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Services in Developing Economies: A new chance for catching-up?

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Abstract

The paper analyses the potential contribution of services as a driving force of economic growth in developing countries within a Kaldorian framework. In doing so, we revisit Kaldor Growth Laws and econometrically test them for a number of economic activities (including four service branches) across twenty-nine developing countries from Asia, Latin-America and Sub-Saharan Africa during a time span of thretrue decades (1975-2005). Panel data estimations are complemented with a decomposition of labour productivity growth by means of a shift-share analysis. The results induce to question the traditional role posed to services as unlikely drivers of productivity growth in developing economies. As a matter of fact, business services seem to allow productivity growth by the same Kaldorian mechanisms that have traditionally made manufacturing the key driver of growth.

Keywords: structural change, growth, development, productivity, Kaldor

JEL codes: L16, O14, O47, C23

1. Introduction

Research on the transformation of the productive structure of economies along the course of development is back in the spotlight. After the pioneer studies by Clark (1957), Kaldor (1966), Kuznets (1966) and Chenery et al. (1986), there has been a renewed interest across developed

countries (e.g., Jorgenson and Timmer, 2011) and, particularly, across developing economies (e.g., Timmer and de Vries, 2009; Bah, 2011; MacMillan and Rodrik, 2011; McMillan, et al., 2014; Timmer et al., 2014, Rodrik, 2015).[1] In general, developed countries have all followed a similar process of structural transformation: a declining share of agriculture in output as Gross Domestic Product (GDP) per capita increases, then an inverted U-shape relationship between industry shares and income per capita, followed by an increasing share of services. However, paths of structural change of developing economies deviate from that of developed countries. Developing countries are characterized by a very large share of services in output at early stages of development. This is explained by the fact that, since 1990, the hump-shaped relationship between industrialization and income has shifted downwards and moved closer to the origin (Rodrik, 2015). Yet, there is not one single process of structural transformation either across developing regions or within each of them. Heterogeneity critically matters in developing regions, since the economies of Asia, Africa and Latin-America are themselves following diverse structural transformation processes (Bah, 2011), which have contributed differently to economic performance in each region (MacMillan and Rodrik, 2011).

Accordingly, there is still a need for going deeper into the analysis of the dynamics of heterogeneous productive structures of developing economies and its impact on growth. As suggested by Ocampo (2005, page 22), recent contributions should be complemented by old ideas that have received little attention in contemporary debates, including the growth-productivity connections associated, in particular, with the Kaldorian tradition. The structure of an economy matters for growth performance and development since sectors have different capabilities to induce productivity gains, promote the expansion of other sectors, or benefit from internal and external demand growth (Cimoli et al., 2005; Thirlwall, 2013). In the Kaldorian tradition, the manufacturing industry has traditionally been considered as the main vector of productivity growth over time and, thus, as an 'engine of growth' of economies (Thrilwall, 1983). Kaldor (1966, 1967) proposed a set of long-run relationships between manufacturing growth, productivity growth and output growth that are commonly known as Kaldor's Growth Laws (henceforth, KGL). Manufacturing expansion can induce the growth of GDP per worker as a result of two mechanisms. First, productivity in manufacturing rises with the growth of manufacturing output due to the presence of increasing returns to scale (IRS) at the sector level. Second, output growth in manufacturing tends to increase the rate of productivity growth in other sectors. Therefore, industrialization has been seen as a pathway to output growth and, ultimately, economic development.

[1] This new set of studies goes hand in hand with the emergence and improvement of long term series on sectoral output and productivity across the developing world.

However, these old ideas on the pivotal role played by manufacturing in growth via productivity gains are now being challenged by new evidence. First, several developing economies are experiencing 'premature deindustrialization' as documented by Palma (2005), Dasgupta and Singh (2005, 2006), and Rodrik (2015), among others. In these countries, the share of manufacturing in employment and value added is shrinking at levels of income per capita that are much lower of those at which the advanced nations historically began to de-industrialize (Bah, 2011; Ghani and Kharas, 2010; Ghani et al., 2012; Szirmai, 2012). Second, the tradability of services has progressively increased and value chains of production have now globally expanded. Services are now major players in the current wave of the globalization process, the past decade characterized by the transformation of services provision and the inter-linkages between services and manufacturing at the global level (Gallego et al., 2013). This means that the advantages that manufacturing and agriculture traditionally had on the trade/globalization sphere are now eroding (Dasgupta and Singh, 2005). Third, some service sub-sectors have completely broken away old myths and have turned into some of the most innovative and productive activities. Productivity improvements in market services (i.e., financial or business services such as computer-related activities) are as important as, or even more important than, productivity growth in manufacturing (i.e., Timmer and de Vries, 2007; Timmer and de Vries, 2009; Maroto-Sánchez and Cuadrado-Roura, 2009, United Nations, 2010).

Facing the old ideas with the new evidence, our research hypothesis regards whether some specific service sectors may be a source of economic growth in developing countries. Whether services-led growth can become a new growth model in the absence of sizable manufacturing industries is a matter of concern (Rodrik, 2015). Potentially, those services embodying knowledge and technology, with strong inter-industry linkages or highly tradable, may serve as a means to catching-up with advance economies by complementing (replacing) manufacturing as an additional (new) engine of growth. This may happen by the same productivity-growth connections that Kaldor uncovered for the manufacturing sector. Recently, the political and academic discussion has renewed its attention towards the 'reindustrialisation' of (developed and developing) countries and the fostering of industrial policies as a means to achieve sustainable growth paths (Tregenna, 2011; Westkämper, 2014). This timely investigation aims at contributing to this debate, as well as to uncover how the heterogeneous productive structures of the different developing regions have an impact on growth.

To the best of our knowledge, no study has tested KGL across developing countries at the two-digit disaggregated level of the services sector. Hence, the analysis contributes to the literature in this field by taking into account the heterogeneity of services when examining growth across developing economies within a Kaldorian framework. Does the composition of services in

developing countries matter for economic growth? We revisit KGL and econometrically test them in seven economic sectors (including four service sub-sectors) across twenty-nine developing countries from Asia, Latin-America and Sub-Saharan Africa during a time span of three decades (1975-2005). Panel data estimations are complemented with a decomposition of labour productivity growth, by means of a shift-share analysis, in order to study how resource (labour) reallocation during the process of structural change affects economic growth in those developing economies.[2]

The paper is structured in the following way. Section 2 explains KGL and summarizes the related literature as to highlight the contribution of the work to existent evidence. Section 3 presents the data used in this research and the empirical strategy followed. The econometric results for the whole sample of countries, as well as for the different sub-regions, and the decomposition of labour productivity growth are discussed in Section 4. Finally, some final remarks and future research paths are presented.

2. The Kaldorian Framework

Nicholas Kaldor (1966, 1967) attempts to explain large growth rates differences between industrialized countries after the postwar by adopting a sectoral approach where dualisms *à la* Lewis (Lewis, 1954) can be found. Unlike the neoclassical theory of economic growth, which is based on a homogeneous product of the economy and is entirely supply-driven, Kaldor argues that both the production and demand characteristics of each aggregate sector of the economy (agriculture, industry and services) matter for economic growth. On the demand side, the income elasticity of manufacturing is similar to that of services but higher than that of agriculture.[3] On the supply side, a low productivity agricultural sector with labour surplus subject to diminishing returns coexists with a capital-intensive manufacturing sector characterized by increasing returns and high productivity growth. At the same time, Kaldor considers that the productivity growth in services tended to be considerable lower than that of manufacturing. Manufacturing showed greater potential for productivity growth than other sectors due to the presence of static and of dynamic economies of scale in their production. Static economies of scale are mainly technical, internal to the firm, and related to mass production. Dynamic economies of scale refer to increasing productivity derived from 'learning by doing' (Arrow, 1962) and from the macroeconomic spillover effects of the expansion of

[2] Our research interest lies exclusively on studying changes in the reallocation of labour across sectors. However, structural change is a much broader concept encompassing many other transformations taking place in the economy, e.g.: in savings and investments rates, in urbanisation, in institutions, etc.

[3] However, beyond a certain level of income per capita the income elasticity of demand for services would tend to be higher than that of manufacturing products. This effect may, to some extent, be offset by the different price movements taking place in these two sectors, which have an influence on the rate of demand growth. In particular, the lower relative prices for manufactures derived by faster productivity growth in this sector may also induce an increase in the demand for manufacturing products.

manufacturing activities (induced technological change, externalities in the production, etc.); the so-called 'macroeconomic of scale' in the sense of Young (1928).

Considering these conditions, the reallocation of labour from underproductive activities (i.e., agriculture) to more productive sectors (i.e., manufacturing) fosters productivity growth in both sectors and depends on the demand derived from manufacturing expansion. Unlike neoclassical economists, Kaldor believes that manufacturing growth is not resource-constrained (mainly by labour) but rather demand-determined. While in the first stages of development, the expansion of this key sector is closely related to the demand of the dominant agricultural sector, in later stages is mainly driven by external demand or export growth. This is explained by the higher tradability of manufactures and the higher income elasticity of demand (Dixon and Thirlwall, 1975). In this respect, manufacturing also has greater potential than other sectors for releasing balance of payment constraints. A virtuous circle of cumulative growth that can be explained on the basis of external demand evolution (Kaldor, 1970; Dixon and Thirlwall, 1975). As exports grow, output increases lead to fast productivity growth (by the presence of dynamic economies of scale) which induces an increase in competitiveness that induces an additional increase in exports. In the view of these stylized facts, Kaldor articulates a set of long-run relationships or empirical generalizations concerning the growth of output, employment, and productivity at the sectoral level of the economy, which latter came to be known as Kaldor´s Growth Laws.

2.1 Kaldor´s Fisrt Law

The first law states that the faster the growth of manufacturing output (q_m) in an economy, the faster the growth of gross domestic product (q_{GDP}). Kaldor fundamentally defines a *causal* relationship running from sectoral growth to overall growth and more precisely from manufacturing growth to the growth rate of GDP per worker (Ros, 2000) as the result of two mechanisms that are reflected in Kaldor´s second and third laws. Following Thirlwall (2013), we can posit the first law as:

$$q_{GDP} = f_1(q_m) \qquad f'_1 > 0 \qquad \text{(Equation I-A)}$$

According to Thirlwall (2003) and Wells and Thirlwall (2003), there are two additional regressions that overcome the problem of spurious correlation that is evidently present in Equation I-A (since by definition total output growth is the weighted sum of sectoral output growth).

$$q_{GDP} = f_1(q_m - q_{nm}) \qquad f'_1 > 0 \qquad \text{(Equation I-B)}$$
$$q_{nm} = f_1(q_m) \qquad f'_1 > 0 \qquad \text{(Equation I-C)}$$

In equation (I-B) the growth of GDP (q_{GDP}) is regressed on the excess of the growth of manufacturing production (q_m) relative to the growth on non-manufacturing production (q_{nm}). In equation (I-C) the growth of non-manufacturing output is regressed on the growth of manufacturing output, the estimated coefficient indicating the strength and size of the impact of manufacturing sector growth on the rest of the economy.[4]

2.2 Kaldor´s Second Law

The second law states that the faster the growth of manufacturing output (q_m), the faster will be the growth of productivity in manufacturing (p_m) as a result of IRS. This first mechanism explaining causality from manufacturing growth to GDP per worker growth is known as the Verdoorn´s law – named after the Ducth economist P.J. Verdoorn who found a strong empirical relationship between productivity and output growth in a cross section of countries in the 1940s.

This law can also be interpreted from the perspective of employment growth in manufacturing (e_m): the higher the scale economies of the sector, the lower the employment elasticity with respect to output, since productivity increases as a result of output expansion. This means that output expansion induces a less than proportional employment creation that causes productivity gains.

$$e_m = f_2(q_m) \quad f'_2 > 0 \qquad \text{(Equation II)}$$

Kaldor (1966) specified the Verdoorn relation in terms of a linear regression model: $e_m = \beta_0 + \beta_1 q_m$ with $\beta_1 > 0$, being β_1 an indicator of increasing returns of scale (the Verdoorn coefficient). However, due to the productivity identity, this can be expressed as: $e_m = -\beta_0 + (1 - \beta_1)q_m$, with $0 < \beta_1 < 1$, being $(1-\beta_1)$ the elasticity of employment with respect to output growth.

2.3 Kaldor´s Third Law

The third law states that employment growth in manufacturing tends to increase the rate of productivity in other sectors as a result of diminishing returns to labour in other sectors and the absorption of surplus labour from those sectors. This is the second mechanism explaining causality from manufacturing growth to GDP per worker growth. Unlike neoclassical

[4] An alternative open economy interpretation of the first Kaldor law in the context of developing economies has been recently provided by Pacheco and Thirlwall (2014). By means of two-stage least squares, they analyze the impact that manufacturing expansion has on exports growth and the effect that export growth has on output growth by providing foreign exchange and reducing balance of payment constraints on demand.

economists, Kaldor considers there is disguised unemployment in agriculture rather than assuming that all resources are efficiently employed.[5] This is the reason why the reallocation of labour from agriculture into manufacturing does not reduce agricultural output and, as a result of employment withdrawn, productivity is increased. In other words, as employment declines in the non-manufacturing sector overall productivity growth raises.

Most empirical studies focusing on developing economies (i.e., Hansen and Zhang, 1996; Dasgupta and Singh, 2005 and 2006; Wells and Thrilwall, 2003) estimate this law by regressing overall productivity growth (p) on the growth of non-manufacturing employment (e_{nm}), controlling for the growth of manufacturing output (q_m), which, according to Verdoorn´s law, induces productivity growth. Accordingly, the linear specification would be as follows:

$$p = \beta_0 + \beta_1 e_{nm} + \beta_2 q_m, \text{ with } \beta_1 < 0;\ \beta_2 > 0 \quad \text{(Equation III)}$$

2.4 Evidence on the KGL: Contribution to literature

The KGL propose a close association between the industrial activity of a country (in particular, manufacturing) and overall output growth. Thus, manufacturing can be conceived as an 'engine of growth' (Thirlwall, 1983). Kaldor established this relationship for 12 OECD countries using cross sectional data over 1953 to 1964. Since then, several other studies have examined and confirmed the interpretation and the validity of the different laws for developed economies from a variety of perspectives: across countries (i.e., Cripps and Tarling, 1973; Rowthorn, 1975; Parikh, 1978; McCombie, 1983; Michl, 1985); across regions within countries (i.e., McCombie and de Ridder, 1984; León-Ledesma, 2000); for individual countries (i.e., Stoneman, 1979; Bairam, 1991; Atesoglu, 1993); across regions (i.e., Pons-Novell and Viladecans-Marsal, 1999, for European regions); and across industries in the Verdoorn law (i.e., McCombie, 1985).

In the same vein, manufacturing has been also proven to be an engine of growth in developing countries based on estimation of KGL.[6] For the sake of clarity, Table 1 reviews a number of relevant works and classifies their different approaches on the basis of their country sample, their time horizon, the equations estimated in the empirical exercise, and the level of sectoral disaggregation adopted. Accordingly, Felipe (1998) finds evidence across five Southeast Asian countries, and Wells and Thirlwall (2003) across forty-five African countries. In case of Latin-American economies, evidence of IRS in industrial sectors is found by Cimoli et al. (2005) and

[5] In mature economies, as labour surplus is exhausted in the agricultural sector, productivity levels will tend to equalize across sectors, and thus the overall productivity growth induced by manufacturing is likely to slow down. Nevertheless, manufacturing ouput growth is never likely to be constrained by labour shortage because this is a very elastic input in terms of hours worked, the possibility of international migration, etc. (Thirlwall, 2013).

[6] At regional level, and particularly for the case of Chinese provinces, the pivotal role of manufacturing is also confirmed by Hansen and Zhang (1996), Jeon (2006), and Guo et al (2012).

Libano (2006). Pacheco and Thirlwall (2014) also consider the role played by exports growth in open developing economies and conclude that there is a strong association between exports and economic growth.

Very few studies, in contrast, argue that services may also serve as a means for catching-up in developing economies. Dasgupta and Singh (2005, 2006) were the first to argue that, although manufacturing continues to be critical for development, services can also be regarded as an additional engine of growth within a Kaldorian framework. In particular, they emphasize the role played by ICT-related services in the context of India. As discussed by Felipe et al. (2009), services also present productivity-growth inducing effects through the exploitations of scale economies in Asia. Notwithstanding the productive heterogeneity of the region, the authors emphasize that the composition of services matters for determining the sustainability of their contribution to productivity growth.

As a matter of fact, only half of the studies exhibited in Table 1 have drawn attention to services in their estimations. Those which integrate services within their research focus account for the aggregate level, that is, the one-digit aggregation level of the *International Standard Industry Classification* (ISIC). Accordingly, most of studies have failed to deal with the heterogeneity of the services sector in developing economies at two-digit level of ISIC. A notable exception is Pieper (2003) who examines the Verdoorn´s law (Kaldor's second law) across 30 developing economies covering nine sectors. Pieper finds strong evidence of IRS for linear and non-linear specifications of the law, with manufacturing and public utilities ranking the highest Verdoorn coefficients. This finding is highly relevant, as it points out that: i) services may be subject to increasing results and ii) the same Kaldorian mechanisms which make manufacturing the engine of growth may also apply to service activities. Our paper aims at contributing to this debate and at filling a gap in current literature by revisiting the three KGL for manufacturing, services and agriculture, and by examining the role played by different service sub-sectors (at two-digit level of ISIC) in economic performance across Asian, Latin-American and African developing economies. To the best of our knowledge, this is a first attempt in the related literature.

Table 1: KGL in developing economies: a summary of the literature

Paper	N	T	Equations estimated			Estimations at one-digit level of ISIC aggregation?	Estimations at two-digit level of ISIC aggregation?
			1st law	2nd law (Verdoorn's law)	3rd law		
Felipe (1998)	5 Asian countries	1967-1992	$q_{nm} = a_2 + b_2(q_m) + \varepsilon_2$	N.E.	N.E.	No	No
Pieper (2003)	30 developing countries	1970-1990	N.E.	$e_m = a_1 + b_1(q_m) + \varepsilon_1$	N.E.	Yes	Yes
Wells and Thirwall (2003)	45 African countries	1980-1996	$q_{GDP} = a_1 + b_1(q_m) + \varepsilon_1$ $q_{GDP} = a_2 + b_2(q_m - q_{nm}) + \varepsilon_2$ $q_{nm} = a_3 + b_3(q_m) + \varepsilon_3$	$e_m = a_1 + b_1(q_m) + \varepsilon_1$	$p = a_1 + b_1(q_m) + c_1(e_{nm}) + \varepsilon_1$	Yes	No
Cimoli et al (2005)	5 Latin American countries	1970-2000	N.E.	$e_m = a_1 + b_1(q_m) + \varepsilon_1$	N.E.	No	No
Dasgupta and Singh (2005)	30 developing economies	1980, 1990, 2000	$logq_{GDP} = a_1 + b_1(logq_m) + \varepsilon_1$	$log(p) = a_1 + b_1(logq_m) + c1(loge_{nm}) + \varepsilon_1$		Yes	No
Dasgupta and Singh (2006)	48 developing countries	1990-2000	$q_{GDP} = a_1 + b_1(q_m) + \varepsilon_1$	$p = a_1 + b_1(q_m) + c_1(e_{nm}) + \varepsilon_1$		Yes	No
Libanio (2006)	7 Latin American countries	1985-2001	$q_{GDP} = a_1 + b_1(q_m) + \varepsilon_1$ $q_{GDP} = a_2 + b_2(q_m - q_{nm}) + \varepsilon_2$ $q_{nm} = a_3 + b_3(q_m) + \varepsilon_3$	$e_m = a_1 + b_1(q_m) + c_1(k_m) + \varepsilon_1$	N.E.	No	No
Felipe et al (2009)	17 Asian countries	1980-2004	$lnq_{nm} = a_3 + b_3(lnq_m) + \varepsilon_3$	$lne_m = a_1 + b_1(lnq_m) + \varepsilon_1$	Decomposition of labour productivity growth	Yes	No
Pacheco and Thirwall (2013)	89 developing countries	1990-2011	$q_{GDP} = a_1 + b_1(q_{EXP}) + \varepsilon_1$ $q_{EXP} = a_2 + b_2(q_m) + \varepsilon_2$ $q_{GDP} = a_1 + a_2b_1 + b_1b_2(q_m) + \varepsilon_2$	N.E.	N.E.	No	No

Note: N.E. for not estimated.

3. Data and empirical strategy

The empirical strategy followed in this research is double. On the one hand, we use panel data analysis to estimate Kaldor´s first and second laws (equations I-A, I-B, I-C and II). Regressions are performed by sector panel: firstly, for the whole sample of developing countries, and, secondly, for the three different regions. The econometric analysis of KGL is conducted using a balanced sectoral panel of 29 developing countries with available information for 1975-2005. The country sample includes nine countries from Latin-America, nine countries from Asia and eleven countries from Africa.[7] In this way, we are able to account for differences across developing regions and, for instance, to reduce disparities in terms of technological progress. Additionally, in order to avoid spurious correlation and identification problems present in Equation III, we perform a decomposition of labour productivity growth, following Felipe et al. (2009). On the basis of both empirical analyses we would be able to determine whether some specific services sector may be a source of economic growth in developing economies.

The main sources of the data applied in this research are the Groningen Growth and Development Centre (GGDC) 10-Sector Database (Timmer and de Vries, 2007) and the Africa Sector Database (de Vries et al., 2013). These are the first databases that provide long-term series of value added (in current and constant prices) and employment at the two-digit level of the ISIC codes for developing economies. The major advantage of these databases is their intertemporal, internal and international consistency that allows reliable comparisons of labour productivity across countries. While other data sources also collect sectoral data and make it publicly available (e.g., the World Bank, the United Nations, and the International Labour Office), the series provided by them 'are often short (starting only in the 1980s or 90s), not consistent over time and across countries, and have little sectoral detail' (Timmer and de Vries, 2007, page 3). The GGDC 10-Sector Database and the Africa Sector Database overcome these shortcomings at the expense of excluding other variables that are relevant for explaining productivity dynamics and vertical links across sectors – such as knowledge intensity–. Related to this, a major disadvantage of these databases is the lack of information on capital input at sectoral level.[8] This fact impedes accounting for capital stock growth in the estimation of Kaldor´s Second Growth Law apart from preventing international total factor productivity comparisons. Finally, a relevant point when studying developing countries is the accounting of informal activities by the data. Our sources compute employment levels using population censuses information that tends to have a more complete coverage of informality (McMillan et

[7] Latin-American countries (N=9): Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Venezuela; Asian countries (N=9): Hong Kong (China), India, Indonesia, Rep. of Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand; African countries (N=11): Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania and Zambia.

[8] This kind of data will be collected in future editions of the databases (Timmer and de Vries, 2007).

al., 2014). However, value added information is gathered within the framework of the System of National Accounts. Therefore, the coverage of the informal sector by value added data varies across countries and depends greatly on the quality of the national sources.

As regards the time span of the econometric study, the year 1975 was chosen as a starting point because of data availability for all countries in the sample (see Appendix A for further details). Moreover, following Pieper (2003) and León-Ledesma (2000), we use a moving average of value added (at constant prices), employment, and productivity growth rates (taking 5-years period averages) to smooth out short-term fluctuations present in the annual data (then, *T=6*). As a result, we avoid the problem of conflating the long-run Verdoorn law with the short-term cyclical relationships described by Okun´s law.[9]

As detailed in Table 2, available time series allow us to disentangle the different role played by the three main aggregated sectors (*j*=1, 2 and 3) as well as a range of service sub-sectors (*j*= 4, 5, 6 and 7). Therefore, the econometric exercise is performed for seven different sectors, namely: 1) Agriculture; 2) Manufacturing; 3) Services; 4) Commerce (distributive trades and tourism); 5) Transport and communications; 6) Business services (finance, insurance, real estate and business activities); and 7) Public services.

Table 2. Description of sectoral composition of GGDC database

j	*Sectors*	*ISIC rev. 3 SNA 1993*	*ISIC rev. 3 SNA 1993*
1	Agriculture, hunting, forestry and fishing	Division 01-05	A-B
2	Manufacturing	Division 15-37	D
3	Services	Division 50-99	G-Q
4	Wholesale and retail trade, restaurants and hotels	Division 50-55	G-H
5	Transport, storage and communication	Division 60-64	I
6	Finance, insurance, real estate and business services	Division 65-74	J-K
7	Public services[10]	Division 75-99	L-Q

In the global econometric analysis, data for each sector is pooled for the 29 country time series. Accordingly, every sector panel ends up having 174 observations based on five-year growth rates. When dealing with the three major sub-samples individually, every sector panel for the Asian and Latin-American countries included in the sample presents 54 observations (*N=9* and *T=6*), while for the Sub-Saharian African economies each sector panel includes 66 observations

[9] Okun´s Law identifies a negative statistical association between the growth in unemployment and the growth of output over the business cycle (Okun, 1962).

[10] Since for several countries there is no distinction between value added or employment (or both) in the "Producers of Government Services" sector (L-N) and the "Community, Social, and Personal Services" sector (O-Q), we aggregate data for these activities into a single "Public Services" sector following McMillan and Rodrik (2011) and McMillan et al. (2014). In addition, as ISIC is a classification according to kind of economic activity, and does not draw distinctions according to kind of ownership, type of legal organisation, or mode of operation, then, no clear distinction in terms of divisions can be made between the two former public sectors.

(*N=11* and *T=6*). Outliers are detected and treated using one dummy variable for each.[11] Fix country effects are added in order to deal with omitted heterogeneity. Equations are estimated by Ordinary Least Squares (OLS) with Panel Corrected Standard Error Estimations (PCSE) accounting for group-wise heteroskedasticity, cross sectional dependence, and autocorrelation in disturbances within panels.[12]

The following are the linear specifications estimated for examining Kaldor´s First Law at sectoral level:

$$q_{GDP_{it}} = \alpha_{1j} + \beta_{1j} q_{jit} + \varepsilon_{jit} \qquad \text{(Equation I-A)}$$

$$q_{GDP_{it}} = \alpha_{2j} + \beta_{2j} (q_{jit} - q_{njit}) + \varepsilon_{jit} \qquad \text{(Equation I-B)}$$

$$q_{njit} = \alpha_{3j} + \beta_{3j} q_{jit} + \varepsilon_{jit} \qquad \text{(Equation I-C)}$$

where *j*, *i*, *t* stand for sector, country and time, respectively, and ε_{jit} is assumed to be normally distributed. q_{GDP} represents total output growth (the growth of total value added in constant prices) and q_{jit} refers to the sectoral output growth (the growth sectoral value added in constant prices).

The specification of Kaldor´s Second Law is displayed below (Equation II). Verdoorn law has been subject to extensive debate and, thus, generated a large body of empirical and theoretical literature.[13] Among others, an extensive debate in the literature has concentrated on the fact that the specification of Verdoorn law made by Kaldor does not control for the contribution of the capital stock growth (Bairam, 1987). If some sort of technical progress function underlies the law, as Kaldor suggested, then, excluding this variable from estimations is likely to provide a biased coefficient of returns to scale except if a constant capital/output ratio is supposed (McCombie, 1982). In fact, some studies have included a variable accounting for the expansion of capital when estimating the Verdoorn law (León-Ledesma, 2000; Libanio, 2006). However, for the case of developing economies is very difficult to find reliable and consistent data of capital stocks at sectoral level, as also noted by Jaumotte and Spatafora (2007) and Wells and Thirlwall (2003).

$$e_{jit} = \alpha_{1j} + \beta_{1j} q_{jit} + \varepsilon_{jit} \qquad \text{(Equation II)}$$

[11] These observations are detected from the residuals of each equation by sector panel and correspond to residuals that are larger than three standard deviations.
[12] Modified Wald test for groupwise heteroskedasticity; Wooldridge test for autocorrelation in panel data and Breusch-Pagan LM test of cross sectional independence are implemented.
[13] For a comprehensive review see Baraim (1987) and, more recently, McCombie et al. (2002).

where j, i, t stand for sector, country and time, respectively, and ε_{jit} is assumed to be normally distributed. $e_{jit}$is the sectoral employment growth and q_{jit} is the sectoral output growth.

Finally, as previously mentioned, most empirical estimates of the third law suffer from spurious correlation and identification problems. Alternatively, growth accounting can be a useful approach for analyzing the relationships underlying in Kaldor´s Third Law. Accordingly, to overcome this matter, following Felipe et al. (2009), we apply a shift-share decomposition analysis that will allow us to understand how aggregate growth is mechanically linked to differential growth of labor productivity and the reallocation of labor between industries. Thus, it breaks down overall productivity growth into two effects: i) structural changes (*SCE*) and ii) the intra-sectoral *productivity* growth (*ISE*).

The SCE comprises a static and a dynamic component. The *static shift effect* (*SSE)* is calculated as the sum of relative changes in the allocation of labour across industries between the final year and the base year, weighted by the value of sector's labour productivity in the base year. This component is positive (negative) if industries with high *levels* of productivity (and usually also high capital intensity) attract more (less) resources and hence increase (decrease) their share of total employment. The standard structural bonus hypothesis postulates a positive relationship between structural change and economic growth as economies upgrade from low to higher productivity industries. It would correspond to an expected *SSE* > 0. The *dynamic shift effects* (*DSE*) captures the interactions between employment changes and productivity *growth*. This interaction term is positive if resources move towards industries experiencing fast productivity growth. The interaction effect is, however, negative if industries with fast growing productivity cannot maintain their shares in total employment. Thus, the interaction term can be used to evaluate hypothesis of a structural burden of labour reallocation (Baumol, 1967).[14] Finally, the 'intra-sectoral *growth' effect* (*ISE*) corresponds to within productivity growth under the assumption that no structural shifts have ever taken place. Such growth mainly steams from the operation of scale economies, technology absorption, etc.

Formally, the method applied here may be derived as follows:

$$\dot{\pi} = \frac{\pi_T - \pi_0}{\pi_0} = \frac{\sum_{i=1}^{N} \pi_{i0}\left(s_{iT} - s_{i0}\right)}{\pi_0} + \frac{\sum_{i=1}^{N} \left(\pi_{iT} - \pi_{i0}\right)\left(s_{iT} - s_{i0}\right)}{\pi_0} + \frac{\sum_{i=1}^{N} s_{i0}\left(\pi_{iT} - \pi_{i0}\right)}{\pi_0} \qquad \text{(Equation IV)}$$

$$\dot{\pi} = SSE + DSE + ISE = SCE + ISE$$

[14] This hypothesis states that as labour reallocates into services, a sector with (generally) lower productivity growth, productivity growth of the economy will decline.

where π is the labor productivity, *0* is the initial year, *T* is the final year, *i* corresponds to each economic sector, and *s* is the sector weight in terms of employment ($s_i = L_i / L$).

4. Empirical findings

4.1 Kaldor´s First Law: Estimation Results

Our evidence confirms the validity of Kaldor's First Law across the whole sample of developing economies (Table 3). As in Dasgupta and Singh (2005, 2006), manufacturing growth seems to be a driving force behind overall growth across developing countries. The estimated coefficients for manufacturing are significant and follow the expected sign in equation I-A and the corresponding side tests (equations I-B and I-C). Services growth is also strongly associated with overall growth, as shown by the estimations of equation I-A. However, spuriousness seems to be a problem as this sector do not pass the first side test of the law. As for agriculture, when the side test is performed relating overall growth to the excess of sector growth over the non-sector growth, the regression coefficient is significant but negative. The same result is found for the case of public services. Finally, commerce and 'transport and communications' activities do not pass the first side test of the law.

Table 3. Panel data estimation of Kaldor´s First Law: all developing countries

SECTOR	EQUATION I-A		EQUATION I-B		EQUATION I-C	
	α_{1j} / s.e.	β_{1j} / s.e.	α_{2j} / s.e.	β_{2j} / s.e.	α_{3j} / s.e.	β_{3j} / s.e.
j=manufacturing	.0125* .0053	.4682*** .0249	.0173 .0094	.1461* .0612	.0160* .0065	.3626*** .0329
	R2	0.781	R2	0.4687	R2	0.637
j=agriculture	.0107 .0088	.2371*** .0531	.0170* .0068	-.3027*** .0477	.0124 .0092	.1343* .0601
	R2	0.516	R2	0.605	R2	0.522
j=services	.0008 .0031	.8411*** .0346	.0161 .0090	-.1328 .0769	.0002 .0070	.7170** .0682
	R2	0.895	R2	0.461	R2	0.664
j=commerce	.0101** .0033	.5414*** .0412	.0158 .0093	.0464 .0573	.0122** .0036	.4671*** .0458
	R2	0.785	R2	0.451	R2	0.705
j=transport and communications	.0007 .0059	.4264*** .0493	0150 .0095	.0220 .0752	.00001 .0062	.3934*** .0518
	R2	0.703	R2	0.448	R2	0.649
j=business services	.0066 .0084	.3373*** .0263	0137 .0090	.1536*** .0415	.0076 .0082	.2694*** .0237
	R2	0.727	R2	0.527	R2	0.653
j=public services	.0094 .0083	.3833*** .0844	.0157* .0063	-.370*** .0455	.0112 .0107	.2650** .1012
	R2	0.515	R2	0.599	R2	0.420
N	174		174		174	

Note: OLS estimations with fixed effects and PCSE accounting for groupwise heteroskedasticity, cross sectional dependence and serial correlation. Dummy coefficients estimates are available on request. Legend: s.e. for standar deviation; * p<0.05; ** p<0.01; *** p<0.001

The results in Table 3 show how the business services sub-sector passes both side tests of the law. This may reflect changes in inter-industry linkages as result of the increase of services as intermediate inputs for the rest of the economy. Business services are generally used as intermediate inputs and thus have important forward and backward inter-industry linkages; apart from embodying and enabling the use of new technology. Including financial services and business activities (R&D, computer services, and other business activities),[15] this sub-sector behaved like manufacturing as an engine of growth in the whole set of developing economies considered in our analysis.

Kaldor's First Law is also confirmed for the three major regions under analysis, as shown in Tables B.1, B.2 and B.3 (See Appendix B). This finding is in line with those by Wells and Thirlwall (2003) for 45 African economies, Libano (2006) for 7 Latin-American economies, and Felipe et al. (2009) for 17 Asian countries. However, a positive relationship between the growth of sector output and economic performance is not found for the services and the agriculture sectors. Again, business services seem to drive overall growth in Asia and Latin-America, although no evidence is found across African economies. This may be related to the undersized manufacturing basis attained by this latter region, which hampers the development of many business-related services. Deindustrialization in Africa is characterized by a declining diversity and sophistication of the region's manufacturing sectors (Page, 2011). As a matter of fact, when the side test is performed relating overall growth to the excess of business services growth (over the non-business services growth), the regression coefficient is significant and negative. Finally, no relationship between the expansion of agriculture and overall growth is found in Asia, whereas in Latin-America and Africa the excess of agricultural growth over the non-agricultural growth impacts negatively on overall growth, as in the aggregate country sample. This result is also found for the case of public services in the three different global regions.

4.2 Kaldor´s Second Law: Estimation Results

The second law is also confirmed for the whole sample of developing economies: there are IRS in manufacturing activities. Table 4 reports panel data estimations for equation II and provides one-tailed test hyphotesis of constant returns to scale (β_{1j}=1) and increasing returns to scale (β_{1j} < 1) at the sector level. All sectors, with the exception of agriculture and commerce, show employment elasticities with respect to output growth that are positively significant and less than unity. In five out of seven sectors we can reject the constant returns hypothesis at the 10 percent confidence interval for one-tailed tests. Moreover, in these five sectors, estimates of the

[15] Within other business services we find standardize activities like building cleaning or security activities as well as customized human-capital intensive services such as consultancy, architectural, engineering, advertising, etc.

employment elasticity with respect to output growth are significantly less than unity. These results suggest strong evidence for increasing returns at the sector level of developing economies, as suggested by Pieper (2003).

Accordingly, results show evidence of IRS in manufacturing for both Asian and African countries, whereas this is not the case for Latin-American economies (Tables C.1, C.2 and C.3 in Appendix C). On the one hand, this may be reflecting the increasing share in world total manufacturing output and the increasing technological upgrade of Asian manufacturers. Asia has experienced faster capital deepening and faster Total Factor Productivity (TFP) growth than other developing economies, including Latin-America (where TFP growth has been negative). At sectoral level, productivity growth in both industry and services was higher than in other regions and, within the manufacturing sector, there has been a shift towards more skill-intensive sectors with higher productivity levels and growth. As suggested by Felipe et al. (2009) and ADB (2007), manufacturing output in a number of Asian economies (i.e., South Korea, Malasya, Taiwan and Singapore) has shifted into more technology- and scale-intensive subsectors.[16] This has been supported by strong institutional quality, trade openness, and financial sector development. Thus, notwithstanding the high heterogeneity within Asian regions, these facts helped to promote the catching-up with advanced economies (Jaumotte and Spatafora, 2007).

On the other hand, technology-intensive industries have lose ground over the past decades in many Latin-American countries. The latter have experienced a relative decline in both manufacturing and services productivity growth, combined with a relative large share of non-skilled intensive sectors within manufacturing that exhibit slower productivity growth (Jaumotte and Spatafora, 2007), which explains Latin-American's stagnation. As a matter of fact, manufacturing output has largely turned into natural resources intensives sectors (i.e., Tobacco, coal, paper, and petrol) (Cimoli et al., 2005). Evidence points out a strong shift towards processing industries producing commodities for highly competitive world markets (Cimoli and Katz, 2003), domestic sources of technology change and productivity growth rapidly deceasing.

More importantly, the findings induce to question the traditional role posed to services as unlikely drivers of productivity growth in developing economies. IRS in services are exhibited both in Asia and Africa. As in the previous case, no relationship is found between services output growth and employment growth at the sectoral level for the Latin-American economies. In the Kaldorian framework this lack of relationship is explained by the existence of disguised

[16] In others Asian economies, such as China and India, this shift is being more slowly and evidence is missing.

unemployment. This may reflect the high levels of informality in Latin-America that hinders productivity growth in services (Pagés, 2012). The only exception to this respect refers to business services sector. As a matter of fact, this latter sector exhibits IRS for Asian and Latin-American countries included in the sample. In relation to this, Timmer and de Vries (2009) suggest market services (namely: distributive trades, financial services, and transport and communications) as highly important contributors to growth in developing Asia and Latin-America from 1950 to 2005. These authors find that productivity advances within manufacturing and market services are a key driver for growth.

Table 4. Panel data estimation of Kaldor´s Second Law: all developing countries

SECTOR	EQUATION II			
	β_{0i} / (s.e.)	β_{1i} /(s.e.)	H_o: $\beta_{1i} = 1$ / p-value	H_o: $\beta_{1i} < 1$ / p-value
j=manufacturing	-0.0096 0.0115	0.5819*** 0.0566	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.620		
j=agriculture	-0.0120 0.0066	0.1278 0.0748		
	R2	0.566		
j=services	0.0209*** 0.0054	0.2118*** 0.0545	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.342		
j=commerce	0.0224*** 0.0046	0.0028 0.0564		
	R2	0.400		
j=transport and communications	0.0098 0.0124	0.3803*** 0.0728	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.4072		
j=business services	0.0231 0.0141	0.3107*** 0.0463	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.541		
j=public services	0.0195*** 0.0054	0.3470*** 0.0858	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.385		
N	174			

Note. OLS estimations with fixed effects and PCSE accounting for groupwise heteroskedasticity, cross sectional dependence and serial correlation. Dummy coefficients estimates are available on request. Legend: s.e. for standar deviation; * p<0.05; ** p<0.01; *** p<0.001

4.3Kaldor´s Third Law

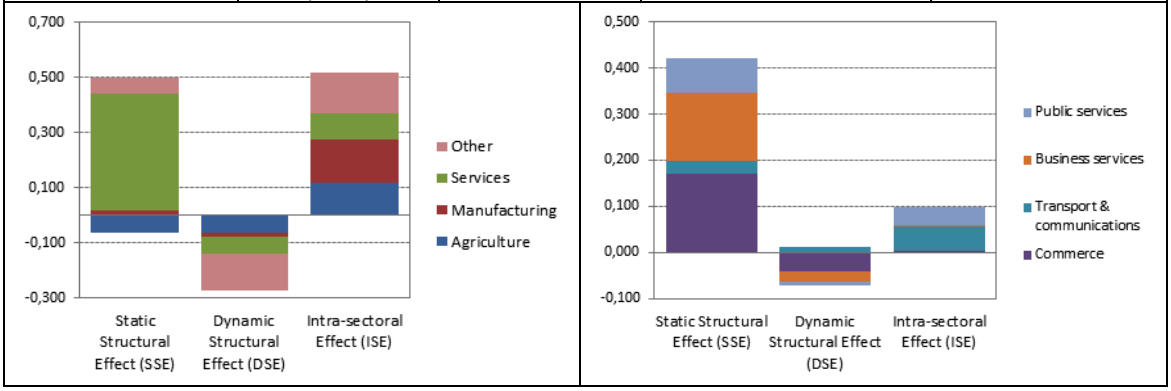
Productivity growth decomposition results accounting for Kaldor´s third law are displayed in Table 5, broken down into sectoral contributions.[17] In line with the Equation IV for the breakdown of the aggregate productivity, the sum of the static and dynamic structural effects (*SCE = SSE + DSE*), as well as the intra-sectoral growth effect (*ISE*), is equal to the average growth rate of labor productivity in the corresponding aggregate (first cell). This is how the data sums up horizontally. Vertically, for each of the three components, the contributions of each sector also add up to the corresponding figure in the first line of each sub-table. As additional

[17] "Other industry" (comprising mining and extracting activities, construction, and energy) is also included in this section in order to get valid results of shift-share technique.

information, the number in brackets shows the average growth of labor productivity within individual sectors, and does not add up either in the horizontal or in the vertical dimensions. The figures allow us to identify whether there are any regular patterns of differential productivity growth between industries.

Table 5. Productivity growth decomposition 1975-2005: all developing countries

SECTOR	Labor productivity growth	Static Structural Effect (SSE)	Dynamic Structural Effect (DSE)	Intra-sectoral Effect (ISE)
TOTAL	+0.680	+0.435	-0.274	+0.519
		=	=	=
Agriculture	(0.939)	-0.062	-0.065	+0.117
Manufacturing	(1.087)	+0.019	-0.014	+0.155
Other industry(*)	(1.854)	+0.055	-0.136	+0.150
Services	(0.280)	+0.422	-0.059	+0.097
Commerce	(0.068)	+0.171	-0.042	+0.004
Transport & communications	(1.040)	+0.027	+0.012	+0.051
Business services	(0.191)	+0.149	-0.022	+0.003
Public services	(0.374)	+0.075	-0.007	+0.038



Note: (*) 'Other industry' includes 'mining and extracting activities', 'construction' and 'energy'.

Results show that the moderate labor productivity growth (0.68 per cent) of developing countries is largely explained by the intra-sectoral component (Table 5). And, such within productivity growth, is mainly driven by the manufacturing sector. This finding is consistent with results obtained by some authors referred to other economic areas[18] and time horizons: the structural components (*SCE*) seem to be generally dominated by the within effects of productivity growth (*ISE*) during the analyzed period. However, the difference observed between both effects is lower in developing countries than in the case of advanced economies. Furthermore, the transfer of workers to high productivity *level* sectors has also contributed positively to productivity growth in developing countries. In particular, services account for a

[18] See: Peneder (2002 and 2003) for 28 countries of the OECD; Havlik (2005) for the new Eastern European countries belonging to the EU; Fagerberg (2000) for the manufacturing sectors in 39 countries based on the UNIDO; Timmer and Szirmai (2000) for the manufacturing sectors of four Asian countries; Maroto and Cuadrado (2009 and 2013) for OECD nations and regions, respectively; van Ark (1995) for a group of 8 countries of the EU and the USA; and Maudos et al. (1998) for the EU-15 and US.

large part of SSE with a significant role played by commerce and business services. Nevertheless, the resource reallocation *structural burden* seems to apply to our sample, since the *DSE* is negative (-0.274), with the only exception of transport and communications (+0.012).

Figures from Table 5 mask large differences across regions. Asia shows the highest labor productivity growth during 1975 and 2005 (1.65 per cent) which is mostly explained by the intra-sectoral component (Table D.1). Both manufacturing and services show the highest rates of Asian within productivity growth. Moreover, the SSE positively contributes to growth with the exception of agriculture. Business services accounts for a large part of such static structural bonus. The DSE is negative but rather small in comparison with the regions under study with dynamic productivity gains emerging from both manufacturing and services industries. This means that Asian economies – especially Indonesia, Thailand and Taiwan – seem not to have reached the *structural burden* yet.

The situation in Latin America is quite the opposite (Table D.2). This group of countries shows an extremely poor productivity performance during the three decades analyzed (0.008 per cent). Interestingly, the structural component is slightly higher than the ISE –with the exception of Chile, Argentina, Colombia and Brazil– mainly due to the significant SSE achieved in the services sector (particularly in commerce and business services). Notably, this is the only developing region in which static productivity losses are observed in manufacturing. The structural burden is comparatively important for the case of Latin America, showing a negative DSE in all sectors under study.

The African region follows, to a certain extent, the pattern found for the whole set of developing economies (Table D.3). Labor productivity growth (0.40 per cent) is mostly explained by the within component. Moreover, all sectors apart from agriculture contribute positively to static structural gains. In particular, commerce and public services account for a large part of such static structural bonus. The resource reallocation *structural burden* is also found African countries, since the *DSE* is negative (-0.299), with the exception of business services (0.006) transport and communications (0.002).

All in all, our decomposition results show that both manufacturing and services show static structural productivity gains for the whole set of developing countries. However, dynamic losses emerge due to resource reallocation structural burden. This pattern is the one followed by developing Africa. In Asia fast productivity growth is enhanced by a positive structural effect in both manufacturing and services. In contrast, a negative structural shift in manufacturing is

found in the case of poor performing Latin America, despite static effects in services are positive. In this respect, MacMillan and Rodrik (2011) point out that Asian countries have experienced growth-enhancing structural change during 1990-2005, whereas in Africa and Latin-America growth-reducing structural change has prevailed, indicating that labour has moved from high-productivity sectors (i.e., manufacturing) to less productive activities (i.e., personal services, informality or even unemployment).[19] Both low-income countries of Sub-Saharan Africa and middle-income economies of Latin-America have been intensely hit by deindustrialization, while Asian regions have been insulated from this trend (Rodrik, 2015). This kind of 'wrong' structural transformation is suggested to be related to the presence of large endowments of natural resources (which do not generate much employment unlike manufacturing industries and business-related services), the overvaluation of currencies (which have a negative effect on tradable modern sectors), and the reduced flexibility of labour markets (which hampers the flow of labour across firms and sectors).

5. Final remarks

Kaldor´s old ideas remain valid with respect to developing economies: manufacturing has been an engine of growth during the past three decades across Asian, Latin-American and African countries. We also find empirical support in favour of some service sub-sectors. While it is hard to find significant relationships between GDP growth and the growth of the agricultural sector, the relationship of the former with some services growth is generally strong (Thirwall, 2003 and 2013). Our findings also support this hypothesis. In particular, business services sector seem to allow productivity growth by the same Kaldorian mechanisms that have traditionally made manufacturing the driver of growth. This fact is related with their important (forward and backward) inter-industry linkages and with their use of knowledge and technology.

Therefore, notwithstanding the existent dissimilarities between manufacturing activities, the heterogeneity between service sub-sectors needs to be taken into account in the debate of how the productive structure of developing countries affects growth. Although being preliminary, our results convey an important policy message: a core manufacturing sector is critical for growth, as well as the promotion of capabilities in certain specific knowledge-based and innovative service sectors. Thus, as suggested by Felipe et al. (2009), the composition of services in the different countries is key in determining the sustainability of their contribution to growth.

[19] Recently, MacMillan et al. (2014) decompose their results for the period 1990-2000 and 2000-onwards, and find that structural change have been also growth-enhancing for the case of Africa in the latter period as result of small expansions in different manufacturing sub-sectors.

As a matter of fact, much of the attention conferred by literature to business services, knowledge-intensive services in particular, focusses on the capabilities for accumulating, processing and disseminating valuable information and knowledge that these firms may place on at the disposition of their clients. This relates to their high proportion of expert labour on a specific technical or functional domain, their contribution to knowledge formation processes, and their potential facilitation of innovative changes as co-producers of innovation (Gallego and Maroto, 2015; Miles et al., 1995; Den Hertog, 2002). Additionally, an important number of technology-intensive manufacturing sectors are thought to be major demanding actors of these knowledge-based business services (Guerrieri and Meliciani, 2005). Therefore, this kind of services seems to complement rather than replace manufacturing as an engine of growth in developing countries. This may explain why business services (still) do not play a significant role in African economies with weaker manufacturing basis than many Asian or Latin-American countries.

At the time the Kaldorian framework was developed there was a clear-cut distinction between sectors in an economy. At present, the distinction between many service and manufacturing industries is debatable since their boundaries have changed during the course of time, the distinction between service and manufacturing activities being increasingly unclear. The dynamic nature of the manufacturing–service interface seems to make the artificial division of these two economic sectors unsustainable and an impediment to the way in which we think about the structure and operation of both the economy and economic organizations (Daniels and Bryson, 2002). Accordingly, future research might try to account explore the dynamics of economic activities on the basis of their knowledge formation processes (i.e., following Pavitt`s (1984) or related innovation-based taxonomies).

Other issues still need to be addressed in the context of this investigation and offer a promising future research agenda. Firstly, the estimation of Kaldor´s Laws is an econometrical challenge. There is still room for further improvements as regards the use of, for instance, instrumental variables estimations and non-linear estimations. Moreover, technical progress diffusion poses an additional challenge in the empirical estimation of the Verdoorn law. If the former varies across countries, then, manufacturing productivity increase in 'laggards' countries may reflect the receipt of technical progress from leading countries, rather than increasing returns of scale. To avoid this problem, different alternatives are proposed in Verdoorn related literature, as for instance: i) The use of additional variables to account for the level of technological development, and ii) The use of cross-regional data, assuming that this minimizes the level of disparities in terms of level of technology. However, available data does not allow to undertake

such strategy. The analysis of individual countries using time series data would be another way to deal with this matter, which obviously exceeds the aim of the present work.

Secondly, the Kaldorian framework relies on an unproblematic take on productivity measurement, as the accurate measurement of services productivity is still an unresolved matter (Djellal and Gallouj, 2008). Thirdly, an input-output analysis would allow a better understanding of the relative contribution of final and intermediate demand to changes in the sectoral structure of developing economies. Finally, some scholars argue that the consolidation and stability of democracies may be hampered by 'premature deindustrialization' (Rodrik, 2015). In any case, the political consequences of the surge of services in developing areas are complex and deserve further scrutiny.

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Appendix A

Table A.1. Data availability by series in GGDC-10 Sector Database and Africa Sector Database

Country	Acronym	Value added at constant prices	Employment
Latin-America			
Argentina	ARG	1950-2005	1950-2005
Bolivia	BOL	1950-2005	1950-2003
Brazil	BRA	1950-2005	1950-2005
Chile	CHL	1950-2005	1950-2005
Colombia	COL	1950-2005	1950-2005
Costa Rica	CRI	1950-2005	1950-2005
Mexico	MEX	1950-2005	1950-2005
Peru	PER	1950-2005	1960-2005
Venezuela	VEN	1950-2005	1950-2005
Asia			
Hong Kong	HGK	1974-2005	1974-2005
Indonesia	IDN	1960-2005	1971-2005
India	IND	1950-2005	1960-2004
Korea	KOR	1953-2005	1963-2005
Malaysia	MYS	1970-2005	1975-2005
Philippines	PHL	1971-2005	1971-2005
Singapore	SGP	1960-2005	1970-2005
Thailand	THA	1951-2005	1960-2005
Taiwan	TWN	1961-2005	1963-2005
Africa			
Botswana	BWA	1968-2010	1964-2010
Ethiopia	ETH	1961-2010	1961-2010
Ghana	GHA	1960-2010	1960-2010
Kenya	KEN	1964-2010	1969-2010
Malawi	MWL	1966-2010	1966-2010
Mauritius	MUS	1970-2010	1970-2010
Nigeria	NGA	1960-2010	1960-2010
Senegal	SEN	1970-2010	1970-2010
South Africa	ZAF	1960-2010	1960-2010
Tanzania	TZA	1960-2010	1960-2010
Zambia	ZMB	1965-2010	1965-2010

Appendix B

Table B. Panel data estimation of Kaldor´s First Law

Table B.1. Asia

SECTOR (j)	**EQUATION I-A**		**EQUATION I-B**		**EQUATION I-C**	
	α_{1j} / s.e.	β_{1j} / s.e.	α_{2j} / s.e.	β_{2j} / s.e.	α_{3j} / s.e.	β_{3j} / s.e.
Manufacturing	.0276*** .0039	.4626*** .0523	.0710** .00611	.2400* .1007	.0537*** .0043	.3617*** .0590
	R2	0.715	R2	0.292	R2	0.520
Agriculture	.0712*** .0080	.1622* .0805	.0431* .0166	-.1708 .1019	0719*** .0080	.162 .0848
	R2	0.357	R2	0.285	R2	0.305
Services	.0021 .0038	.9223*** .0416	.0683 .00	-.244 .1358	-.0036 .0137	.9095*** .0864
	R2	0.920	R2	0.245	R2	0.747
Commerce	.012* .0056	.6755*** .0444	.0570*** .009	.3763 .209	.0134 .00762	.6102*** .0551
	R2	0.859	R2	0.351	R2	0.784
Transport and communications	.019* .0077	.548*** .0977	.0610*** .0054	-.2399** .0919	.02143* .0084	.5108*** .107
	R2	0.623	R2	0.352	R2	0.571
Business services	.0404*** .0051	.3097*** .0267	.058*** .0070	.2999*** .04819	.0408*** .0064	.2578*** .0274
	R2	0.750	R2	0.521	R2	0.649
Public services	.0362* .0150	.5048** .1929	-.5147*** .1132	-.5147*** .1132	.044* .01876	.397 .2341
	R2	0.362	R2	0.504	R2	0.277
N	54		54		54	

Table B.2. Latin-America

SECTOR (j)	**EQUATION I-A**		**EQUATION I-B**		**EQUATION I-C**	
	α_{1j} / s.e.	β_{1j} / s.e.	α_{2j} / s.e.	β_{2j} / s.e.	α_{3j} / s.e.	β_{3j} / s.e.
Manufacturing	.0114** .0043	.6353*** .0551	.020* .0097	.3848*** .1323	.0148*** .0054	.5564*** .0653
	R2	0.823	R2	0.422	R2	0.723
Agriculture	.0031 .0090	.612*** .2121	.0190*** .0051	-.6878*** .0857	-.0014 .0089	.821*** .196
	R2	0.323	R2	0.659	R2	0.438
Services	-.0002 .00288	.8998*** .0454	.0156 .0083	-.0420 .1583	-.0006 .00690	.7681*** .0918
	R2	0.916	R2	0.217	R2	0.6538
Commerce	.0101** .0033	.5420*** .0585	.01674* .00833	.1860 .1124	.01245** .0038	.4503*** .0700
	R2	0.720	R2	0.239	R2	0.571
Transport and communications	-.0062 .0046	.6304*** .0509	.01247 .0098	.1466 .1278	-.0004 .0034	.6007*** .0637
	R2	0.796	R2	0.207	R2	0.756
Business services	.0068 .0083	.3292*** .0452	.0137 .0083	.1277* .0561	.0088 .0085	.2349*** .0479
	R2	0.588	R2	0.381	R2	0.4017
Public services	.0055 .0076	.6264*** .1192	.0157** .0051	-.5235*** .0758	.0069 .0101	.5352*** .1517
	R2	0.476	R2	0.522	R2	0.358
N	54		54		54	

Table B.3. Africa

SECTOR (j)	**EQUATION I-A**		**EQUATION I-B**		**EQUATION I-C**	
	α_{1j} / s.e.	β_{1j} / s.e.	α_{2j} / s.e.	β_{2j} / s.e.	α_{3j} / s.e.	β_{3j} / s.e.
	α_{1j} / s.e.	β_{1j} / s.e.	α_{2j} / s.e.	β_{2j} / s.e.	α_{3j} / s.e.	β_{3j} / s.e.
Manufacturing	0.0435***	0.327***	0.0571***	0.1364*	0.0479***	0.2583***
	0.00798	0.0547	0.00992	0.06506	0.0084	0.0567
	R2	0.626	R2	0.586	R2	0.575
Agriculture	0.06175***	0.2370***	0.0553	-0.150***	0.0658***	0.0103
	0.0105	0.0636	0.01314	0.0575	0.0124	0.0612
	R2	0.515	R2	0.397	R2	0.495
Services	0.0041	0.7074***	0.04936***	-0.2532***	0.0098	0.4857**
	0.0107	0.0818	0.0038	0.0769	0.0166	0.1291
	R2	0.729	R2	0.542	R2	0.437
Commerce	0.0128*	0.4545***	0.0629***	-0.00883	0.024728*	0.3944***
	0.0064664	0.0474	0.0110	0.0673	0.0126	0.0711
	R2	0.793	R2	0.412	R2	0.625
Transport and communications	0.0313**	0.2993***	0.0586	0.1035	0.0339**	0.2641***
	0.0093	0.0593	0.0111	0.09725	0.0098	0.0608
	R2	0.640	R2	0.431	R2	0.597
Business services	0.03506***	0.4520***	0.05445	-0.2164*	0.03842***	0.3959***
	0.00991	0.0760	0.00725	0.1088	0.0108	0.0817
	R2	0.641	R2	0.558	R2	0.580
Public services	0.0429***	0.2259**	0.0582***	-0.2625***	0.0501	0.0907
	0.01063	0.0895	0.0083	0.0693	0.0126	0.1033
N	66		66		66	

Note. OLS estimations with fixed effects and PCSE accounting for groupwise heteroskedasticity, cross sectional dependence and serial correlation. Dummy coefficients estimates are available on request. Legend: s.e. for standar deviation; * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

Appendix C

Table C. Panel data estimation of Kaldor´s Second Law

Table C.1. Asia

SECTOR (j)	**EQUATION II**			
	β_{0i} / (s.e.)	β_{1i} /(s.e.)	H_o: $\beta_{1i} = 1$ / p-value	H_o: $\beta_{1i} < 1$ / p-value
Manufacturing	-.060*** .0082	.695*** .070	Reject H_o (0.0000)	Retain H_o (.99999159)
	R2	0.766		
Agriculture	-.0307*** .0103	.461*** .1101	Reject H_o (0.0000)	Retain H_o (.9999995)
	R2	0.587		
Services	.0252*** .0065	.283*** .0749	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.333		
Commerce	.03134*** .0083	.1033 .1013		
	R2	0.091		
Transport and communications	.0231 .0124	.2626** .0984	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.377		
Business services	.0554*** .0108	.2414*** .0491	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.419		
Public services	.0319* .0107	.1968 .1168		
	R2	0.453		
N	54			

Table C.2. Latin-America

SECTOR (j)	**EQUATION II**			
	β_{0i} / (s.e.)	β_{1i} /(s.e.)	H_o: $\beta_{1i} = 1$ / p-value	H_o: $\beta_{1i} < 1$ / p-value
Manufacturing	-.0082 .0093	.2992 .1964		
	R2	0.427		
Agriculture	-.0073 .0078	-.1025 .2102		
	R2	0.118		
Services	.0245*** .0043	.0033 .0930		
	R2	0.360		
Commerce	.0223 .0049	.0185 .1037		
	R2	0.389		
Transport and communications	.0161 .01348	.1964 .1467		
	R2	0.075		
Business services	0261 .0151	.1772* .0825	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.580		
Public services	.0207*** .0056	.2691 .1624		
	R2	0.315		
N	54			

Table C.3. Africa

SECTOR (j)	**EQUATION II**			
	β_{0i} / (s.e.)	β_{1i} /(s.e.)	H_o: $\beta_{1i} = 1$ / p-value	H_o: $\beta_{1i} < 1$ / p-value
Manufacturing	.0301 .0228	.718*** .1158	Reject H_o 0.0152	Retain H_o .99242332
	R2	0.613		
Agriculture	.0116 .0065	-.110** .0400		
	R2	0.559		
Services	.0281** .0105	.30794** .0949	Reject H_o (0.0000)	Retain H_o (1.0000)
	R2	0.378		
Commerce	.0805*** .0172	.1104 .109		
	R2	0.305		
Transport and communications	-.0182 .0211	.666*** .0907	Reject H_o (0.0000)	Retain H_o .99988027
	R2	0.556		
Business services	.0143 .0120	.8220*** .1009	Retain H_o (0.0779)	Retain H_o (.96105105)
	R2	0.623		
Public services	.0031 0154	.3958** .1180	Reject H_o 0.0000	Retain H_o .99999984
	R2	0.438		
N	66			

Note. OLS estimations with fixed effects and PCSE accounting for groupwise heteroskedasticity, cross sectional dependence and serial correlation. Dummy coefficients estimates are available on request. Legend: s.e. for standar deviation; * p<0.05; ** p<0.01; *** p<0.001

Appendix D

Table D. Productivity growth decomposition: Percent contribution of each effect.

Table D.1. Asia

SECTOR	Labor productivity growth	Static Structural Effect (SSE)	Dynamic Structural Effect (DSE)	Intra-sectoral Effect (ISE)
TOTAL	+1.655	+0.479	-0.190	+1.366
Agriculture	(1.338)	-0.084	-0.139	+0.225
Manufacturing	(2.917)	+0.035	+0.009	+0.414
Other industry(*)	(3.991)	+0.085	-0.234	+0.290
Services	(1.027)	+0.443	+0.174	+0.437
Commerce	(0.992)	+0.107	+0.087	+0.162
Transport & comm.	(2.039)	+0.038	+0.035	+0.106
Business services	(0.758)	+0.211	+0.028	+0.038
Public services	(0.849)	+0.087	+0.024	+0.131

Table D.2. Latin-America

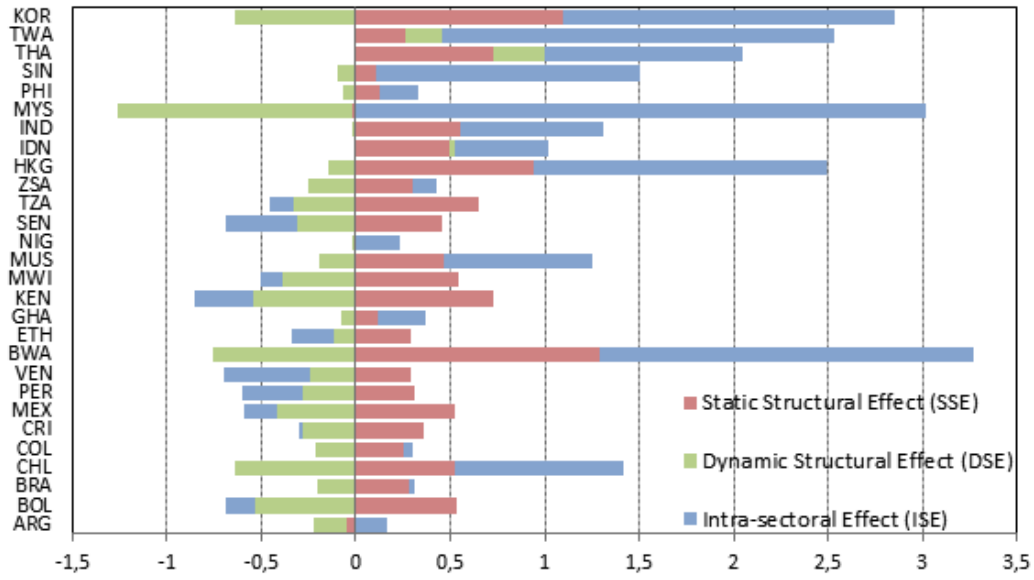
SECTOR	Labor productivity growth	Static Structural Effect (SSE)	Dynamic Structural Effect (DSE)	Intra-sectoral Effect (ISE)
TOTAL	+0.008	+0.338	-0.332	+0.002
Agriculture	(1.180)	-0.040	-0.045	+0.085
Manufacturing	(0.226)	-0.035	-0.022	+0.046
Other industry(*)	(0.585)	+0.025	-0.060	+0.027
Services	(-0.310)	+0.388	-0.205	-0.156
Commerce	(-0.473)	+0.167	-0.095	-0.089
Transport and comm.	(0.414)	+0.022	+0.000	+0.019
Business services	(-0.385)	+0.163	-0.098	-0.033
Public services	(-0.219)	+0.036	-0.012	-0.053

Table D.3. Africa

	Labor productivity growth	Static Structural Effect (SSE)	Dynamic Structural Effect (DSE)	Intra-sectoral Effect (ISE)
TOTAL	+0.407	+0.483	-0.299	+0.222
Agriculture	(0.299)	-0.061	-0.010	+0.042
Manufacturing	(0.119)	+0.057	-0.030	+0.005
Other industry	(0.987)	+0.056	-0.115	+0.166
Services	(0.122)	+0.431	-0.144	+0.009
Commerce	(-0.315)	+0.239	-0.119	-0.060
Transport & comm.	(0.667)	+0.021	+0.002	+0.029
Business services	(0.200)	+0.074	+0.006	+0.005
Public services	(0.492)	+0.097	-0.033	+0.035

(*) Note: 'Other industry' includes 'mining and extracting activities', 'construction,' and 'energy'.

Figure D.1. All developing economies, 1975-2005



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