ISSN 2318-2377

TEXTO PARA DISCUSSÃO Nº 680

ENHANCING INDUSTRY-MODERN SERVICES INTEGRATION VIA COMPETITIVE REAL EXCHANGE RATES

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Maio 2025

Textos para Discussão

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Ficha catalográfica

P436e
2025

Enhancing industry-modern services integration via competitive real exchange rates / Wallace Marcelino Pereira., Fabrício Missio. Frederico Gonzaga Jayme Júnior. - Belo Horizonte: UFMG / CEDEPLAR, 2025.

1v.: il. - (Texto para discussão, 680)
Inclui bibliografia.
ISSN 2318-2377

1. Desenvolvimento econômico. 2. Política econômica. 3. Biodiversidade. I. Pereira, Wallace Marcelino. II. Missio, Fabrício José. III. Jayme Júnior, Frederico Gonzaga. IV. Universidade Federal de Minas Gerais. Centro de Desenvolvimento e Planejamento Regional. V. Título. VI. Série.

CDD: 330

Elaborado por Adriana Kelly Rodrigues CRB-6/2572

UNIVERSIDADE FEDERAL DE MINAS GERAIS FACULDADE DE CIÊNCIAS ECONÔMICAS
CENTRO DE DESENVOLVIMENTO E PLANEJAMENTO REGIONAL

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2025

Sumário

Enhancing Industry-Modern Services Integration via Competitive Real Exchange Rates

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Abstract: This article discusses theoretically the role of the Real Exchange Rate (RER) on the integration of industrial and modern services sectors. It highlights the historical importance of manufacturing in economic growth and explains how deindustrialization since the 1970s has elevated the significance of modern services, which are critical for productivity and innovation. The symbiotic relationship between the manufacturing and services sectors is a vital force that induces pro-growth structural economic change. We demonstrate how competitive RER encourages structural adjustments and investments, promoting interaction between the manufacturing and services sectors, particularly in developing economies, thereby enhancing global competitiveness. In a two-cycle process, a competitive RER initially boosts profitability and external competitiveness, leading to increased automation and collaboration with modern services. This interaction catalyzes "amplified dynamic increasing returns to scale," driven by shared innovations. Over time, as sectors reap profits, they deepen their integration, improve products, and broaden market access. Consequently, the RER fosters a symbiotic relationship that is essential for sustainable economic development and competitiveness in international trade.

Keywords: Industry-Modern Services Symbiosis; Real Exchange Rate, Economic Growth

JEL: O4; E6; L8

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Introduction

This paper explores the theoretical impact of the real exchange rate (RER) on the symbiotic relationship between manufacturing and modern services, focusing on how this integration can potentially influence economic growth. Structural changes arise from shifts within production systems and labor dynamics across different sectors. These transformations can either promote or hinder growth, primarily determined by productivity changes in sectors reallocating resources. The increasing integration of manufacturing and modern services is identified as a crucial driver of structural economic change that supports sustainable economic growth.

Modern services sector can be defined as "a set of dynamic activities based on the generation and dissemination of technical and scientific knowledge, applied transversally in the productive structure through digital means, with the aim of increasing productivity and/or adding value to production" (Pereira, 2021, p. 7). Specifically, we can see its presence in products manufactured with embedded software for everyday use and in production lines, through the integration of mechanical, electronic and digital systems.

This type of service plays an essential role in modern economies because it contributes to adding value and increasing productivity. Its integration with manufacturing can therefore be understood as a new stage in the process of structural change in which the rigidly defined boundaries of agriculture, industry and services are no longer clear. Modern services are pervasive and transversal to the entire productive structure.

Therefore, sustained long-term economic growth depends heavily on a production structure in which manufacturing and modern services are symbiotically integrated. This synergy is believed to enhance dynamic increasing returns to scale, with the advantages from both sectors being maximized through mutual collaboration. The convergence of these sectors spurs cooperative development and reinforces mutual growth.

The paper highlights how a competitive exchange rate may theoretically enhance the efficiency of interactions between manufacturing and services, thereby fostering economic growth. Productive efficiency is conceptualized as the capacity to lower production costs while optimizing the use of available technology through the integration of manufacturing and modern services. Integration, in this sense, is defined as the symbiosis between manufacturing and modern services. Symbiosis refers to the interdependence and integration between manufacturing production and the modern services sector capable of generating static and dynamic increasing returns to scale to a greater degree and extent than manufacturing or services alone. That is, Extended Increasing Returns to Scale.

This analysis underscores the pivotal role of services in boosting production efficiency and catalyzing economic growth. It suggests that policymakers should integrate insights from the manufacturing-services symbiosis into their strategic frameworks, particularly in managing the RER, to fully exploit the theoretical potential of this relationship.

The paper is organized as follows: Section 2 reviews the literature on the role of deindustrialization and the rise of modern services in economic growth, including the impact of the exchange rate on their symbiotic relationship. Section 3 explores the integration of industries and modern services, providing insights into RER channels. Finally, Section 4 presents the conclusions.

Industrial and Services Sector in economic growth perspectives

The manufacturing sector plays a crucial role in driving economic growth due to several reasons, such improvement of productive, higher levels of technological progress and relaxing the balance of payments constraints. Firstly, the sector exhibits a positive impact on the overall output of the economy and demonstrates the ability to generate high productivity gains compared to other sectors, which aligns with Kaldor-Verdoon's law (Di Meglio & Gallego, 2022). Secondly, the manufacturing sector facilitates the development of activities that involve higher levels of technological progress and value addition. Lastly, as economies progress to more advanced stages, the industrial sector assumes the role of a net exporter of capital goods and/or other products with high income elasticity, relaxing the balance-of-payments constraint.

Furthermore, enjoys dynamic increasing returns to scale, which distinguishes it from other economic sectors that are characterized by either constant returns to scale (such as traditional services) or decreasing returns (like agricultural activities and mining). As a result, the dynamics of industrial activities drive overall productivity growth in the economy, leading to long-term income growth.

The role of RER on growth has been extensively discussed since the 1960s, with one notable outcome being the Balassa-Samuelson effect (BS). This effect posits that productivity gains positively impact wages and have differential effects on the tradables (manufacturing sector) and nontradables sectors (Balassa, 1964; Samuelson, 1964). In the case of tradable products, where prices tend to equalize in the international market, a country with higher production levels experiences an appreciation of its currency in terms of Purchasing Power Parity - PPP. Conversely, in the nontradables sector, characterized by lower productivity, prices rise more rapidly than in the tradables sector. These dynamics lead to the expansion of the nontradables sector within the economy.

Some literature raises concerns about the expansion of the services sector and its implications for economic growth. Baumol (1967) developed a theoretical evaluation on services sectors known as the 'costs disease'. From the supply side, this approach argues that despite being less productive, services tend to follow wage increases in the manufacturing sector. This leads to rising production costs and changes in relative prices within the economy, potentially limiting the competitiveness of countries whose productive structure shifts towards services.

Conversely, from the demand side, there is a strong connection between the income elasticity of demand for goods and services and the increase in per capita income. As per the assumption of technical progress in the manufacturing sector, income growth drives changes in society's consumption patterns. If societies adopt more sophisticated consumption habits, the services sector becomes increasingly significant in the dynamics of economic growth[4] (Clark, 1940; Fuchs, 1965).

The point to emphasize is that for more than half of the twentieth century, the literature on economic growth has provided evidence that the manufacturing sector has a primacy in output growth. On the other hand, the service sector did not show any characteristics of greater importance for economic growth. It was not until the 1970s that a significant shift occurred with the process of deindustrialization and the emergence of the Information and Communication Technology (ICT) paradigm. This led to a profound

[4] According to Engel's law (or Bell's law), an increase in real income causes changes in the composition of domestic demand in favor of more sophisticated consumption desires, consequently reallocating economic resources. Since services have a higher income elasticity of demand than manufactured goods, consumption shifts towards them (Clark, 1940; Comin et al., 2021).

change in the way the services sector began to organize its productive activities and position itself within the productivity chains of the economic system.

The emergence of specific segments within the service sector as an independent and productive sector, capable of enhancing productivity and adding value to production, increased its relevance in relation to economic growth. This shift drew the attention of researchers and policymakers (Roach 1988; Dunning, 1989). This question is discussed in the next section.

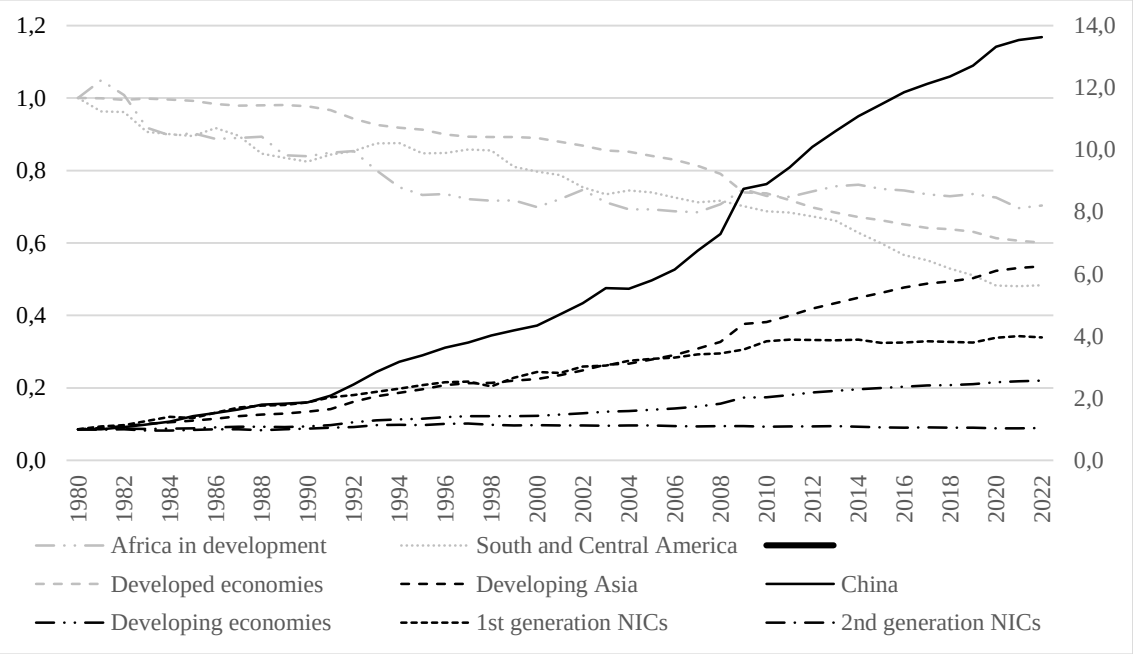
2.1. Deindustrialization and the rise of modern services

Deindustrialization began in the 1970s, marked by a decline in the relative significance of the manufacturing sector in advanced economies and a corresponding increase in the contribution of the services sector to national income. Tregenna (2009) posits that deindustrialization is evidenced by a decrease in industrial employment and value-added in the manufacturing sector relative to total employment and Gross Domestic Product (GDP).

In developed countries, deindustrialization is viewed as a natural outcome of successful economic development, where the manufacturing sector has played a role in improving living standards (Baumol, 1967; Fuchs, 1965; Rowthorn & Ramaswamy, 1997; Tregenna, 2016). However, in developing countries, deindustrialization is considered early or premature as it occurs before reaching a similar per capita income level to that of developed countries. In such cases, the long-term development prospects of these countries tend to be limited (Rowthorn & Wells, 1987; Palma, 2005; Rodrik, 2016). This limitation on economic development arises due to decrease in the capacity to add value to production, a decline in investment rates, a limitation of technical progress, and imbalances in the balance of payments.

Figure 1 shows the trajectory of deindustrialization in the Western world, compared to the behavior of manufacturing in the Eastern world, with a focus on China, over the past forty-two years. Developed countries, Africa, and South and Central America show continued losses. In the special case of South and Central America, deindustrialization has been more intense since 2010. The behavior of these economies illustrates why this phenomenon is relevant to understanding long-term growth.

Figure 1 - International Relative Deindustrialization Index - selected regions, 1980 - 2022



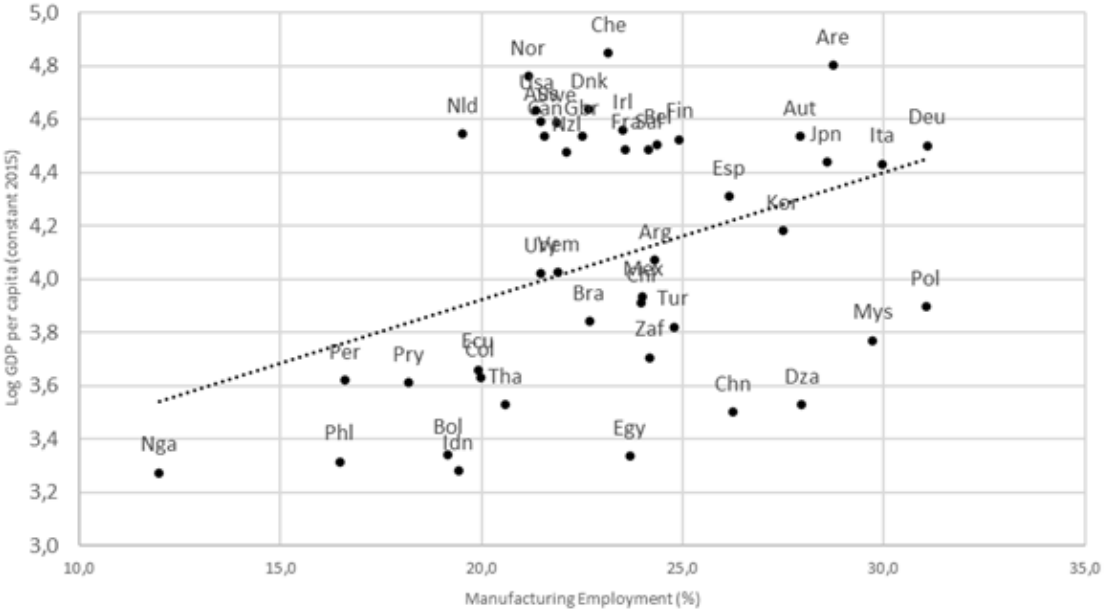
Source: prepared by the authors based on Arend's methodology (2010)

On the other hand, Asian countries have shown the opposite trajectory, with China standing out as the leader of the industrialization phenomenon. The first and second direction Newly Industrialized Countries (NICs) and developing economies follow the same trend, but at a slower pace. In any case, Figure X helps to understand the degree and extent of the phenomenon taking place in the world. Asia, on the one hand, stands out as the dynamic center of innovation and a lever for global productivity, especially since the 2000s, while developed economies seek to reconfigure their productive structure in the face of deindustrialization.

Central to the deindustrialization process is that long-term economic growth depends on the productivity of the service sector, especially those subsectors that emerge with new production dynamics (Rowthorn & Ramaswamy, 1999). These subsectors are those that we can call modern services and that play a decisive role in driving economic development.

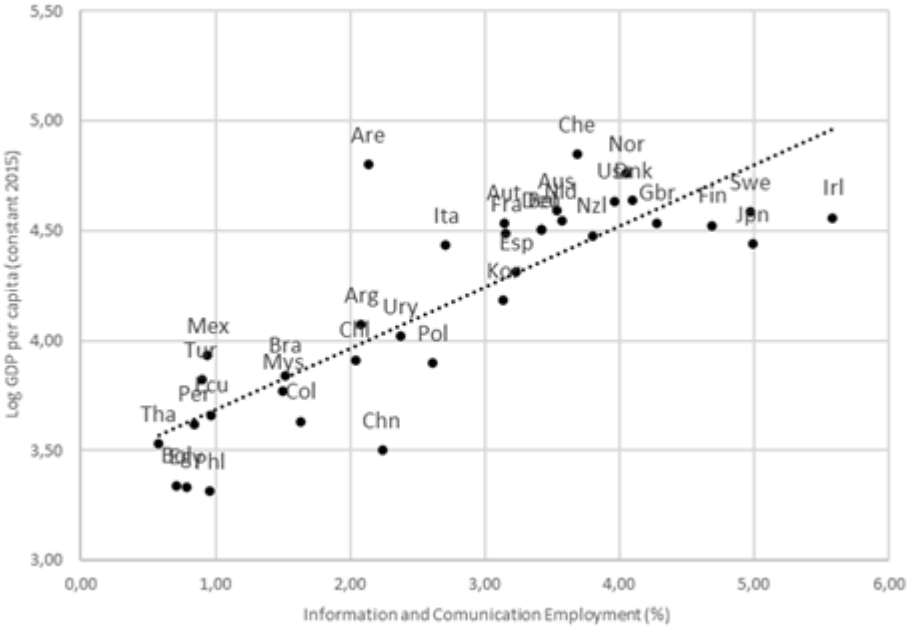
Figures 2 and 3 illustrate some of this literature on the importance of modern services. It shows the relationship between GDP per capita and the share of employment in manufacturing and employment in information and communication services. The correlation is positive in both cases. Figure XA summarizes the historical relationship between the level of economic development and employment in manufacturing, while Figure XB suggests the recent positive association between the level of development and employment in modern service activities.

Figure 02 – Relationship between GDP per capita and employment share in manufacturing sector for selected countries, 1970-2023.



Source: prepared by the authors based on IOLstat

Figure 03 – Relationship between GDP per capita and employment share in Information and Communication services sector for selected countries, 2014-2023



Source: prepared by the authors based on IOLstat

In the literature, it is possible to find terms such as intermediate services, modern services, sophisticated services, productive services, professional or business services, and finally, cost and value-added services (see Apendix 01). The classification depends on the availability and level of data disaggregation, and variations may occur over time due to the evolution of the global economy itself, based on constant technological changes (Kon, 2004).

Thus, modern services sector can be defined as "a set of dynamic activities based on the generation and dissemination of technical and scientific knowledge, applied transversally in the productive structure through digital means, with the aim of increasing productivity and/or adding value to production" (Pereira, 2021, p. 7). The term "modern services" is more appropriate, as it carries with it the idea of technological progress (Mishra et al. 2011). Furthermore, assuming that the current economy is based on the generation, dissemination and application of knowledge intensively, the word "modern" is more appropriate because it expresses the dynamic behavior of this sector (Dominiak 2018), always expressing the avant-garde.

For the purposes of the concept of modern services adopted in this study, it is important to emphasize that the modern services sector is not homogeneous, despite performing the functions of generating and disseminating technical-scientific knowledge. In these terms, we can divide the modern services sector into two groups that are interconnected.

They are: 1) Modern technological services: These combine highly qualified technical-scientific professionals with highly technological equipment, mainly aiming to add value and lead the technological frontier; 2) Modern professional services: These combine highly skilled technical and organizational professionals with socially widespread technological equipment, mainly aiming to increase productivity. These qualifications about the modern services sector contribute to a better understanding of what this sector is and how it operates within the productive structure. This is important because there is an emerging literature showing that the modern service sector contributes positively to economic growth.

2.2. Services in economic growth

The first signs of a change in the role of services in growth were observed in the 1980s. Roach (1988) identified that in the United States, the growth rate of capital stock was higher in the services sector compared to the manufacturing sector, particularly in activities related to ICT activities. A similar trend was observed in Europe. Additionally, Ark and McGuckin (2003) support the notion that the productivity improvement in these economies was driven by the dominant employment share in the ICT production sector and the rapid productivity growth of industries that extensively utilized ICTs.

The repositioning of services within the productive structure can be attributed to several factors. Firstly, there has been an increase in the share of services in intermediary consumption. Secondly, there has been a trend towards outsourcing certain activities. Thirdly, services have expanded their role by incorporating additional value into physical production through marketing, distribution, maintenance, after-sales, and assistance services. Fourthly, the growth of financial and transportation services has contributed to enhancing overall economic efficiency. Lastly, the services sector has demonstrated its ability to create new products and expand markets (Dunning, 1989).

The diffusion of information technologies, particularly the use of computing and software in financial and operational management of manufacturing production, has played a crucial role in facilitating the transverse position of services within the productive structure (Bell & Pavitt, 1993). Among the activities within modern services, Knowledge-Intensive Business Services (KIBS) have emerged as noteworthy. The literature on KIBS highlights their contribution to supplying knowledge to the industrial sector and fostering innovation (Hertog, 2000; Miles et al., 2008; Gallego & Maroto, 2015).

Besides, services contribute to productivity and economic growth, since they are also subject to Kaldor's laws (Dasgupta & Singh, 2006; Ariu et al., 2019; Di meglio et al., 2018; Giovanini & Arend, 2017; Leon-Ledesma & Moro, 2020; Pereira et. al., 2024; 2025). Especially in developing countries, ICTs perform a relevant role in raising productivity and ensure a relatively satisfactory position in the global value chain (Dasgupta & Singh, 2006; Di meglio & Gallego, 2022).

Other researchers have argued that the services' activities add value and contribute to product differentiation by generating innovation and ensuring external competitivity, so they are important to relieve external pressure (Castellacci, 2008; Cainelli & Mazzanti, 2013; Arbache, 2014).

Regarding symbiosis, it emphasizes the importance of considering the integration between the manufacturing sector and services in order to understand economic development (Engelbrecht, 1992; Park, 1994; Karaomerioglu & Carlsson, 1999; Ascani & Iammarino, 2018; Di Berardino & Onesti, 2018; Giovanini & Arend, 2019; Giovanini et al., 2020; Pereira at al., 2024).

Thus, the relationship between modern services and the manufacturing sector is bidirectional, and their interaction plays a vital role in maintaining the economy's total employment in conditions of intersectoral transition of employment. This is the basic trait of a positive structural change. In other words, ICTs narrow the intersectoral dynamics present in value chains and contribute to the overall productive efficiency of the economy. (Di Berardino; Onesti, 2018).

Recent studies further support the argument that in advanced economies, the productive structure is characterized by a significant involvement of companies in the production of integrated goods and services. This trend is observed in many countries worldwide (Barreto et al., 2017; Cadestin & Miroudot, 2020). Consequently, the current production process goes beyond the creation of tangible goods and incorporates a wide range of intangible goods or a combination of both. This poses a challenge in accurately measuring the share of services incorporated in the diverse products available in the market.

The current production process is increasingly characterized by a symbiotic integration between manufacturing and modern services, supported by development strategies and industrial policies that recognize this symbiosis as a crucial factor for growth. Merely producing a manufactured product is no longer sufficient; the product needs to possess differentiating factors that can only be achieved through the incorporation of modern services, such as design, on-board computer systems, mobile applications, artificial intelligence, and software for human-machine interactions. These elements contribute to enhancing the value and competitiveness of the final product in the market.

In summary, the literature on services highlights several factors that underscore the importance of this sector in boosting productivity, fostering innovation, enhancing the quality of production efficiency, and ultimately driving economic growth. The productive dynamic stimulates forms of integration between manufacturing and services (symbiosis) that outperform the traditionally known forms of production.

This scenario imposes challenges for economic policymakers. Understanding how to stimulate the symbiosis between the sectors is relevant for improving economic policies. Particularly in developing countries, services offer new opportunities for job creation, value generation, and structural change. (UNCTAD, 2017). We dedicate special attention to this question of macroeconomic policy in the next section.

2.3 The RER and its role in the symbiosis between manufacturing sector and modern services

There is extensive empirical literature showing that an undervalued RER has positive effects on growth (Rodrik, 2008; Razmi et al., 2012; Missio et al., 2015; Rapetti, 2016, 2020; Habib et al., 2017; Nassif et al., 2017; Guzman et al., 2018; Gabriel & Missio, 2018; Demir & Razmi, 2021; among others).

According to this literature, the RER can promote economic growth through various channels, including the 'foreign savings channel,' the 'development channel' or 'tradable-led channel,' and the 'capital accumulation channel,' among others (see Blecker, 2021). In the first case, it is argued that RER depreciation can affect aggregate savings by influencing consumption and investment paths through alterations in the functional distribution of income (Lima & Porcile, 2013; Rapetti, 2016). Basically, the RER affects real wages and transfers workers' income to profits. In this way, the self-funding capacity of firms increases, as does the availability of funds that can be changed in the process of expansion and improvement of productive quality (Levy-Yeyati & Sturzengger, 2009; Dao et al., 2017).

Through the "tradable-led growth channel", a competitive RER can promote a structural change from towards non-tradable to tradable sectors (Frenkel and Ros, 2006, Rodrik, 2008; Rapetti, 2020; among others). In the same vein, a competitive exchange rate also has a positive impact on investment and capital accumulation by inducing changes in the sectoral composition of GDP and employment. Razmi et al. (2012), and Rapetti (2020) argue that real depreciation redirects domestic consumption towards non-tradable goods and frees up a larger share of the tradable sector's production for exports, leading to increased profitability and investment.

Some studies investigate the integration of these different transmission channels. In general, these analyses suggest that a competitive exchange rate induces changes in the productive structure by facilitating the transition of tradable sectors from low to high productivity. The management of the RER favors the manufacturing sector, influencing investment decisions, changing the distribution of intersectoral profits, promoting resource reallocation, and stimulating increasing returns to scale (Vaz & Baer, 2014; Dhasmana, 2015; Hunegnaw, 2017; Dao et al., 2017; Alfaro et al., 2018; Mazorodze & Tewari, 2018; Panda & Nanda, 2019; Gabriel et al., 2020; Iasco-Pereira et. al, 2024;). Furthermore, there is a body of research suggesting that the structural change induced by a competitive RER affects the income elasticity of imports and exports, which relaxes the foreign restrictions (Missio & Jayme Jr., 2012; Porcile et al., 2020; Goda et. al, 2024).

Recent studies also indicate that RER competitiveness can stimulate the services sector (Baggs et al., 2010; Alimi, 2025; Pereira et. al., 2025). Evidence from Canadian firms shows that a competitive RER favors the survival and sales of the services sector, while manufacturing is more sensitive in terms of profitability (Baggs et al., 2010). Alimi (2025) shows that the effects of changes in the RER on sectoral employment shares are neutral in the short term and significant in the long term. According to the author, the effect differs across sectors, and while undervalued currencies boost employment in the agriculture and services sectors, the same may not be true for manufacturing. Similar results are found for the modern services sector. The undervalued RER is capable of promoting structural changes in modern service activities and is capable of positively affecting employment and value added (Pereira et al., 2025).

In terms of international trade, Pattichis (2012) suggests that the RER has a significant effect on the services trade balance of the United States and the United Kingdom between 1986 and 2009. Similar findings have been observed for developed and developing countries, with the RER's effect being stronger for modern services exports compared to

goods exports. Eichengreen and Gupta (2013a) argue that a depreciated exchange rate alters the relative prices of exports and promotes resource allocation in favor of the tradable sector. In the case of modern services, the effect of the RER on resource allocation is faster, as this sector relies less on imported inputs and has lower fixed input costs, leading to a more elastic response in service supply. Additionally, the price elasticity of demand for these exports is higher.

Lastly, Sahoo et al. (2019) conducted a study on the impact of RER movements on the total of exports and modern and traditional services in India. The authors argue that a competitive exchange rate policy contributes to sustaining the exports of services in the long term. Mahalik & Pal (2024) conduct the investigation from the point of view of total, traditional and modern service imports to India. The authors show that the devalued real exchange rate reduces service imports differently. Traditional services are more sensitive than modern services to exchange rate depreciation, highlighting the nature of remittances in consumption and production activities.

Despite the existing studies, we have identified some gaps in literature. Firstly, there is limited mention of the symbiosis between the manufacturing sector and services and its impact on economic growth. This intersectoral relationship appears to be crucial in understanding the recent economic growth of certain nations. Second, we noticed an absence of studies investigating the role of macroeconomic policy in promoting interaction between the services sector and manufacturing sector. An important question to consider is whether the RER, which can affect the dynamics of added investment, also influences the rate of investment in the modern services sector. These are relevant and unexplored questions that we aim to discuss in the next section.

Integrating Industries and Modern Services: insights into RER channels

The RER plays a crucial role in enhancing the symbiotic integration between the manufacturing sector and modern services, working through two complementary cycles: the short term (Cycle 1) and the long term (Cycle 2). In both cycles, three transmission channels - external competitiveness, profitability, and investment - operate in a complementary manner, alternating in importance over time. In Cycle 1, characterized by companies with limited access to foreign markets, competitive RER boosts external competitiveness and domestic demand, increasing profits and stimulating investment in both manufacturing and modern services. This process fosters productive modernization, laying the groundwork for structural changes and GDP growth. In Cycle 2, with companies accessing foreign markets, the maintenance of investments and competitiveness gains consolidates the development of a new service portfolio. This progress is further enhanced by technical advancements resulting from investments in new technologies and R&D, supporting structural growth and sustainable economic expansion.

More specifically, in the manufacturing sector, during the nascent phase of structural change, the channels of profitability and external competitiveness are particularly sensitive to a competitive RER. This sensitivity arises from the need for the economic structure to recalibrate itself to adapt to shifting market dynamics. The depreciation of the exchange rate enhances external competitiveness by making domestically produced goods more attractive in international markets, thereby increasing export demand. This boost in demand directly influences potential profitability by allowing firms to achieve greater sales volumes at competitive prices, improving margins in the short to medium term.

Besides, for manufacturing sectors reliant on imported inputs, a competitive RER policy puts pressure on costs. As a result, these companies are compelled to invest in productivity improvements and automation of their production lines as a means of cost reduction. In such circumstances, the solution lies in acquiring modern machinery and hiring skilled personnel in modern services to implement and/or enhance industrial automation within their facilities. At same time, industrial sectors that produce goods/inputs competing with similar imports experience an increase in demand and subsequently higher profits. This upturn in demand encourages investments aimed at expanding production capacity.

Over the long term, a sustained competitive RER induces structural change by prompting changes in sectorial production shares. As certain industries expand due to favorable export conditions, resources are reallocated, leading to a transformation in the sectoral composition of the economy. This shift not only supports a more export-oriented industrial base but also fosters the development of industries with higher value-added production, contributing to economic resilience and sustainable growth. In essence, the competitive RER serves as a catalyst for dynamic adjustments within the manufacturing sector, driving both immediate gains in profitability and enduring structural transformation.

In the case of the modern services sector, it is important to highlight some characteristics of this sector: i) wages are typically higher compared to the traditional services sector; ii) production stages are shorter and developed within relatively compressed timeframes; and iii) investment in physical capital is generally lower than in the manufacturing sector, resulting in lower inflow and outflow costs.

Thus, a competitive RER reallocates relative operating costs in favor of domestic service companies by increasing external competitiveness and encouraging domestic manufacturing to consume service inputs. The signaling of greater profits by service companies operating in the domestic and international market encourages investment in physical capital and the hiring of new professionals. Therefore, the expectation of profit and the conquest of foreign market share, induce the integration between manufacturing and service companies. This occurs to improve productivity via automation and reduce costs to face international competition.

The competitive RER also stimulates investment in the product creation process. From the services sector, the manufacturing sector demands market research, product design, and data analysis, as well as the creation of applications that will be incorporated into the final product. This process, focused on product development and engaging service companies to improve productivity and automation, introduces a new stage known as the amplified dynamic increasing returns to scale. This phenomenon is a productive manifestation of the symbiosis between manufacturing and modern services.

At this stage, the products are ready for sale. The hired services have successfully accomplished their objectives, including market mapping, improved design, enhanced sales strategies, and the development of specific and integrated applications for the product, facilitating interaction with consumers. The result of the symbiosis is reflected in the increase in GDP.

After that, the industrial facilities are expanded and modernized. The production process is automated, and at each stage, information is generated, processed, and analyzed to identify any failures and monitor production performance over time. As a result, both sectors become more competitive and are well-positioned to enter the international market favorably. This sets the stage for the beginning of a new cycle of productive development.

Cycle 2 begins following the realization of profits and rise of GDP. Companies, now equipped with greater financial resources, embark on a new investment cycle with the objective of conquering a larger share of the international market.

In this new cycle, both sectors benefit from the experience and knowledge gained in the previous one. Incremental advancements and novel formulations are integrated into

existing production processes. With the presence of amplified dynamic increasing returns to scale, the interaction process expands the possibilities for developing new products and enhancing existing ones. As a result, the complexity regarding the level of technological embodied in these products increases.

In addition to the new basket of products prepared for sale, the symbiosis between manufacturing sector and modern services has created a range of related products. This means that the main product paves the way for offers of auxiliary products and services that ensure differentiation and value addition. Both sectors progress along the production chain and begin to possess the necessary conditions to compete for new markets in international trade.

In summary, the RER significantly fosters economic dynamism and strengthens ties between the manufacturing sector and services. Across both cycles, dynamic increasing returns to scale operate in their amplified form, driven by research, innovation, and learning that generate positive externalities and technological spillovers, becoming shared assets across sectors. This environment creates a productive symbiosis, where mutual dependencies ease knowledge diffusion and innovation absorption. Such interactions not only boost productivity but also underpin the mechanisms of economic growth in the twenty-first century, creating a virtuous cycle where each sector enhances the other, laying the groundwork for sustainable, long-term growth.

Conclusions

From a theoretical perspective, this work places the service sector at the center of the debate on economic growth and its role in underdeveloped economies. In this context, it emphasizes the importance of reviving traditional theories to comprehend the current economic transformations and, when needed, revising the current theoretical framework.

A novel theoretical and interpretative effort is made to indicate that the ongoing structural change is advancing towards new forms of productive organization, which requires scholars to revisit and reconsider current theoretical frameworks. Understanding reality and constructing theory necessarily involves acknowledging that the capitalist mode of production is undergoing reconfiguration.

Furthermore, it highlights the need to analyze economic dynamics beyond traditionally established sectoral determinations, given that the classic division between agriculture, industry, and services limits the understanding of the exchange rate policy's effect on the productive process and, consequently, on economic growth. An integrated sectoral analysis enhances the analytical and explanatory capacity of the effects of economic policy on the level and pace of economic activity growth.

In terms of economic policy formulation, two contributions are pointed out, with implications extending both in the dimension of macroeconomic policy and in terms of productive development policy. Regarding macroeconomic policy, we show exchange rate policy acting in a manner that extend beyond the immediate impact on industry.

A competitive RER contributes to the relative expansion of the service sector, in terms of added value and employment. This helps to understand the determinants of performance differentials between countries, highlighting the role of macroeconomic policy instruments. Apart from factors related to supply, such as education, technology, and institutional patterns, the exchange rate level has a catalytic effect on productive interactions.

Moreover, the RER stimulates the symbiosis between industry and sophisticated services, allowing the establishment of increased dynamic returns to scale. This is an important issue as it indicates a possible path to understand why the sophisticated services sector has been growing in various countries, highlighting the significant performance of Asian nations.

Thus, considering that the productive structure is characterized by an increase in the composition of the service sector in production over the last decade, this study demonstrates that exchange rate policy remains a current and relevant instrument for boosting the economy.

In terms of productive development policy, is argue that the formulation of development strategies needs to be renewed from the terms conceived in past decades. Hence, both for developed countries and, especially, for developing ones, it is vital to incorporate the modern service sector in the formulation of economic development policies.

Efforts to reduce the gap relative to developed countries, concerning technical progress, demand special attention to the degree of interaction between the service sector and the industry. In other words, the symbiosis between these sectors is key to economic growth, demonstrating that solutions for peripheral countries require a systemic view of the economy. Simple industrialization or reindustrialization is not capable of generating the necessary results for economic development in Latin America.

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Apendix

Authors **Criteria** **Typology**
Browning & Singelmann (1978) Demand Driven i) Productive services: Banking; Insurance; Real estate; Engineering; Accounting; Miscellaneous business services; Legal services; ii) Distributive services: Transportation; Communication; Wholesale trade; Retail trade; iii) Personal services: Domestic services; Hotels; Restaurants; Repair services; Barber shops; Entertainment; Laundry; Miscellaneous personal services; iv) Social services: Medical and health services; Hospitals; Education; Welfare, religious services; Non-profit organizations; Postal service; Government services; Miscellaneous social services;
Nusbaumer (1984) Functions performed and position occupied in the production and exchange circuit i) Primary: Repairs; Construction; ii) Intermediate: Transportation; Insurance; Financial services; Professional services; Data processing; Rental services; Ancillary services; Dispatch services; Real estate; Wholesale and retail trade; Administration; Insurance; Financial services; Databases; iv) Final: Transportation; Insurance; Financial services; Recreational services; Real estate; Wholesale and retail trade; Domestic and personal services; Rental services;
Marshall (1988) Type of service consumer i) Information processing services: R&D; marketing; advertising; engineering; financial services; auditing, office services, photography; architectural and design services; computer services; accounting; real estate; ii) Goods-related services: distribution and storage of goods; wholesalers; maintenance and repair of equipment; communications networks and public utilities; maintenance and repair of vehicles, buildings and other infrastructure; iii) Personnel support services: health, cleaning, domestic, security and insurance, accommodation and personal transport;

Las Casas (1991)

Consumer effort to obtain services

i) Services provided directly to the end consumer and are subdivided into: a) convenience services: when the consumer does not wish to waste time looking for a company, such as a shoe store; b) choice services: referring to services with differentiated costs according to the quality and type of services provided, such as banking and insurance services; and; c) specialty services: whose activities are highly technical and specialized, such as medical and legal services; ii) Industrial services provided to industrial, commercial and institutional organizations, subdivided into: a) equipment services: related to the installation, assembly or maintenance of equipment; b) facility services: which facilitate the company's operations, such as financial services; and; c) consulting services: which assist in decision-making, such as consulting, research and education services;

Silvestro et *al*. (1992)

Customer processing volume

i) professional services: have a relatively low volume of transactions, relatively high contact time, a high degree of personalization and process orientation, consisting of consulting and engineering activities, corporate services, among others; ii) service stores: have average levels of transaction volume, contact time with customers and customization, orientation of their structure towards the front-office or back-office, such as hotels, retail trade, banking and real estate services, and; iii) mass services: high volume of transactions with customers, limited contact time and little personalization, such as the transportation, confectionery and other sectors.

Hauknes (1998)

Required knowledge base

i) Capital-intensive services: These services use manufacturing technologies and capital goods intensively, including services that are intensive in the use of computing and infrastructure, such as financial, transportation and telecommunications services; ii) Services based on the creation and perceptive use of functional and technologically specialized capabilities: consulting, R&D activities, industrial design, engineering consultancy, software and systems development, etc.; iii) Services based on the application of codified professional skills and abilities: There is usually strong regulation of professional organizations, such as medical, legal, accounting services, among others; iv) Services based on tacit skills: These are

human-centered services, which may or may not be regulated, such as restaurants, fashion design, hairdressing, cleaning services;

Oecd (2000; 2004) Standard Industrial Classification (SIC) Rev. 3
i) Professional business services: Post and telecommunications, financial intermediation, commercial real estate activities, machinery and equipment rental, IT and related activities, R&D and other business activities; ii) Traditional services: Supply of electricity, gas and water; Construction; wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants; land, water and air transport; Support and auxiliary transport activities; Travel agency activities; Public administration and defence; Compulsory social security; Education; Health and social assistance; Other community, social and personal service activities;

Miozzo & Soete (2011) Technological capabilities
i) Supplier-dominated: consisting of personal services (such as education, health, entertainment) and public services, which have little or no technological development and low interaction as final service providers; ii) Large-scale physical networks and information networks: formed by transportation and trade services, telecommunications, gas and electricity distribution, among others, which present economies of scale, great division of labor, and low capacity for innovation; iii) Science-based services and specialized suppliers: composed of R&D activities, software, IT development, etc., characterized as intensive in skilled labor, with capacity for developing technological innovations;

Castellacci (2008) Innovation patterns
i) Knowledge-intensive services: consisting of activities with a high capacity for generating knowledge and innovation, such as R&D, software, engineering projects and consulting; ii) Support infrastructure services: category subdivided into physical and distributive infrastructure services, for example, transportation and

	wholesale trade, and network infrastructure services, consisting of activities that make intensive use of ICTs developed by other advanced sectors to increase the efficiency of the production process and the quality of their services, such as finance and telecommunications; iii) Personal services dominated by suppliers: have lower technological content and limited capacity to develop new products and processes internally;
Eichengreen e Gupta (2013) Technological standard	i) Traditional services: retail and wholesale trade; transport, storage and mail; public administration; ii) Hybrid services: Health; Education; hotels and restaurants and personal services; iii) Modern services: financial services; intellectual property services; insurance and pension services; information services; business services, telecommunications;
Arbache (2014) Functionality	i) Cost services: infrastructure; logistics; transportation; storage; repairs and maintenance; outsourcing services; travel; accommodation; distribution; ii) Value addition: R&D activities; design; engineering projects; specialized technical services; sophisticated IT services; customized software; branding; marketing;
Machado et. al. (2015) Destination	i) Final consumption: services consumed predominantly by families; ii) Consumption for companies: services used predominantly in the production process;

Source: adapted from