret when, for example, reductions

in the employment share are accompanied by increases in productivity.

2.2.2. Decomposition Results: Morocco's Labor Productivity

Figures (4a, 4b) show sectoral productivity and overall productivity dynamics in Morocco. They highlight a significant increase since the early 2000s, driven mainly by the manufacturing and services sectors. Furthermore, the productivity of the manufacturing sector has exceeded that of services from 2010 onwards (Figure 4b), coinciding with the adoption of the Industrial Emergence Program in 2009 and the Industrial Acceleration Plan in 2014. The agricultural sector has sustained relatively stable productivity with a modest increase starting from 2010.

Despite the progress made, intersectoral productivity gaps remain significant 4b. As the economy develops, technological progress leads to an increase in agricultural productivity, and the shift of workers from agriculture to higher-productivity sectors accompanied by public investment in modern sectors makes the economy more "dual". Consequently, productivity levels in traditional and modern sectors converge, strengthening intersectoral linkages. However, heterogeneity across sectors could plausibly explain the persistent intersectoral productivity gaps in Morocco.

In economies where significant intersectoral productivity gaps exist, the relocation of labor will have major implications on the overall productivity of the economy, as displaced workers could end up in sectors with low productivity levels [29].

Figure 5 show results from equation 1. It highlights two distinct sub-periods. The first sub-period, spanning from 1960 to 1999, is characterized by the significant contribution of the structural change effect in driving labor productivity. Notably, this contribution even surpassed the within effect during 1970-1979 and 1990-1999. Secondly, after 2000, the within effect became predominant, as illustrated in Figure 5. This trend aligns with the period characterized by a marked increase in overall productivity.

Although our findings are consistent with those of Moussir and Chatri [32], our analysis by sub-periods revealed periods during which the between effect was predominant. This finding supports previous research on various African countries [29] and more specifically on the MENA region [31].

The nature of reforms adopted in Morocco from the late 1990s, notably trade liberalization and privatization, might explain the considerable contribution of the within effect. These measures have increased productivity within sectors rather than across sectors [29, 21]. This observation is in line with the broader literature that shows how developing nations that have implemented structural adjustment programs did not succeed in their structural transformation process [35]. Subsequently, market reforms alone are not sufficient to achieve the desired structural change [29].

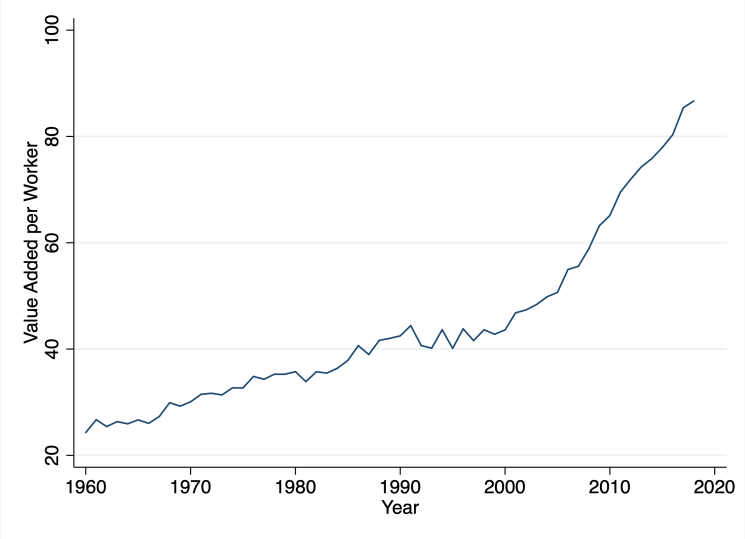
By examining the sectoral distribution of these effects (Table A.2), it is worth mentioning that during the period 1960-1979, the between effect was predominantly led by the manufacturing sector, indicating a shift of labor force from agriculture to manufacturing. This marks the first phase of the industrialization process of the Moroccan economy.

Also, it is noteworthy that this period was marked by a growing trend of labor migration toward the trade and government sectors. Nevertheless, as the privatization period unfolded, a transformation took place whereby the workforce gradually shifted away from manufacturing and government sectors, in favor of finance, and business services.

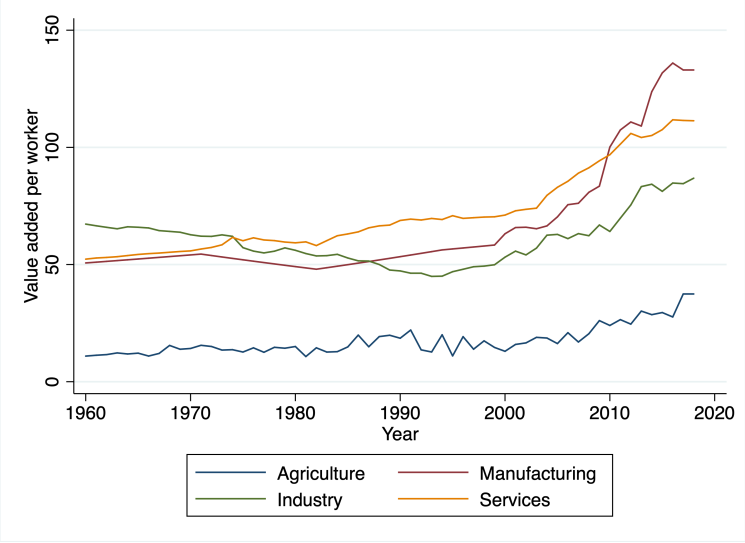
Regarding the within effect, we observe a greater contribution of the agriculture, manufacturing, and government sectors. However, the growth in manufacturing productivity during the post-2010 period did not result in a shift of the agricultural workforce towards this sector. This may be attributed to the fact that emerging industries in Morocco, such as automotive and aerospace, exhibit a capital-intensive production process and hence rely less on labor.

Figure 4: Overall labor productivity in Morocco

(a) Overall labor productivity



(b) Sectoral labor productivity



Authors' calculations based on the GGDC/UNU-WIDER Economic Transformation Database.

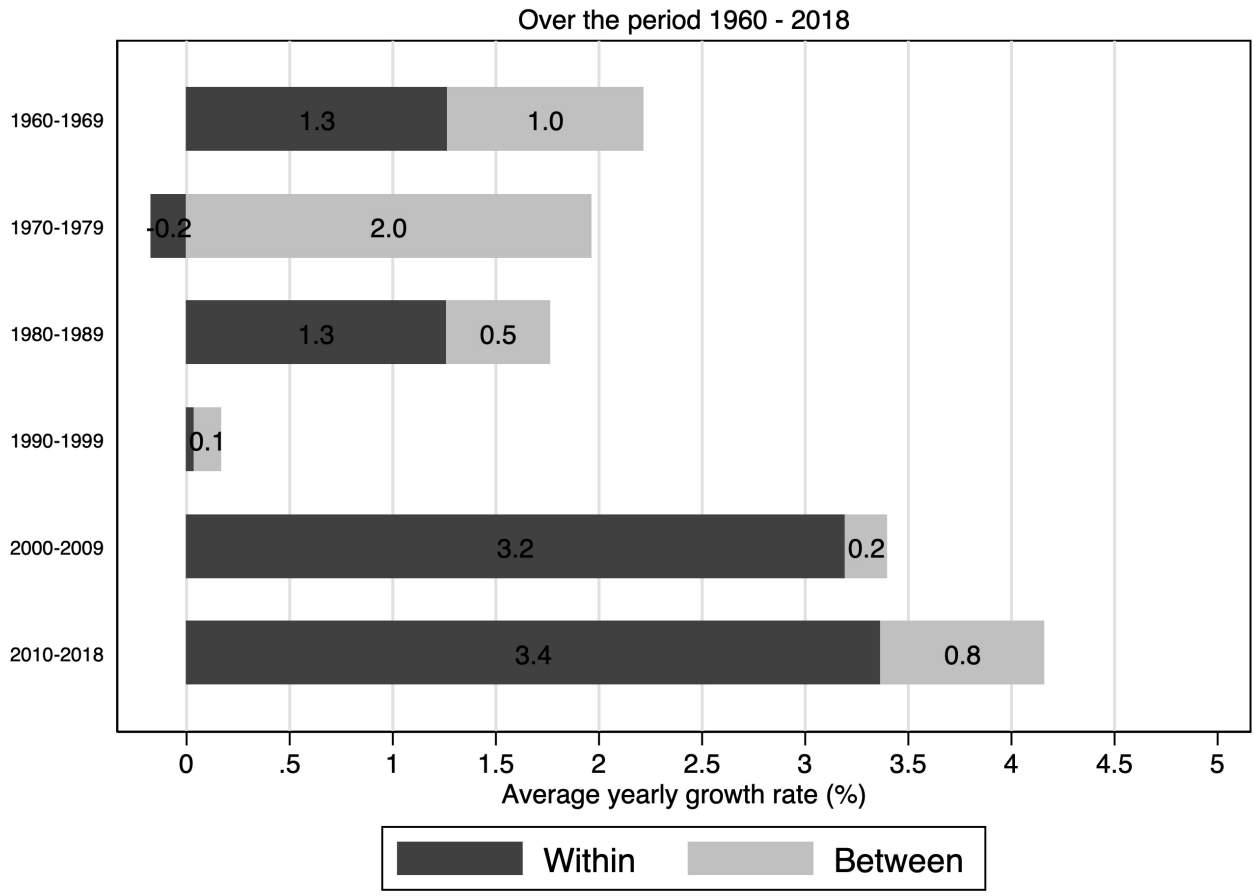
3. The structural decomposition analysis: methodology and data

In this section, our initial objective is to explain the Chenery et al. [5] decomposition method. Then, in the second sub-section, we describe how we adapted the Input-Output database from 1998 to 2018 to make it possible to conduct this analysis.

3.1. Methodology

Chenery et al. [5] accounting framework goes back to Leontief et al. [26]. It is designed to be used in the context of open developing economies and allows for the measurement of deviations from proportional growth. In other words, the model calculates the difference between actual sectoral output and expected sectoral output, by subtracting a proportional part. This is analogous to removing trends in the analysis

Figure 5: The decomposition of labor productivity growth



Authors' calculations based on the GGDC/UNU-WIDER Economic Transformation Database.

of cyclical variation. This deviation is then decomposed into five factors, namely, technological change, which reflects changes in intermediate consumption, domestic demand, imports, exports, and investment, which are responsible for changes in production structure.

Theoretically, if the deviation in sectoral output is positive, the sector grows at a rate higher than that of GDP growth. According to this method, two forces act on the deviation, namely supply which reflects technological change and demand components.

The basic Leontief model is written as follows:

$$X_i^t - \sum_j a_{ij}^t X_j^t = D_i^t + E_i^t + I_i^t - M_i^t$$

With $(i = 1, ..., n; t = 1, ..., T)$

- X_i^t: The output of product i in period t;
- D_i^t: Government and household domestic demand for product i in period t;
- I_i^t: Investment in product i in period t;

- E_i^t: The export of product i in period t;
- M_i^t: The import of product i in period t;
- a_{ij}^t: The coefficient of intermediate inputs of product i in sector j and period t;
- $\sum_j a_{ij}^t X_j^t$: Intermediate consumption of product i in all production sectors.

The solution of equation 2 is of the form:

$$X_i^t = \sum_j r_{ij}^t (D_i^t + E_i^t + I_i^t - M_i^t) \quad \text{With} \quad (i = 1, \ldots, n) \tag{2}$$

The coefficients r_{ij}^t are the elements of the inverse Leontief matrix $r_{ij}^t = (I - A)^{-1}$.
Based on the assumption of proportional growth between periods 1 and 2, the ratio λ represents the average (weighted) ratio of output expansion, obtained by dividing the total output of period 2 by that of period 1 as follows:

$$\lambda^{12} = \frac{\sum_i r_{ij}^t (D_i^2 + E_i^2 + I_i^2 - M_i^2)}{\sum_i r_{ij}^t (D_i^1 + E_i^1 + I_i^1 - M_i^1)}$$

When $X - M = 0$, this ratio represents the growth in GNP.

Given the properties of the Leontief model, if each of the autonomous effects in equation 2 is multiplied by λ, the corresponding solution of each level of output X_i^p is λ times the initial level of output :

$$X_i^p = \lambda X_j^1 = \sum_j r_{ij}^1 (\lambda D_i^t + \lambda E_i^t + \lambda I_i^t - \lambda M_i^t) \tag{3}$$

By defining the difference between the current values (period 2) and the values given by the proportional growth between the two periods 1 and 2 *deviations* are as follows:

$$\begin{gathered}
\delta D_i^{12} = D_i^2 - \lambda D_i^1 \\
\delta X_i^{12} = X_i^2 - \lambda X_i^1 \\
\delta I_i^{12} = I_i^2 - \lambda I_i^1 \\
\delta M_i^{12} = M_i^2 - \lambda M_i^1 \\
\delta E_i^{12} = E_i^2 - \lambda E_i^1
\end{gathered}$$

The following formula is derived from deviations from production levels as a function of deviations from the autonomous elements:

$$\delta X_i^{12} = \sum_j r_{ij}^2 (\delta D_i^{12} + \delta E_i^{12} + \delta I_i^{12} - \delta M_i^{12} - \lambda T_i^{12}) \tag{4}$$

With T_j^{12} representing the change in intermediate consumption of product j in period 2 due to the technology change between periods 1 and 2. Using the matrix notation of the model, the Leontief equation is:

$$X = (I - A)^{-1} f$$

With $f = (D + I + E - M)$, the vector combining between the autonomous effects. The deviation vector of production (20×1) is defined as follows:

$$\delta X_{12} = X_2 - \lambda X_1 = (I - A_2)^{-1} f_2 - \lambda (I - A_1)^{-1} f_1$$

$$\delta X_{12} = (I - A_2)^{-1} f_2 - \lambda(I - A_1)^{-1} f_1 + \lambda(I - A_2)^{-1} f_1 - \lambda(I - A_2)^{-1} f_1 \quad (5)$$

Equation 5 can be rewritten as follows:

$$\delta X_{12} = (I - A_2)^{-1} \delta f_{12} + [(I - A_2)^{-1} - (I - A_1)^{-1}] \lambda f_1 \quad (6)$$

The second term of equation 6 represents the vector (20×1) of the technological change.

3.2. Input-Output Database: Overview and Revisions

The Input-output (IO) tables represent a production system that highlights the relationships between the products and the branches of the economy. It is based on a product-by-product breakdown of the accounts of goods and services into resource and use components, which allows for the analysis of the origin (domestic production or imports) and destination (final consumption, exports, investments) of each product, to establish a resource-use balance for each product.

The IO tables of the Moroccan economy are produced by the High Commission for Planning (HCP) with different base years. The first period, from 1998 to 2013, adopts 1998 as a base year (SNA 1993). The second period, from 2007 to 2020, uses the 2007 base year (SNA 2008)[7]. Finally, the third period, from 2014 to 2022, employs the 2014 base year. For the purposes of this study, we choose to conduct our analysis on the IO tables covering the period from 1998 to 2018[8]. As a result, we exclude the tables calculated with the 2014 base year, as they do not cover a sufficiently extended period to meet our analysis needs. This decision aims to avoid major inconsistencies due to variations in the base years.

To conduct a long-term analysis and keep in view the impact of policies as well as periods of crisis and expansion that the Moroccan economy faced, we subdivide the period 1998-2018 into five sub-periods: 1998-2001, 2002-2006, 2007-2011, 2012-2014 and 2015-2018. Also, this breakdown of years enables us to distinguish between the different base years. The first two subperiods use the 1998 base year, while the rest use the 2007 base year.

To understand the main changes between the 1998 and 2007 base years, it is imperative to grasp the distinctions between 1993 SNA and 2008 SNA. Generally, the 2008 SNA follows the same structure as the 1993 SNA, with a few minor adjustments [41]. These changes aim to clarify the treatment of economic aspects that have become important recently. This involves the treatment and classification of assets, the financial sector, and issues relating to international trade [17].

As we distinguish between the two base years 1998 and 2007 in our breakdown of years, it is not necessary to adjust the base years for the tables between 1998 and 2006. Nevertheless, to carry out this analysis, we need to maintain the same structure of the tables for the two base years. To achieve this, we face the major challenge of eliminating the fictitious branch.

Indeed, in the 1998 base year, the financial intermediation services indirectly measured (FISIM)[9] were considered as intermediate consumption of the total economy recorded at the level of a fictitious branch [17]. Given that the production of these services is immaterial and not directly linked to the production

[7]The System of National Accounts (SNA), adopted by the United Nations Statistical Commission.

[8]We decided to exclude 2019 and 2020 from our model to ensure consistency with the other sub-periods studied, we choose to focus our analysis only on data up to 2018.

[9]FISIM (Financial Intermediation Services Indirectly Measured) is a service provided by financial intermediaries, namely banks and other credit institutions. It is assessed as the margin that financial intermediaries gain from their dealings with their clientele on their deposits and loans [17].

of tangible goods[10], this approach was adopted by several countries. However, this option was abandoned in the SNA 2008. As a result, in the 2007 base year, the fictitious branch was eliminated and the FISIM production was allocated to the different uses in the IO table [17].

Since we do not have a transition matrix to eliminate the fictitious branch, we utilized the available tables for the two base years (from 2007 to 2013). Subsequently, we calculated the average changes caused by removing the fictitious branch in the tables computed with the 2007 base year. This average was then applied to the tables using the 1998 base year to eliminate the fictitious branch.

To ensure internal validation of our results, we initially verify that the resource-use balance is maintained. Then, we calculate the GDP for all the tables. Typically, the transition from the 1998 to the 2007 base year leads to a GDP increase. According to [17], breaking down the production of FISIM across different uses causes a 2% increase in the GDP. This observation aligns with our results.

Then, our next step involves removing the territorial correction from the IO tables, while preserving the resource-use balance. Essentially, the territorial correction is an account that corrects the direct purchases of non-residents within Morocco and direct purchases made by Moroccan residents abroad that do not pass through the international trade circuit. The aim is to remove the territorial correction from the IO tables by adding it to exports.

This process occurs in several stages. Initially, we calculate the sum of the margins for the branches G00, I01, and J00[11]. Subsequently, we compute the proportion of each branch relative to the calculated total. This share is then multiplied by the amount of the territorial correction and subtracted from the respective margins. These adjustments are then added to the corresponding exports for the same branches. In the following phase, we calculate the sum of the territorial correction amounts for imports and exports. By deducting the applied amount of the territorial correction from the margins, we obtain the new amount of exports. Lastly, we determine the shares of final consumption attributed to households and non-profit institutions serving households for each exporting branch (excluding the F45, L75, and MNO branches). Using these shares, we allocate the new amount of exports to the exporting branches.

4. Results and discussion

In the first subsection, we will conduct an aggregated analysis describing the contributions of the deviation and proportional growth. The second subsection will focus exclusively on deviations by subperiod and subsector, as it reflects the intensity of structural change.

4.1. Deviation and proportional growth : An Agreggated analysis

The concept of proportional growth entails a scenario in which every sector of the economy grows at a rate that is proportional to its contribution to the economy. This supposes a relatively stable economic structure in which each sector experiences growth that is similar to the overall GDP growth rate. In other words, this factor is indicative of the inherent growth of each sector in the absence of significant structural transformations or unexpected events. On the other hand, deviation reflects the existence of a gap between the observed and predicted sectoral growth rates based on past trends. Therefore, to ensure structural changes in the economy, the growth rate of a sector must deviate from the overall economy's growth rate.

[10]The 1993 SNA recognized the challenge of allocating FISIM among different users and therefore accepted that some countries might prefer to continue maintaining the convention where all services were allocated to the intermediate consumption of a fictitious branch.[40]

[11]The labels of the concerned branches are listed in Table A.4.

The findings show that in Morocco, GDP growth is primarily driven by proportional growth, which accounts for 98% (see Table 1 and Table A.5 for the sectoral breakdown). In contrast, deviations remain mostly negative and do not indicate significant structural changes in the economy, with an average of -2%. This is further supported by previous analyses, particularly Figure 1a, which illustrates that the structure of value added in the economy did not undergo substantial changes between 1998 and 2018.

Table 1: Weights in % of proportional growth and deviations by sub-periods

	1998-2001	2002-2006	2007-2010	2011-2014	2015-2018
Proportional growth	98.06	97.57	96.33	99.54	98.82
Deviation	1.94	-2.43	-3.67	-0.46	-1.18

Source: Authors' Elaborations based on HCP data
Note: weights are calculated in absolute terms

Results in Table 1 are not entirely consistent with the decomposition analysis of labor productivity, which may appear counterintuitive. In contrast to the 2000-2009 period, Figure 5 illustrates a more significant structural change between 2010 and 2018. Whereas table 1 reveals that deviations (in absolute values) were slightly higher during 2002-2006 and 2007-2010 than in 2011-2014 and 2015-2018. This discrepancy arises because Figure 5 and Table 1 measure different dimensions of structural change. Specifically, Chenery et al.[5]'s approach identifies which sector benefits from resource reallocation (a measure of intensity), while the decomposition of labor productivity as depicted in Figure 5 evaluates if such reallocations result in productivity gains (a measure of efficiency).

During the 1998-2010 period, Table 1 highlights a relatively strong resource reallocation, evidenced by significant deviations from proportional growth. However, this did not immediately translate into large productivity gains, as indicated by the relatively low between-sector effect in Figure 5 for the same period. In contrast, from 2010 to 2018, while the deviations were less marked, implying a more stable phase of reallocation, Figure 5 shows that the productivity gains associated with this reallocation were more pronounced. This suggests that the reallocation efforts of the first period yielded greater productivity gains in the following one.

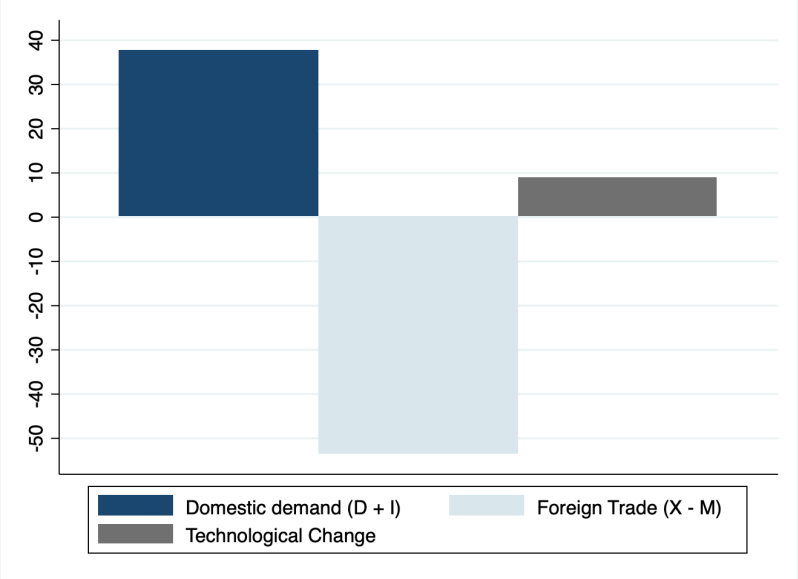
This observation aligns with broader literature on structural change, that emphasizes that labor productivity does not necessarily lead to immediate productivity growth [28, 36]. Factors such as institutional constraints, the adoption of new technologies, and the quality of employment in expanding sectors may restrict the immediate impact of such reallocation. Similarly, research has demonstrated that aggregate productivity growth often depends on the efficiency with which sectors or firms absorb new resources [13, 20, 11]. In this regard, the reallocation observed during 2010-2018 may have acted as a preparatory phase for more robust productivity growth in 2010-2018.

Moreover, the negative deviations in Table 1 suggest that the reallocation of resources between sectors was less intense than what would be expected in a balanced growth scenario. This may indicate disproportionate growth in certain sectors or a general slowdown in structural transformation during that period. Nonetheless, as Figure 5 demonstrates, even with more modest deviations, structural change had a greater impact on productivity in the 2010-2018 period, implying that the reallocation, though less intense, was more effective in enhancing overall productivity growth.

To analyze the factors behind the negative deviation in our model, Figure 6) illustrates the contribution of each effect to the total deviation. Foreign trade accounted for -53.5%, followed by the positive impact of domestic demand at 37.6% and technological change at 8.8%.

The negative deviation that is attributed to foreign trade highlights the negative impact that foreign

Figure 6: Supply and Demand Side Factors in Morocco over 1998-2018



Authors' elaborations based on HCP data.

trade has had on the analyzed sectors. This, in turn, underlines the heavy dependence of these sectors on trade with partner countries, as well as the vulnerability of the economy to external shocks [3]. As noted by Yusuf [42], Morocco's trade liberalization policy with its international partners does not appear to be the best strategy to improve the standard of living of its citizens. Hence, the importance of implementing economic policies aimed at reducing excessive dependence on trade or increasing the competitiveness of export-oriented sectors to reduce vulnerability to external shocks should be underscored.

To achieve industrialization, it is important to boost the performance of different sectors by embracing new technologies that enable the more efficient utilization of resources for producing equivalent output. Nonetheless, the low contribution of technological change - only 8.8% - explains partly the slow pace of Morocco's structural transformation process.

Finally, it seems that Morocco has not been able to fully benefit from export-oriented trade policies, as evidenced by the negative contribution of the foreign trade effect. Several studies have shown that East Asian countries, such as South Korea, Taiwan, and Japan, experienced significant positive deviations resulting from the expansion of their manufacturing sectors in the early stages of development, followed by the export of high-value manufactured products. These studies also conclude that export-oriented policies were instrumental in promoting industrialization and strengthening intersectoral linkages in these economies [5, 24, 14].

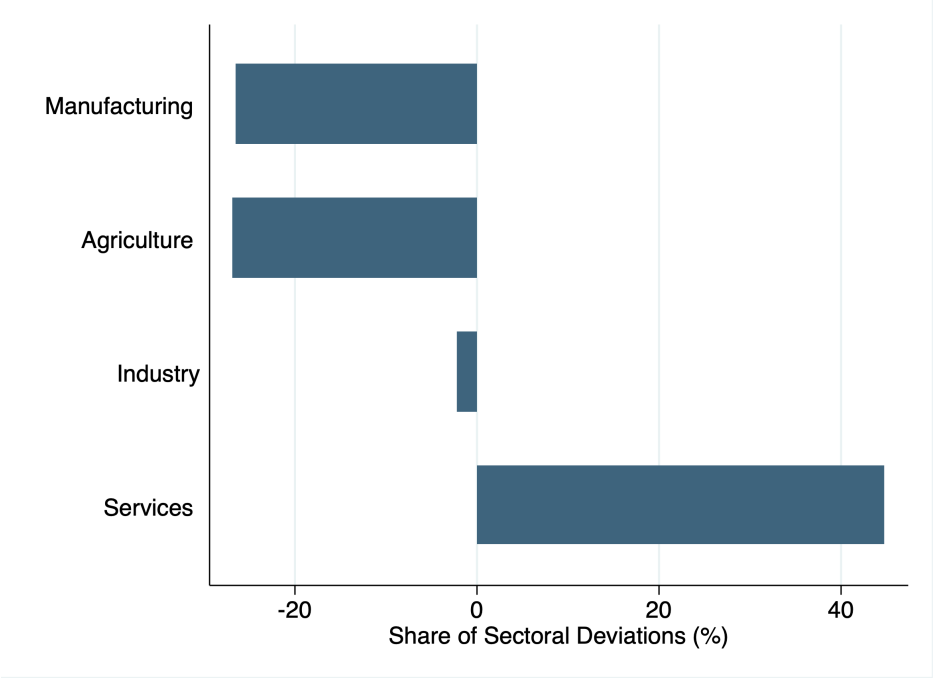
4.2. Decomposing Deviations: A Disaggregated Analysis

An in-depth analysis of the underlying factors driving the changes in the production structure of the Moroccan economy requires a sectoral analysis that is both aggregated and disaggregated. This makes it possible to identify the sub-sectors that significantly impact sectoral growth.

The results of the aggregated model over the period 1998-2018 suggest that the manufacturing and industry sectors show strong and negative impact on the total deviation, with a decrease of -26.4% and -2,1% respectively. This trend is in contrast to the goal of successful industrialization. The agricultural sector also experienced a decline of -26.8%. On the other hand, the services sector positively and significantly deviated by 44.8%. These findings corroborate the trend towards tertiarization of the Moroccan

economy.

Figure 7: Deviations by sector in Morocco 1998-2018



Authors' elaborations based on HCP data.

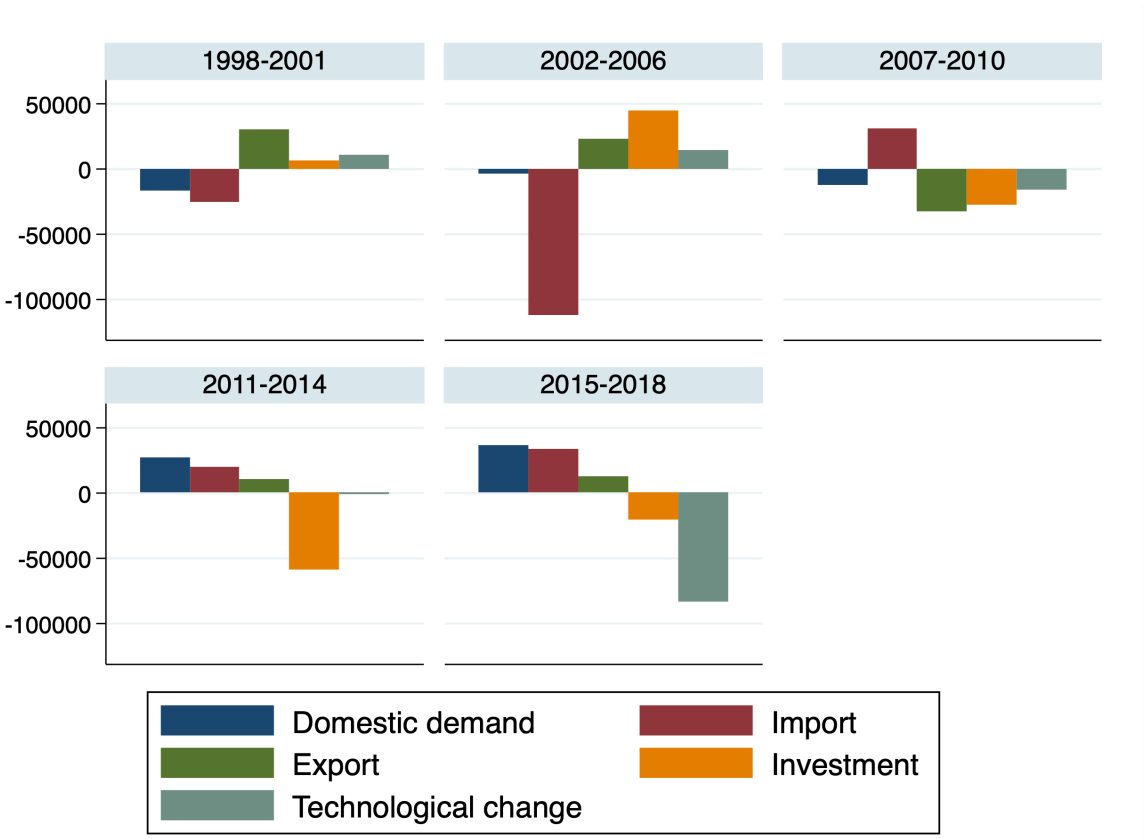
To achieve significant growth in the industry, it is crucial to implement advanced technologies, reduce dependence on imports, and promote exports. Furthermore, the results reveal that technological change generally has a negative impact on the industry's deviation, except for a few sub-periods. Furthermore, the weak effect of exports in all sub-periods hinders the industry and fails to offset the negative impact of imports, which experienced a decrease of -20.2% from 2015 to 2018. In sum, foreign trade has impacted significantly the industrial sector.

The relationship between imports and investment effects in the industry sector (Figure **??**), particularly during the periods 2002-2006 and 2015-2018, suggests that the significant imports negative effect could be attributed to the acquisition of capital goods such as machinery, equipment, and technology. This is reflected in the positive effect of investment during these periods. In developing economies like Morocco, domestic production often falls short in meeting the demand for advanced capital goods required for industrial modernization. As a result, firms in the industry sector rely heavily on importing these goods [3]. However, the agricultural sector shows a different dynamic (Figure 9), since its overall dependency on imports is less significant compared to the industrial sector.

The textile and leather subsector (D02) is a major contributor to national employment, generating almost 27% of all industrial jobs[13]. Additionally, this subsector is pivotal for the growth of the industrial sector, as evidenced by its substantial impact on the industry prior to the 2008 crisis. Before the crisis, all factors contributed to reducing the deviation, including a negative impact of foreign trade of -34%. The 2008 financial crisis witnessed a significant decrease in external demand and investments, leading to a considerable drop in production and exports. Furthermore, trade liberalization has led to fierce competition from imported products, particularly from Asian countries and Turkey. The intensity of this

[13]According to data from the Ministry of Industry, Trade, Green and Digital Economy (MITGDE).

Figure 8: Decomposition of industrial deviation by effects and subperiods[12]



Authors' elaborations based on HCP data.

competition was further magnified by the expiration of the multi-fiber agreements in 2005. In response to this challenging climate, the textile and leather industrial subsector had to innovate, but the effect of technological change has remained notably weak, or even negative, resulting in a decline in productivity and competitiveness.

Moreover, the chemical and petrochemical industry (D03) is one of the key sectors of the national economy due to its linkages to the agro-food, paramedical, textile, and leather industries among others. Notably, the OCP Group - an essential entity in this field - represents a considerable asset, being the world's leading exporter of phosphate and phosphoric acid. Remarkably, the activities of this company contribute to 52% of the subsector's total revenue, 90% of its exports, 67% of investments, and 22% of jobs in the industrial sector[14]. Furthermore, these accomplishments are reflected in the significant and positive deviations in exports and the substantial improvement in domestic demand from the second sub-period onwards. Moreover, it is noteworthy that the impact of technological change has also made significant progress during the last two sub-periods.

In addition to the aforementioned industry, the food and tobacco sector is also a key sector of the Moroccan economy as it uses local agricultural resources as inputs [38]. It is characterized by a significant and positive export effect in all sub-periods, except during the crisis. This situation can be ascribed to the country's openness to the European market, which accounts for nearly 73% of Moroccan food product

[14]According to data from the MITGDE.

imports, making Morocco vulnerable to the economic conditions in the European Union [27]. This period was marked by a trade deficit that increased during the years 2007-2008 due to the rise in prices of agricultural inputs imported by Morocco, primarily cereals.

Likewise, the mechanical, metallurgical, and electrical industry (D04) holds a pivotal role in the Moroccan industry. This subsector encompasses industries such as automotive and aerospace. During the post-crisis subperiods, the total deviation of this industry experienced a mild positive evolution, reaching 7% between 2015 and 2018, owing to the favorable impact of exports and investment. This progress can be partially attributed to the incentive measures instituted as part of the Industrial Acceleration Plan in 2014, such as tax incentives and investment subsidies. The positive trend can also be credited to the dynamism of the metal and metallurgical industry, which constitutes a substantial proportion of the production and value-added of this subsector [27].

As for the agricultural sector, it is primarily dominated by Agriculture, Hunting, and Related Services (A00), which accounts for nearly 93% of this sector. In comparison, the Fishing and Aquaculture (B05) subsector only represents about 7% of the sector, thereby making its influence relatively insignificant, even though it recorded positive deviations during the subperiods of 1998-2001 and 2011-2014. The Agriculture, Hunting, and Related Services (A00) tends to exhibit negative deviations, except from 2007 to 2010, driven by domestic demand and investment with a rate of 20% and 26% respectively. It is worth noting that this period coincided with the adoption of the Green Morocco Plan in 2008, which led to increased investments in the sector.

However, no significant improvement was observed during the following subperiods. In other subperiods, the effects of domestic demand and technological change resulted in negative deviations with averages of -22.2% and -26% respectively. This negative impact driven by technological change, particularly during 2002-2006, 2007-2010 and 2011-201 subperiods, may help explain the slower productivity growth in the agricultural sector compared to industry and services, as shown in Figure 4b. While labor productivity in agriculture lags behind, both industry and services have experienced faster gains.

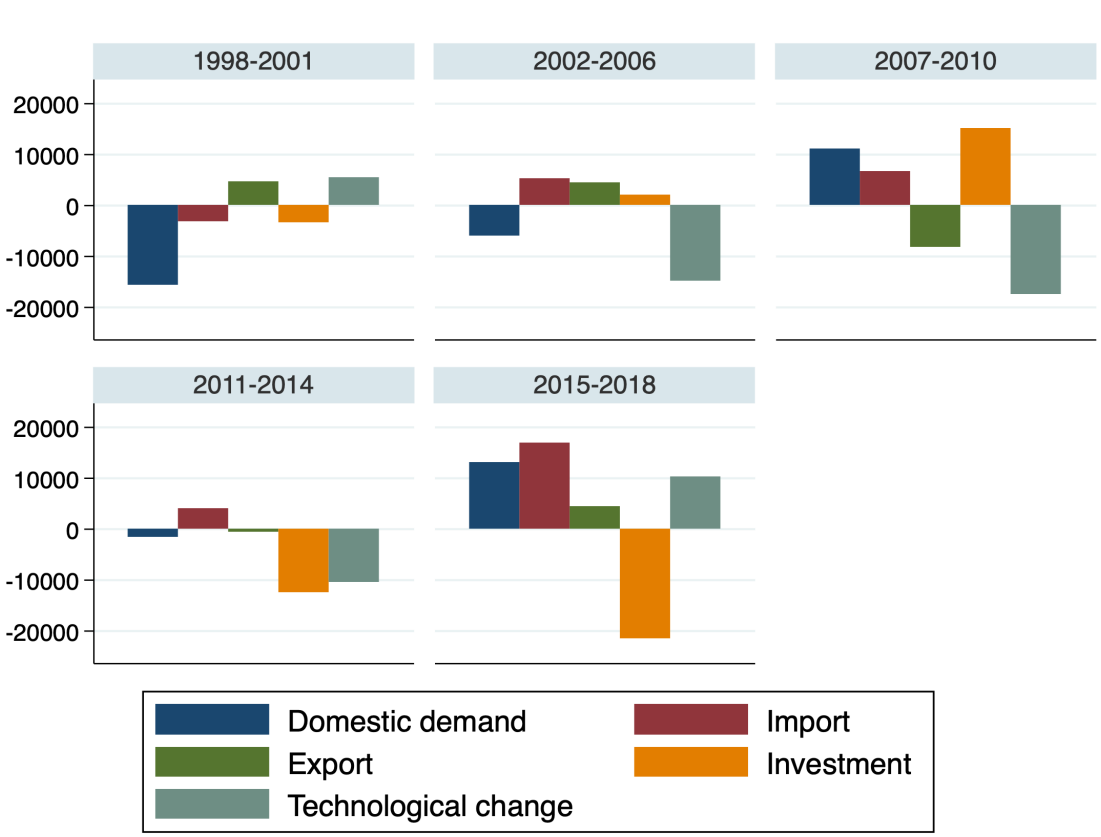
Overall, although the agricultural sector employs a substantial portion of the workforce (as illustrated in Figure 1b), its performance has been on a downward trajectory, except from 2007 to 2010 when it recorded a slight growth of 4%. This pattern can be attributed, in part, to the negative impact of technological change, which reveals a decline in the competitiveness of the farms that have not upgraded their equipment. Furthermore, the traditional nature of Moroccan agriculture and its reliance on rainfall, which has been amplified by the consequences of climate change and water scarcity pose a genuine threat to food security, thus necessitating an urgent modernization of the sector.

However, despite the weaknesses of the aforementioned sectors, the service sector stands out for its relatively better performance, marked by a trade surplus. Notably, domestic demand has a pronounced positive effect over the period 1998-2018, explained by the close interdependence between services and domestic consumption. As a result, strong domestic demand can have a stimulating effect on economic growth by boosting the production and employment of the sector.

From a different analytical perspective, there is a significant gap in the deviations observed across different service sub-sectors. Certain modern sub-sectors record considerable deviations, such as financial and insurance activities (J00), as well as postal and telecommunications services (I02), contributing to an increase in service deviation by 39% and 31%, respectively, during the 1998-2006 subperiod. This is reflected in their high productivity, as illustrated in Figure 10. Additionally, tradable services of finance and telecommunications recorded outstanding productivity levels compared to other non-tradeable services, which neither contributed to the overall economic growth nor the deviation.

Since 2005, the service sector has undergone trade liberalization through several bilateral trade agree-

Figure 9: Decomposition of agricultural deviation by effects and subperiods

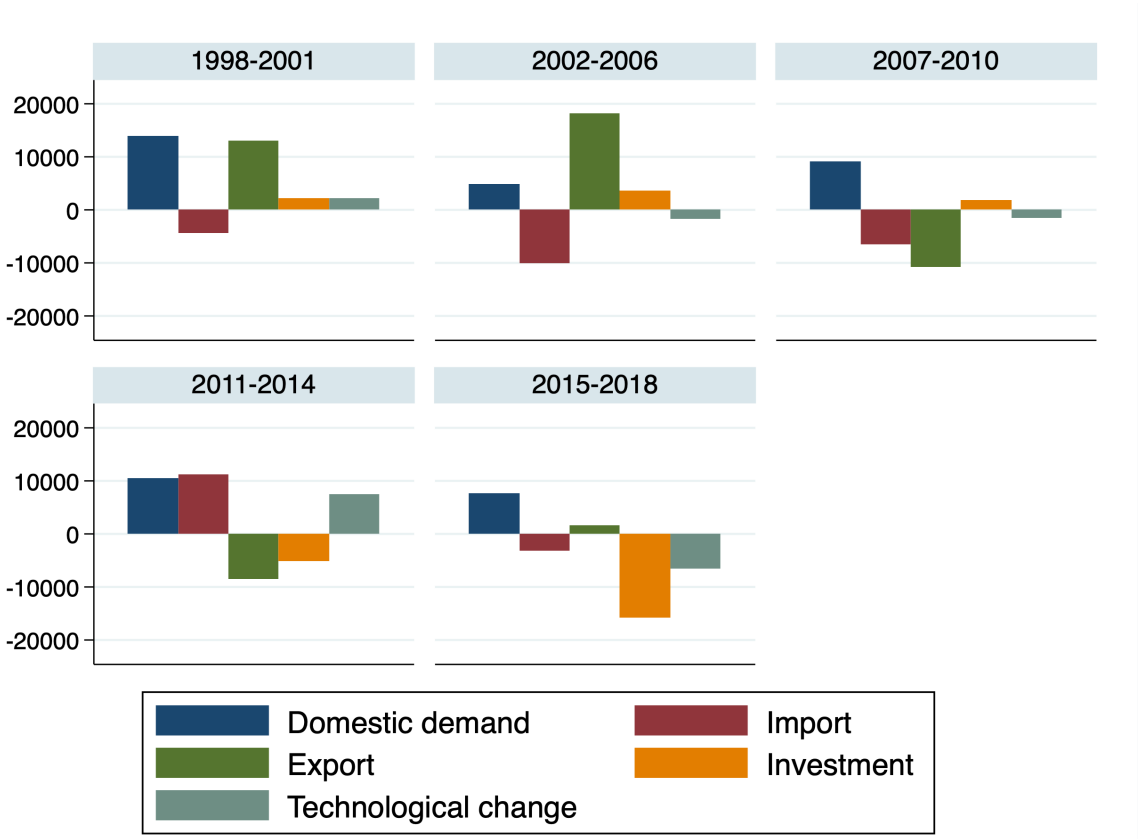


Authors' elaborations based on HCP data.

ments (with the United States) and regional agreements (Agadir Agreement). Notably, the financial and insurance activities (J00), as well as those of postal and telecommunications services (I02), have been positively impacted by the effects of domestic demand and exports. During the initial two subperiods, foreign trade effects alone accounted for 19% and 21%, respectively, for these subsectors, but experienced a decline due to the financial crisis of 2008. On the other hand, the most recent subperiod revealed a negative impact on demand for postal and telecommunications services (I02), with a rate of -59%. Both of these subsectors experienced negative deviations due to substantial import effects -33% and technological change -32% for I02, whereas J00 was negatively affected by both export -62% and import -29% effects.

The Hotels and Restaurants (H55) subsector is significantly impacted by exports, as it relies heavily on foreign tourism, a key component of Morocco's economy. According to the HCP, tourism accounted for 5.6% of GDP in 2018. During the initial subperiods (1998-2006), the export effect contributed positively and substantially to overall sector performance, indicating robust foreign demand. However, between 2007-2010, the export effect dropped to -59.2%, reflecting a significant decline. This sharp drop coincides with the 2008 global financial crisis and the European sovereign debt crisis, which had a profound impact on global tourism flows [4]. Since a large portion of tourists to Morocco are from Europe, these economic crises likely reduced Europeans' disposable incomes, resulting in fewer visitors to Morocco. In contrast, the domestic demand effect played an increasingly important role in the 2007-2018 subperiods, contributing positively to the sector's recovery. This suggests a rise in local tourism or improving economic conditions, which enabled more people to spend on hotels and restaurants services.

Figure 10: Decomposition of service deviation by effects and subperiods



Authors' elaborations based on HCP data.

On the other hand, other traditional services recorded positive deviations, especially during the post-crisis period. For instance, the Transport (I01) subsector has exhibited positive deviations primarily due to demand components. The effect of domestic demand has dominated 65% for I01 between 2011 and 2014. Non-market services such as (MNO), and (L75) have generally experienced positive deviations due to domestic demand. However, these subsectors are characterized by weak intersectoral linkages as they are merely users of inputs from other sectors.

5. Conclusion

This article contributes to the growing literature on structural change in Africa, particularly the MENA region, by examining the structural reforms implemented in these countries. Focusing specifically on Morocco, it offers a novel perspective on the nation's structural transformation. We quantitatively assess both the intensity and efficiency of this process, as well as the factors contributing to its stability. The extended coverage period and detailed sectoral disaggregation provide insights into industrial policies across various stages, offering a nuanced understanding of their impacts.

Our methodology includes the shift-share decomposition of labor productivity, following Rodrik and McMillan [28], to analyze labor productivity growth from 1960 to 2018. This approach enables us to assess the contributions of both structural change and within-sector productivity growth to overall labor productivity growth. To further quantify the intensity of the structural change process and identify its driving factors, we apply the Chenery et al.[5] framework to Morocco's input-output tables from 1998 to

2018. A key contribution of this paper is the adjustment and revision of the input-output database for Morocco, which allows a long-term analysis and facilitates future research on this topic.

Our findings indicate a substantial increase in productivity in Morocco from 2000 onward, mainly driven by the within effect, as opposed to the 1960-1989 period marked by structural changes in the economy. This suggests the potential impact of privatization and trade liberalization on productivity dynamics after the late 90s. Moreover, the stagnant process of structural change in Morocco is mainly attributed to the unfavorable impact of foreign trade on key economic sectors signaling a need to rethink Morocco's industrial policies. Although sectors such as automotive, aerospace, business, and financial services have shown resilience and growth potential, others like textiles, food processing, and agriculture remain vulnerable to external shocks and global competition.

To address these vulnerabilities, Morocco's industrial policy should focus on diversifying and upgrading its export base. Particularly, in key sectors with significant backward and forward linkages to other industries [15]. Strengthening sectors such as automotive and aerospace through better integration into global value chains and fostering innovation will sustain their growth. Meanwhile, sectors like textiles and food processing require targeted support to enhance their competitiveness in international markets. Advancing technology, improving product quality, and supporting SMEs will help Morocco reduce its reliance on low-value exports and build greater resilience to external shocks.

In agriculture, where significant employment persists alongside structural weaknesses, policies must focus on building resilience. Expanding initiatives such as including sustainable farming techniques, modern irrigation, and crop diversification will help stabilize agricultural productivity and safeguard food security in the face of climate variability and market fluctuations.

At the same time, Morocco's service sectors, particularly business, finance, and information and technologies (IT), have demonstrated strong performance driven by domestic demand. To build on this momentum, policies should foster entrepreneurship, improve access to credit, and develop digital infrastructure. Promoting high-value service exports, such as financial services and IT outsourcing, can further diversify the economy and reduce reliance on industrial outputs alone.

Labor market reforms are also essential to support the country's industrial shifts. Encouraging workforce mobility and investing in vocational training, particularly in sectors like manufacturing, will equip the labor force with the skills needed to meet the demands of a modern, transforming economy.

While this study provides valuable insights into Morocco's structural change, it has several limitations. The Chenery et al. [5] framework, for instance, treats the supply-side effect as a residual term, neglecting important factors such as technological change. Also, a higher-quality dataset, particularly one that better captures the informal sector, could provide a clearer understanding and reveal further dimensions of the structural change process that may have been missed in this analysis.

Last but not least, it turns out that achieving successful transformation is not solely dependent on the industrial policies implemented by a country, but also on a range of social and institutional changes that must accompany this process. We hope that the findings presented in this paper will serve as a useful reference for future studies.

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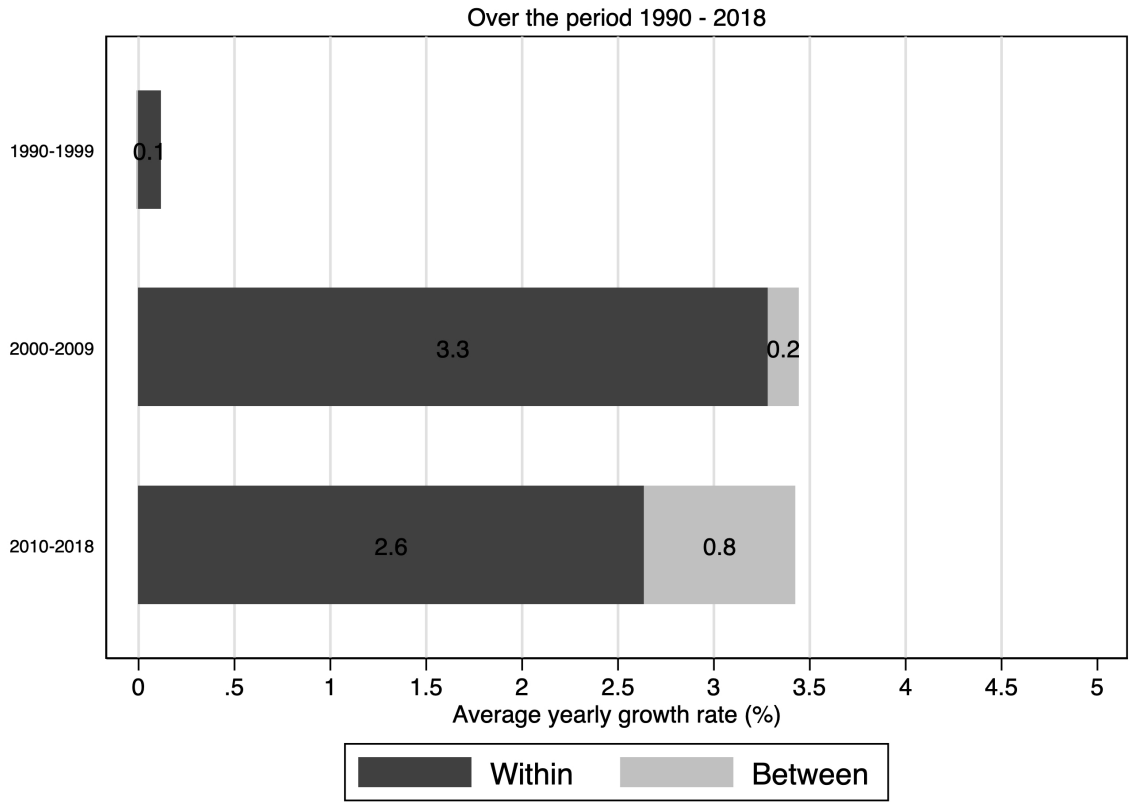
Appendix A.

Table A.2: Decomposition Results for the Moroccan economy

Subperiod	**1960-1969**	**1970-1979**	**1980-1989**	**1990-1999**	**2000-2009**	**2010-2018**
Overall productivity	2.22	1.79	1.76	0.17	3.40	4.16
Within effect	**1.27**	**-0.17**	**1.26**	**0.04**	**3.19**	**3.37**
Agriculture	0.90	0.09	0.77	-0.34	0.63	1.00
Mining	-0.05	0.06	0.06	0.09	0.14	0.29
Manufacturing	0.12	-0.16	0.12	0.21	0.74	0.96
Utilities	0.07	0	0.01	0.08	0.30	0.05
Construction	-0.05	-0.18	-0.20	-0.07	0.15	0.14
Trade	0.23	-0.21	-0.12	-0.08	0.26	0.12
Transport	0.00	0.13	0.06	0.02	0.01	0.09
Business	0.03	-0.04	0.04	-0.07	0.20	-0.02
Finance	0.03	-0.04	0.04	0.07	0.04	-0.16
Government	0	0.15	0.48	0.14	0.70	0.82
Other	0	0.02	0	0	0.01	0.07
Between effect	**0.95**	**1.97**	**0.51**	**0.13**	**0.21**	**0.79**
Agriculture	-0.30	-0.60	-0.23	-0.10	-0.16	-0.32
Mining	0.08	-0.02	-0.16	-0.10	-0.08	-0.07
Manufacturing	0.38	0.61	0.09	-0.01	-0.31	-0.13
Utilities	0.01	0.10	-0.04	0.01	-0.14	0.13
Construction	0.34	0.65	-0.02	0	0.22	0.12
Trade	0	0.52	0.34	0.13	0.15	0.21
Transport	0.06	-0.02	-0.01	0.08	0.18	0.10
Business	0.03	0.21	0.10	0.07	0.22	0.33
Finance	0.02	0.18	0.09	0.04	0.25	0.36
Gouvernment	0.28	0.29	0.32	-0.01	-0.14	0.07
Other	0.04	0.04	0.04	0	0.02	-0.01

Authors' calculations based on the GGDC/UNU-WIDER Economic Transformation Database

Figure A.11: Robustness checks: Decomposition results from the ETD



Authors' calculations based on ETD.

Table A.3: Sector Comparison: ISIC Rev 4, HCP, and ETD

Consolidated Sectors	**ISIC Rev. 4 code**	**ETD sector name**	**HCP Classification**
Agriculture/ Primary Sector	A	Agriculture	A00, B05
Industry/ secondary sector	B	Mining	C00
	C	Manufacturing	D01, D02, D03, D04, D05
	D+E	Utilities	D23, E00
	F	Construction	F45
Services/ Tertiary Sector	G+I	Trade services	G00, H55
	H	Transport services	I01
	J+M+N	Business services	I02
	K	Financial services	J00
	L	Real estate	K00
	O+P+Q	Government services	L75, MNO
	R+S+T+U	Other services	OPO

Table A.4: Disagregated sectoral deviations by subperiod and by effect in %

Subsector	**Effect**	**1998-2001**	**2002-2006**	**2007-2010**	**2011-2014**	**2015-2018**
(A00) AGRICULTURE, HUNTING, RELATED SERVICES	**D**	-55.0	-10.2	20.0	-8.1	-15.7
	M	-10.4	17.5	12.2	13.8	-27.9
	X	13.6	16.7	-11.7	-1.8	38.5
	I	-11.0	6.7	26.5	-41.0	-10.7
	T	10.0	-48.9	-29.6	-35.2	-7.2
(B05) FISHING, AQUACULTURE	**D**	16.2	-73.9	-6.6	64.4	-34.4
	M	-0.6	-2.4	-8.1	-7.3	-1.4
	X	16.5	18.6	-55.8	-12.8	-23.3
	I	-0.6	1.3	4.8	-14.7	-0.9
	T	66.1	3.8	-24.8	0.8	40.0
(C00) MINING INDUSTRY	**D**	-5.0	-4.1	9.2	21.1	-4.3
	M	-42.6	-53.4	19.1	34.6	-27.1
	X	11.7	6.8	-7.5	-20.7	3.9
	I	7.6	6.7	-60.7	-21.9	42.8
	T	33.0	29.0	-3.5	-1.7	-21.9
(D01) FOOD INDUSTRY AND TOBACCO	**D**	-43.1	-68.6	-7.7	36.9	11.5
	M	-3.6	-6.4	-4.3	15.8	-50.8
	X	40.2	9.3	-47.9	19.8	25.8
	I	-2.7	5.0	33.2	-25.7	-6.0
	T	10.4	-10.7	-7.0	1.9	5.9
(D02) TEXTILE AND LEATHER INDUSTRY	**D**	-36.7	-11.6	-16.2	23.6	15.9
	M	-31.0	25.9	27.0	-14.5	-39.6
	X	14.7	25.6	-45.8	-38.4	8.0
	I	2.9	-19.5	2.0	-5.4	27.6
	T	14.7	-17.4	-9.1	18.1	-9.0
(D03) CHEMICAL AND PETROCHEMICAL INDUSTRY	**D**	-31.5	-2.9	3.6	-1.1	0.3
	M	-15.9	-43.7	19.0	9.8	-30.1
	X	20.2	25.9	40.1	-50.1	31.4
	I	-11.1	17.2	-16.4	-31.2	-22.2
	T	-21.4	-10.3	-20.9	7.7	16.0

Table A.4 continued from previous page

Subsector	Effect	1998-2001	2002-2006	2007-2010	2011-2014	2015-2018
(D04) MECHANICAL, METALLURGICAL AND ELECTRICAL	**D**	5.7	15.2	-9.3	-5.9	4.0
	M	-5.4	-46.1	35.3	-5.3	-44.8
	X	32.3	14.9	-1.0	48.0	26.0
	I	-30.4	22.0	-52.6	-24.8	22.8
	T	-26.3	1.8	-1.9	-16.0	2.4
INDUSTRY (D05) OTHER MANUFACTURING INUSTRIES	**D**	-12.5	8.9	-7.8	1.9	-1.1
	M	-11.1	-32.8	23.1	-19.0	-64.8
	X	24.7	5.1	-26.6	16.6	24.5
	I	29.0	20.3	1.7	-49.8	-4.3
	T	-22.8	-32.9	-40.9	12.7	5.3
(D23) PETROLEUM AND OTHER REFINING	**D**	-6.2	-7.9	0.8	27.1	-5.9
	M	-25.8	-43.5	-49.2	22.0	-42.5
	X	24.2	4.7	-25.6	1.1	2.9
	I	7.0	7.7	18.8	-41.6	33.3
	T	36.8	36.3	5.6	8.3	-15.4
(E00) ELECTRICITY AND WATER	**D**	2.9	17.0	26.0	55.7	19.2
	M	-30.3	-38.2	8.1	10.1	-23.0
	X	47.2	22.1	-17.3	-3.0	21.2
	I	2.3	12.8	-2.0	-23.4	16.7
	T	-17.2	-10.0	-46.5	7.8	19.9
(F45) CONSTRUCTUION AND PUBLIC WORKS	**D**	1.9	4.4	-9.4	-2.5	-2.3
	M	-0.8	-1.6	1.2	3.0	-5.5
	X	0.3	0.2	-2.7	-1.5	3.4
	I	96.8	86.1	-84.7	-63.6	-88.8
	T	0.2	7.7	2.0	29.5	0.0
(G00) TRADE AND REPAIR	**D**	-51.9	-13.8	22.3	2.6	-8.9
	M	-0.6	0.0	0.0	0.4	-3.7
	X	32.5	48.9	-75.7	-78.7	78.2
	I	-2.1	-1.6	0.3	-0.4	0.4
	T	13.0	-35.8	1.7	17.9	8.9

Table A.4 continued from previous page

Subsector	Effect	1998-2001	2002-2006	2007-2010	2011-2014	2015-2018
(H55) HOTELS AND RESTAURANTS	**D**	-14.5	-19.5	0.8	36.0	72.3
	M	-1.0	0.8	-19.2	29.8	-12.7
	X	50.0	67.8	-59.2	-13.0	8.3
	I	-0.3	5.1	-2.3	-3.7	1.0
	T	34.1	6.8	18.4	17.5	5.6
(I01) TRANSPORT	**D**	-26.2	-2.5	33.9	65.2	16.2
	M	-29.6	-51.7	1.1	12.3	-45.9
	X	34.8	37.8	-36.8	-8.0	24.6
	I	0.4	4.7	-1.6	-9.1	8.5
	T	8.9	3.3	-26.6	5.4	-4.8
(I02) POSTAL AND TELE-COMMUNICATIONS ACTIVITIES	**D**	68.0	51.8	42.7	-59.1	-5.7
	M	-1.7	-9.8	-34.3	16.2	-29.1
	X	25.8	28.7	15.4	-20.7	-62.2
	I	0.3	2.1	-1.0	-0.5	2.8
	T	-4.2	-7.6	-6.6	-3.4	-0.1
(J00) FINANCIAL ACTIVITIES AND INSURANCE	**D**	92.7	41.2	29.2	-24.9	8.9
	M	-1.3	-21.5	-7.2	7.1	-32.6
	X	4.6	19.4	-26.7	-1.8	19.6
	I	0.2	6.4	-1.4	-11.6	7.1
	T	1.3	11.5	35.5	54.6	-31.8
(K00) REAL ESTATE, RENTAL AND BUSINESS SERVICES	**D**	-76.5	-2.0	9.0	-2.0	4.1
	M	-3.7	-22.5	-37.9	51.7	-27.5
	X	16.7	54.3	-23.8	-2.8	41.1
	I	-2.6	16.2	17.6	-24.5	-14.4
	T	0.5	-5.1	-11.7	19.1	12.8
(L75) PUBLIC ADMINISTRATION AND SECURITY	**D**	100.0	100.0	100.0	100.0	100.0
	M	0.0	0.0	0.0	0.0	0.0
	X	0.0	0.0	0.0	0.0	0.0
	I	0.0	0.0	0.0	0.0	0.0
	T	0.0	0.0	0.0	0.0	0.0

Table A.4 continued from previous page

Subsector	**Effect**	**1998-2001**	**2002-2006**	**2007-2010**	**2011-2014**	**2015-2018**
(MNO) EDUCATION, HEALTH AND SOCIAL SERVICES	**D**	99.0	85.5	-95.5	99.2	-97.3
	M	-0.1	1.1	0.7	0.2	0.4
	X	0.1	2.0	-1.1	0.0	0.3
	I	-0.1	0.8	1.6	-0.6	0.0
	T	0.7	-10.7	1.2	0.0	2.0
(OP0) OTHER NON-FINANCIAL SERVICES	**D**	-44.4	-1.1	37.8	67.1	-7.1
	M	-17.2	-30.1	12.3	-20.9	-54.6
	X	32.7	43.8	-36.1	-1.0	11.8
	I	-3.0	9.3	-1.2	-6.0	18.0
	T	2.7	-15.8	-12.5	5.0	-8.5

Table A.5: Sectoral deviations by subperiod and by effect in % following ETD classification

ETD Sector	Effect	1998-2001	2002-2006	2007-2010	2011-2014	2015-2018
Agriculture	D	-48.69	-18.12	19.05	-5.71	-22.09
	M	-9.61	16.20	11.44	13.77	-29.41
	X	14.48	13.59	-13.87	-2.35	36.32
	I	-10.20	6.51	25.86	-42.35	-11.35
	T	17.02	-45.59	-29.77	-35.82	-0.83
Mining	D	-5.0	-4.1	9.2	21.1	-4.3
	M	-42.6	-53.4	19.1	34.6	-27.1
	X	11.7	6.8	-7.5	-20.7	3.9
	I	7.6	6.7	-60.7	-21.9	42.8
	T	33.0	29.0	-3.5	-1.7	-21.9
Manufacturing	D	-26.9	0.2	-12.3	11.4	4.9
	M	-10.1	-51.1	32.1	-3.3	-49.3
	X	38.4	13.1	-22.2	28.8	26.8
	I	-11.1	22.7	-21.3	-50.9	15.5
	T	13.4	-13.0	-12.1	-5.6	-3.5
Utilities	D	-5.4	-4.8	8.2	29.9	-3.7
	M	-27.7	-46.2	-40.3	21.0	-44.0
	X	28.3	7.7	-27.2	0.7	5.1
	I	6.8	9.1	15.7	-40.1	34.3
	T	31.8	32.3	-8.6	8.3	-12.9
Construction	D	1.9	4.4	-9.4	-2.5	-2.3
	M	-0.8	-1.6	1.2	3.0	-5.5
	X	0.3	0.2	-2.7	1.5	3.4
	I	96.8	86.1	-84.7	-63.6	-88.8
	T	0.2	7.7	2.0	29.5	0.0
Trade services	D	-35.7	-17.1	13.3	12.3	57.6
	M	-0.8	0.1	-8.1	9.0	-11.3
	X	40.1	60.2	-69.0	-59.6	23.7
	I	-1.3	1.0	-0.8	-1.3	0.9

Table A.5 continued from previous page

ETD Sector	Effect	1998-2001	2002-2006	2007-2010	2011-2014	2015-2018
	T	22.1	-21.5	8.8	17.8	6.5
Transport services	D	-26.2	-2.5	33.9	65.2	16.2
	M	-29.6	-51.7	1.1	12.3	-45.9
	X	34.8	37.8	-36.8	-8.0	24.6
	I	0.4	4.7	-1.6	-9.1	8.5
	T	8.9	3.3	-26.6	5.4	-4.8
Business services	D	68.0	51.8	42.7	-59.1	-5.7
	M	-1.7	-9.8	-34.3	16.2	-29.1
	X	25.8	28.7	15.4	-20.7	-62.2
	I	0.3	2.1	-1.0	-0.5	2.8
	T	-4.2	-7.6	-6.6	-3.4	-0.1
Financial services	D	92.7	41.2	29.2	-24.9	8.9
	M	-1.3	-21.5	-7.2	7.1	-32.6
	X	4.6	19.4	-26.7	-1.8	19.6
	I	0.2	6.4	-1.4	-11.6	7.1
	T	1.3	11.5	35.5	54.6	-31.8
Real estate	D	-76.5	-2.0	9.0	-2.0	4.1
	M	-3.7	-22.5	-37.9	51.7	-27.5
	X	16.7	54.3	-23.8	-2.8	41.1
	I	-2.6	16.2	17.6	-24.5	-14.4
	T	0.5	-5.1	-11.7	19.1	12.8
Government	D	99.2	95.3	-42.9	99.6	-95.8
	M	-0.1	0.4	8.9	0.1	-0.6
	X	0.1	0.7	-13.4	0.0	0.5
	I	-0.1	0.3	20.2	-0.3	0.0
	T	0.5	-3.5	14.6	0.0	3.1
Other services	D	-44.4	-1.1	37.8	67.1	-7.1
	I	-17.2	-30.1	12.3	-20.9	-54.6
	X	32.7	43.8	-36.1	-1.0	11.8
	I	-3.0	9.3	-1.2	-6.0	18.0
	T	2.7	-15.8	-12.5	5.0	-8.5

Table A.6: Deviations and proportional growth by sectors and sub-period

Sector	**Component**	**1998-2001**	**2002-2006**	**2007-2010**	**2011-2014**	**2015-2018**
Agriculture	Proportional growth	92.1	94.9	96.2	91.8	97.9
	Deviation	-7.9	-5	-3.8	-8.2	-2
Manufacturing	Proportional growth	96.6	92.9	93.8	98.2	99.5
	Deviation	-3.3	-7.1	-6.4	-1.8	0.4
Industry	Proportional growth	88.7	99.9	94.1	96.2	93.2
	Deviation	11.3	0.1	-5.9	3.8	-6.8
Services	Proportional growth	90.2	95.8	98.4	97.5	99.7
	Deviation	9.8	4.2	-1.6	2.5	0.3