

Long-term inflationary services and the problem of sectorial measurement in National Accounts: an analysis of the American case

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Summary

Deindustrialization is on the spot, again. The anachronism between the real economy and the way SNA accounts manufacturing and services has led economic research to render a new world with old premises. This paper aims to review statistical data upon its factual structure and to answer the following question: Did the manufacturing sector indeed lose room for the services sector? We offer evidence that the so-called American deindustrialization is, at least in part, a result of relative prices dynamics underneath manufacturing and services progress over time. We also find evidence that the deflationary pattern of the manufacturing sector does not necessarily imply a less relevant role in the economy. Ricardo's pricing theory, the Kaldor-Verdoorn's Law, Baumol's Disease and the symbiotic and synergetic relationship between manufacturing and services help explain that price dynamics.

Keywords: services; manufacturing; productivity; measurement; inflation; costs, technology.

JEL codes: O14, L6, L8, L16, D2, D4.

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1. Introduction

The topic of deindustrialization is on the spot, again. Part of the literature understands deindustrialization as an inevitable economic evolution associated to high stages of economic development and structural change initiated by the transition from an agricultural and rural economy to an industrial and urban one, and finally to a service economy (KUZNETS 1973; ROWTHORN & RAMASWAMY, 1997; inter alia).

Another part of the literature also understands deindustrialization as a natural but pathological phenomenon. The economic progress would entail deindustrialization and low growth rates, as the services sector does not provide the same productivity pattern, as the industrial sector can do. Thus, per capita income growth stands still (BAUMOL, 1967; RODRIK, 2013a and 2013b; BAUMOL et al., 1989; ROWTHORN & WELLS, 1987).

A third part of the literature claims that deindustrialization is, to some extent, the result of economic and corporate policies. Growing costs of manufacturing activity and trade liberalization encourage the shifting of manufacturing operations to developing countries (DASGUPTA & SINGH, 2006; WARWICK, 2013).

Finally, some authors introduced the concept of "premature deindustrialization", whose central aspect is the empirical evidence that developing economies prematurely lose their manufacturing activities as compared to the experiences of developed economies (RODRIK, 2015).

The purpose of this paper is to look to this subject by following recent theoretical advancements that question deindustrialization (ARBACHE 2012, 2014, 2015 and 2016; BERLINGIERI, 2013; SAVONA, 2016; GONZALEZ et al., 2015; ARBACHE et al., 2016, inter alia).

In order to examine this issue, we investigate the case of the US economy because of the following reasons: it is the largest economy in the world experiencing deindustrialization; it reached economic supremacy because of its manufacturing industry (DiMICCO, 2015); the US is one of the countries that have mostly neglected the deindustrialization issue (SMIL, 2013; ATKINSON & EZELL, 2012); and finally, there have been renewed signs of

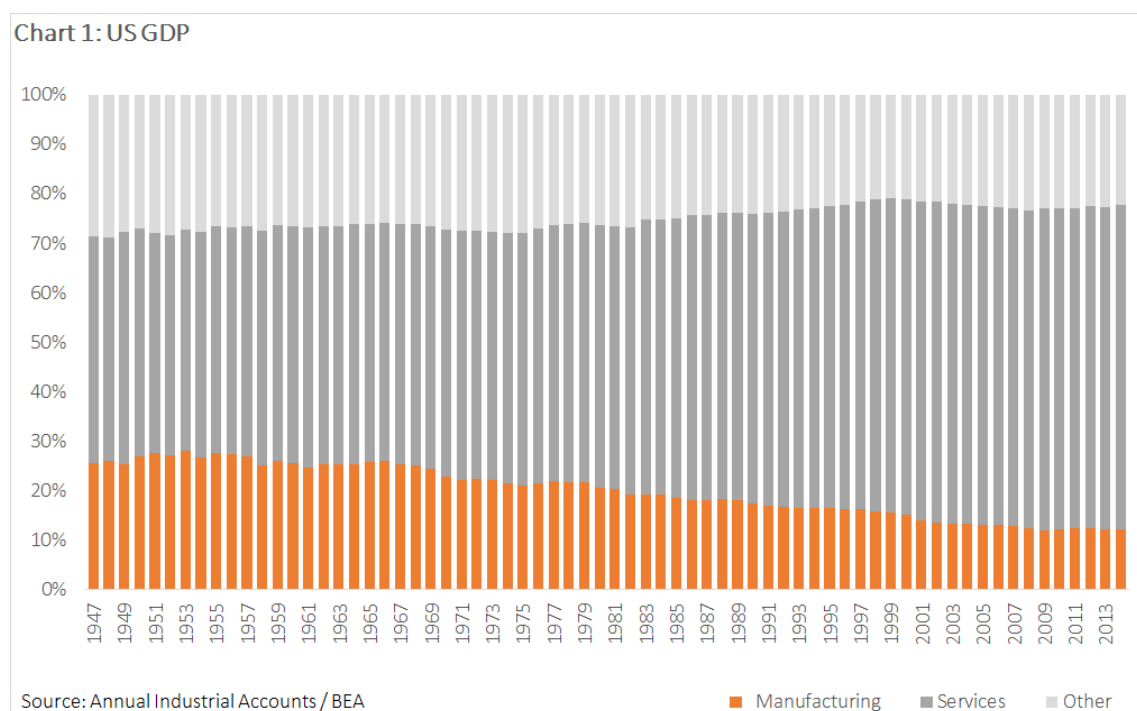
concern with this topic in that country (and also a supposed "re-industrialization" debate). An additional motivational aspect is an extensive literature on the US case and the vast availability of data and statistics.

This paper aims to answer the following question: "Did the manufacturing sector indeed lose room for the services sector?"

The paper is organized as follows. Section 2 presents the critical stylized fact of deindustrialization - the decline of industry share in GDP - and then shows evidence that reinterprets GDP composition by exploring the evolution patterns of quantum indices and sector prices. Section 3 advances this analysis deploying new theoretical perspectives that explain how services and industry have evolved in the last decades and show that these two large sectors are actually two sides of the same coin. Section 4 presents the conclusions.

2. Reviewing the deindustrialization thesis

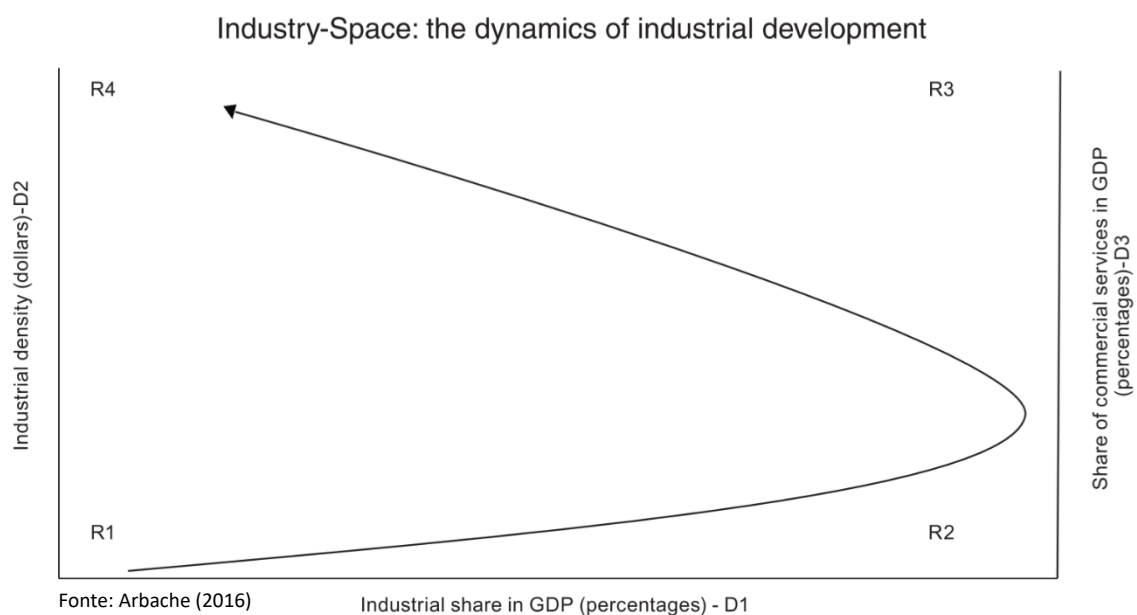
Throughout most of the post-war period, the services industry increased its share in the US GDP mostly at the expense of manufacturing. Chart 1 summarizes the argument of deindustrialization: the decreasing share of manufacturing value-added (ROWTHORN & RAMASWAMY, 1997).



When shown this way, these data corroborate the deindustrialization thesis as an economic development trend with services industry on the lead. In developed countries, the increase in income-elasticity of demand for services as a result of higher per capita income is an important cause. In developing countries, premature deindustrialization is a result of, among others, the effects of globalization and the widespread diffusion of labor-saving technologies.

Some authors (ROWTHORN & RAMASWAMY, 1997) do not see deindustrialization as a source of economic issues for developed countries. For others (RODRIK, 2013a and 2015), deindustrialization is a negative phenomenon aggravated in developing countries because it prevents the income convergence between developing and developed countries.

ARBACHE (2012 and 2015), in its "industry-space " formulation, presented in the figure below, reviews the concept of deindustrialization - both "classical" and "premature" ones. In this conceptual analysis tool, three dimensions of economic development are combined in time: percentage share of manufacturing in GDP; percentage share of business-services³ in GDP; and industrial density, defined as the manufacturing value-added per capita⁴. Countries begin their industrialization trajectory in R1, with traditional



³ This concept will be elaborated further, but for the moment it is enough to understand that these services are dedicated to the business sector; thus, one should exclude all those services aimed at household and government consumption (GONZALEZ et al., 2015).

⁴ In detail, industrial density is the manufacturing value-added divided by the total population.

industries such as textile, iron and cement, and move toward R2, with a greater variety of sectors and manufacturing activities, but still, most are of low technological and value content. As an economy moves to the critical point that characterizes the transition from R2 to R3, it presents more and more sophisticated interindustry interactions, especially between business-services and manufacturing industries⁵. From that point on, economic sophistication requires growing embodied business-services content, which can be seen in the disproportionate increase in industrial density (ARBACHE, 2016)

In 2011, Brazil and the United States had similar manufacturing industry shares in GDP, but at quite different levels of industrial density. According to ARBACHE (2016):

“The decline of the manufacturing sector’s share in GDP does not necessarily mean that industry becomes irrelevant. In fact, increasing industrial density features a more sophisticated and influential stage of manufacturing, which is marked by the changing nature of goods and the way they are produced. The manufacturing sector acts as a catalyst for R&D and other advanced services, as well as creating wealth and good jobs in a more complex way. (...) The changing relationship between manufacturing and services is perhaps one of the main elements of the so-called ‘Third Industrial Revolution’. *The changing nature of products suggests that the definition and classification of goods in the national accounts based on sectors and activities are obsolete.*” (Pgs. 70 and 71).⁶

The highlighted italics in this quote is key to this paper. At its birth, the System of National Accounts (SNA) was embedded with post-war industrial production concepts. The Standard Industrial Classification (SIC) used by the US government to classify the country's economic activities has supported the SNA and has itself undergone several revisions over the decades, rooming new activities, especially of the services industry. In 1997 the SIC was replaced by the North American Industry Classification System (NAICS) to better account for new economic activities.

Notwithstanding the conceptual advances brought by NAICS, the same anachronistic industry-bordering logic remained rooted in economic research. The increasingly blurred distinction between "goods" and "services" (ARBACHE, 2014) not considered in both classifications represents an obstacle to the understanding of the productive dynamics that emerged at the end of the twentieth century and shaped the trends of the twenty-first century.

⁵ The critical point R2-R3 would also be the *middle-income trap* "breaking point".

⁶ Italic by the authors themselves.

One could assume that the input-output matrix technique is enough to reveal this new dynamic since it links sectors by sources and destination of the input-output flows. However, the issue is not limited to capturing the economic flows between industries; instead, it is related to identification and classification of activities.

Although adjustments to track the flows between activities in I-O matrix are made – such as dealing with secondary output – it should be emphasized that this effort does not bring about the understanding of the combination of multiple activities under the same unit, or even the intrinsic connection between different productive activities (framed or not in the same industry) under the same technological solutions adopted (ROSENBERG, 2006).

The anachronism between the real economy and the way SNA accounts it has led economic research to render a new world with old premises. This paper aims to review statistical data upon its factual structure.

Measuring GDP from a supply perspective requires the value-added of each sector at current prices as well as a constant-price GDP deflator. In sectoral comparisons of real GDP, general deflator is applied to eliminate nominal price changes without purging the actual variations in relative intersectoral prices. Applying sectoral-specific deflators in intersectoral comparisons eliminates any price changes (nominal and real), therefore "freezing" a given time-relative price structure.

The US GDP historical data show that changes in the composition of value-added do not differentiate real from quantum variations to relative prices, "hiding" the patterns of economic transformation and the price composition of each sector, notably when intermediate consumption is accounted for to estimate value-added.

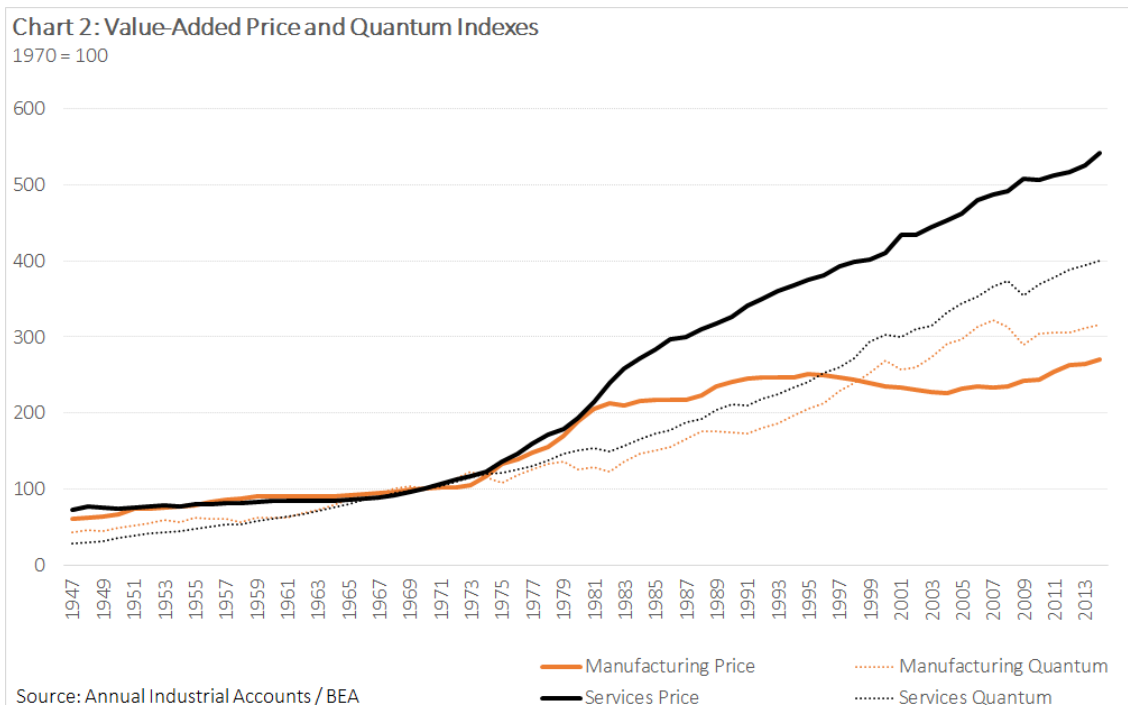
TOBIN & NORDHAUS (1973) raised important questions about the usability of value-added statistics to examine a nation's well-being. According to the authors, an apparent misconception in the understanding of GDP as a measure of well-being is that it is based on production, not consumption. It turns out that the production of goods and services that generate identical levels of well-being may undergo cost changes that erroneously induce economists to perceive rising (or declining) standards of well-being.

In the debate on deindustrialization, what does this questioning tell us about the greater or lesser "importance" of any industry regarding its role in the economy's value-added?

According to HELPER et al. (2012), the manufacturing sector is still relevant for the American economy, since, despite the service industry occupying an increasing share of the GDP, manufacturing industry's purchases are the source of business opportunities in the services industries and for innovation projects.

The misunderstanding of the new concepts of production and production management - the increasing interdependence between different activities - coupled with an anachronistic paradigm of economic activity measurement would have laid the groundwork for a debate that misled service and industry. The commonplace that sees the loss of importance of manufacturing in economic development is a direct result of the outdated way economic activity has been recorded in the last few decades.

From the evolution of the relative prices of the manufacturing and services industries of the United States, it is possible to identify some evidence of the supposed origin of the "loss of importance" of manufacturing. Chart 2 shows how quantum and price evolve in different ways across sectors and how this trend creates the structural change perception of the US economy. Both the services and manufacturing value-added quantum indexes behave the same way, although the quantum index for services reached a slightly upper level than for manufacturing. However, price indexes (solid lines) behave diametrically, with stagnation in the manufacturing sector and growth in the services sector.



The first point to highlight is that the services sector is mostly non-tradable and, although this characteristic is changing rapidly more recently (ARBACHE, 2014), that understanding remains. As a mostly non-tradable sector, services are less exposed to competition than tradable goods, which face internationally-based prices. *Ceteris paribus*, non-tradable industries tend to show higher price growth than tradable ones (DUARTE & RESTUCCIA, 2015, inter alia).

Tradable industries also have different pricing dynamics. In the case of commodities, Ricardian mechanisms impose themselves; in the long run, the expansion of the agricultural frontier and the exhaustion of mineral reserves raise production costs by increasing technical difficulties and declining productivity. According to RICARDO (1996), the increasing scarcity of these products persistently raises the production costs and, therefore, its prices. In his theory, agricultural and mineral goods prices are determined by their production costs, although, in the short term, supply and demand fluctuations may reduce or reinforce this trend. This argument is more adherent to mineral goods than to agriculture, since mineral deposits are limited and spatially located, and technological advances have enhanced soil productivity everywhere.

In the case of manufacturing goods, the price set up is different. Industrial production is a relentless pursuit of technological advances, gains in scale, and in productivity. Although

monopolistic competition and product differentiation prevail in the short run, their effects are not permanent, requiring companies to seek for differentiation continually.

Increase in manufacturing output is related to increases in productivity - this is the Kaldor-Verdoorn Law⁷. Output increases by technological advances (dynamic effects) or by scale (static effects)⁸ and both effects increase industrial productivity, reducing production costs. The deflationary trend of manufacturing production would be, therefore, inherent to its long-term development and sophistication: a competitive market, in which rising productivity is the key to competitiveness, drives prices to stagnation (MOWERY & ROSENBERG, 2005).

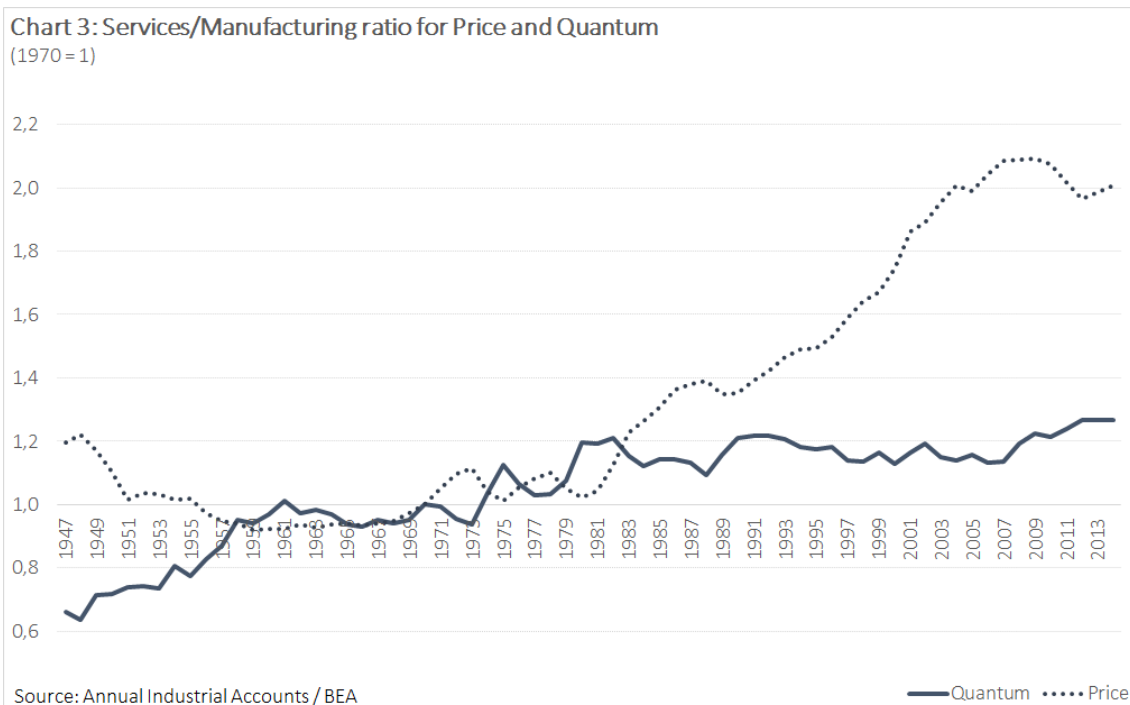
When all these factors are grouped in the SNA for the GDP estimation, over and over, year after year, the room for the manufacturing sector vanishes. This perception is not brand-new. Some authors had already identified a temporal dynamic in the structure of sectoral relative prices that could undermine some sectors, while others would be oversized in GDP estimation (BAUMOL, 1967; ROWTHORN & WELLS, 1987). In ROWTHORN and RAMASWAMY (1997) own words:

“... the growing current price share of services in value-added reflected the impact of differential productivity growth – labor productivity has grown more slowly in services than in manufacturing. This has pushed up their relative price, tending to raise the service sector’s share of current price output. However, when output in the two sectors is measured in constant prices, there does not appear to be evidence of a shift in expenditure from manufacturing to services that corresponds to the magnitude of the shifts in employment that have taken place between these two sectors in the advanced economies.” (Pg. 9).

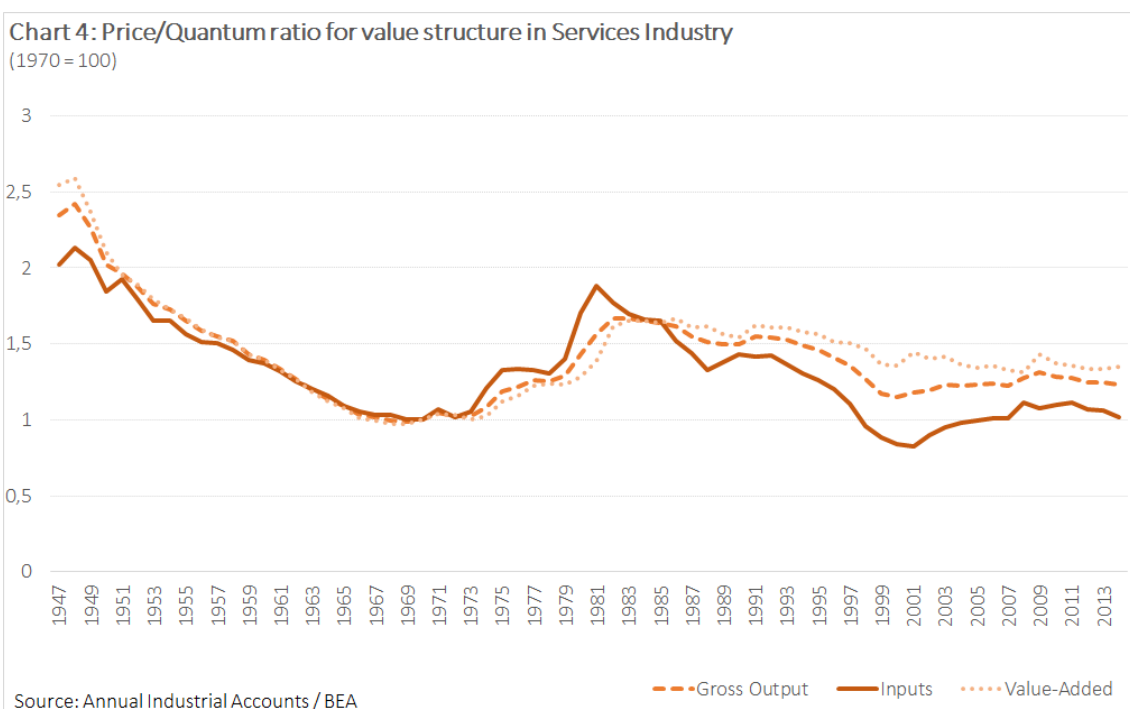
Chart 3 shows both the ratio of the quantum and the ratio of prices for both sectors. The trend is clear: the quantum of services remained in a stable ratio with the manufacturing quantum, while relative prices evolved in favor of services.

⁷ See (CASTIGLIONE, 2011) for a discussion of the empirical findings of the Kaldor-Verdoorn Law for the American economy.

⁸ For a more about the dynamic effects of technological advances on manufacturing activity and the minor importance of scale for competitiveness, see (VALLADÃO, 2016).



So far indexes and charts related to value-added have been presented. However, the behavior of the inputs quantum and price indexes of manufacturing and services industry have a role in value-added behavior. Charts 4 and 5 present the price and quantum ratios for the three components of the value structure (intermediate consumption, gross output and value-added). The ratio between price and quantum indexes provides a proxy for the evolution of relative prices between input, output and value-added.



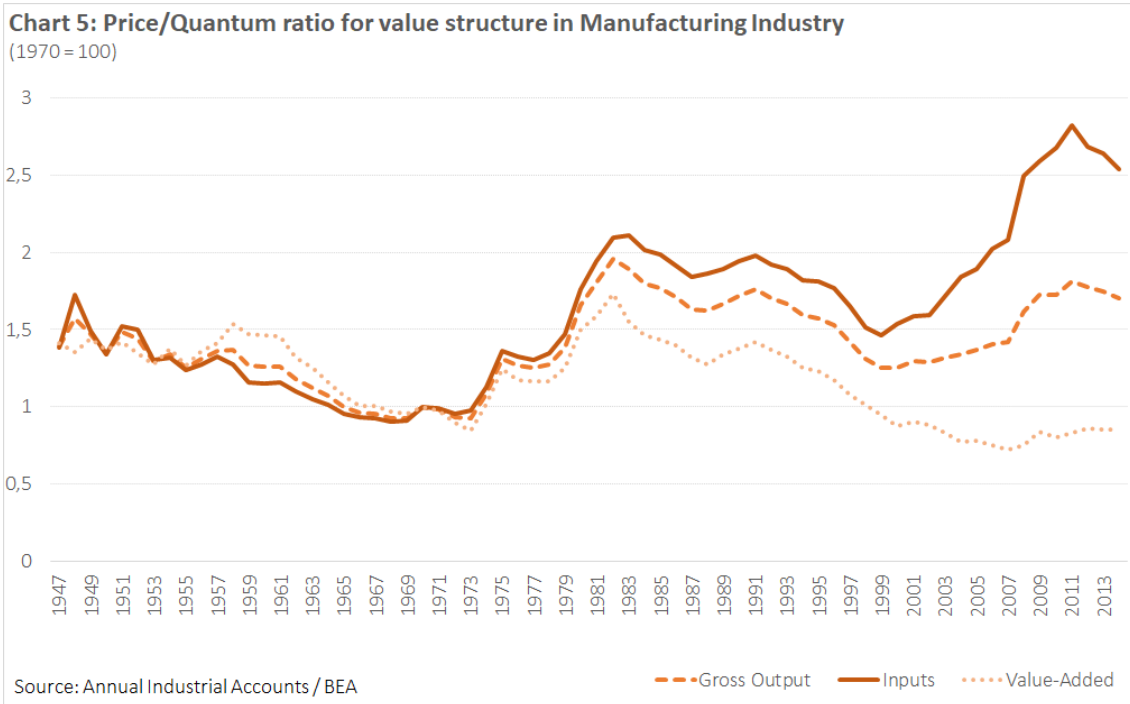


Chart 4 presents the analysis for the services sector. The equilibrium between all components of the value structure for the price/quantum ratio of this sector is remarkable. Since the 1980s, the evolution of the value-added curve was higher than the evolution of the input and gross output curve.

There is a different story when it comes to the manufacturing sector in Chart 5. The evolution of the price/quantum ratio of the components of the value structure of the manufacturing industry was unbalanced, with relative prices evolving with huge disparities. The input consumption curve remained above the gross output and value-added curves since the 1970s⁹. It is worth noting the very moment when input prices soared; the price/quantum ratios of inputs, gross output, and value-added drift apart in different ways, with an increasing gap between value-added and intermediate inputs. As already described, this divergence does not happen in the services industry.

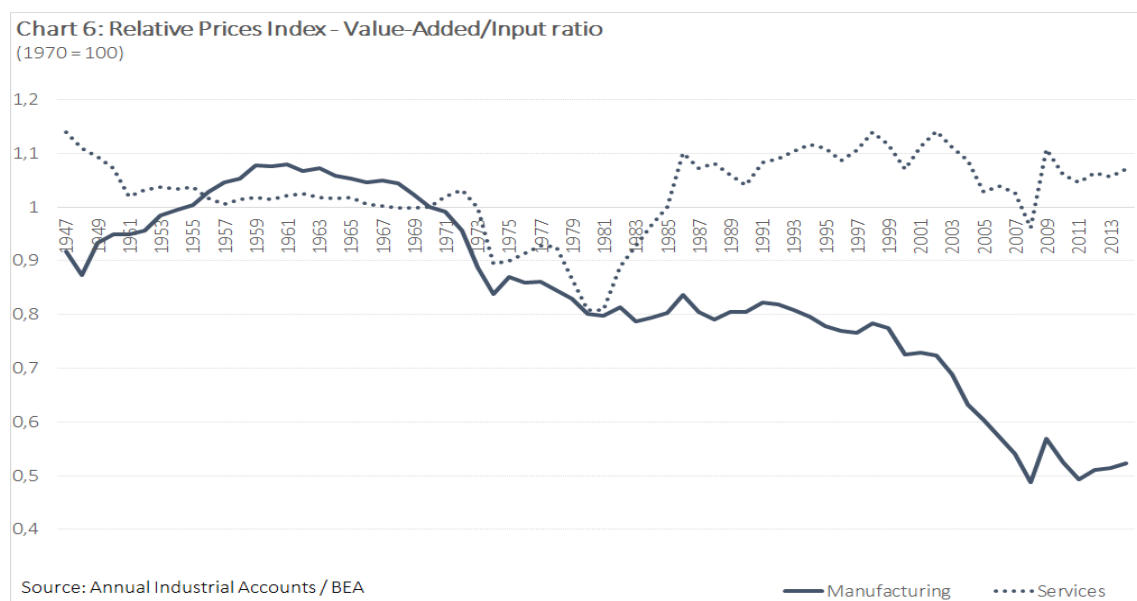
3. Symbiosis and synergy between manufacturing and services

The rising energy and industrial fuels prices may be one of the reasons for the high-cost pressure the US manufacturing industry has undergone since the 70s. The US remained

⁹ The year 1970 is the base because of the 1973 and 1979 oil crisis. Chart 2 shows how prices started to rise at the beginning of the decade and how their trajectories diverged at the beginning of the 1980s.

the leading oil producer between 1860 and 1970 (when production reached its all-time high), ensuring a plentiful and cheap supply of fuels for power generation and industrial use (SMIL, 2013). However, since then, the manufacturing sector has been affected by a sharp rise in its inputs cost, while value-added has shrunk over time, with two aggravation periods: the 1980s and 2000s.

Chart 6 presents the relationship between services and manufacturing due to changes in relative prices, with the ratio between price indexes of value-added and intermediate inputs for both sectors. The divergent evolution between the two curves shows a relative price increase for inputs acquired by the manufacturing sector against value-added prices of manufacturing. Differently, the services sector has experienced stability in its input prices compared to its value-added prices.



These are pieces of evidence of how the price factor was more relevant than the quantum factor in the perception of structural change of the American economy synthesized by Chart 1. In real terms, manufacturing value-added kept growing at a similar pace as that of the services sector, but relative prices rose in favor of the service sector, increasing its share in GDP. Besides, as intermediate inputs prices for manufacturing sector have gone up, the same has not happened to the services sector.

Two central questions arise; first, the understanding of input consumption by the manufacturing sector; and second, the structural deflationary trend in manufacturing.

One important point has already been highlighted: the sharp rise in fuels cost. However, an additional hypothesis is the proliferation of connections between manufacturing and services companies through outsourcing. The increasing demand for intermediate services is an additional explanation for the supposed deindustrialization due to the search for cost minimization, specialization in core activities and acquisition of more advanced solutions out in the market (WINDRUM et al., 2009). However, the literature often discusses the less "noble" connections - cost services - and dismisses the "nobler" connections - value-added services and product-differentiation services. Most authors do not even see this differentiation¹⁰. According to ARBACHE et al. (2016):

“More generally, more widely available and better-quality cost services contribute to level the playing field but do not necessarily turn into higher relative productivity. In the days of global value chains and regional production networks, efficient transportation and finance are a necessary condition for a firm to compete, but they may not suffice to bring industrial firms’ performance to the next level. Innovation, technology, design, branding, marketing and other differentiating services are those most likely to create value and change firm prospects”. (Pg. 62).

Cost services are among those most remembered when it comes to outsourcing. We shall call this type of outsourcing as "shelfsourcing" once it has minimal customization opportunities, in an almost one-size-fits-all supply strategy. It does not generate conceptual changes in industrial production, and it is, in no small extent, a mere decision made under intense competition and the need to cut costs; it is a symbol of increasingly radical stages of a phenomenon that is as old as capitalism: the division and specialization of labor. According to ten RAA & WOLFF (2001), these services had low rates of productivity growth in the 70s and 80s, which led industrial companies to delegate them to other companies, allowing them to focus on core activities which led to productivity increases in the 1980's and 1990's.

In the SNA, the growth of the service sector in GDP is partly accountable by the provision of ancillary activities by new specialized companies; activities that remained "hidden" from national accounts when they were inside departments in manufacturing companies itself (law, accounting, and transportation are good examples of shelfsourced activities)¹¹.

¹⁰ These categories were proposed by ARBACHE (2014).

¹¹ Some recent work is concerned about the ability of the NSA to record new economic activities, especially those in the digital world. See AHMAD & SCHREYER (2016).

Although any specialization gains arose from this experience, they served both sectors (BERLINGIERI, 2013).

Outsourcing would have generated "accounting deindustrialization" by the change of ownership of these activities, but it can hardly be responsible for the so-called structural change of the American economy since the control, and the reason for the existence of these activities remained in the manufacturing enterprise itself (WINDRUM et al., 2009). According to (DE GROOT, 2001):

"... outsourcing can be seen as a reorganizational effort aimed at reducing transaction costs, taking into account the comparative costs of planning, adapting, and monitoring task completion under alternative governance structures. The principal factor to which appeal is made is *asset specificity*. (...) as asset specificity increases, the bureaucratic costs of internal governance decrease relative to those of market mediation due to increased bilateral dependency, increased costs of control, and the need to sign detailed contracts that have limited adaptability. (...) internal governance becomes more and more attractive when asset specificity increases. It ultimately becomes the preferred mode of governance, resulting in vertical integration (or 'insourcing')". (Pgs. 54 and 55, italics are our own).

Sustaining this argument depends on the premise that the more specific a particular activity is, the more relevant it is to the company's competitiveness, and the higher is the ability (not just the interest) of the company to maintain it internally. Even vertical integration, which would be the opposite phenomenon to outsourcing, would represent the importance given by manufacturing companies to value-added services, as it would allow the incorporation of new technological and entrepreneurial skills. According to ATALAY et al. (2014):

"... it facilitates efficient transfer of *intangible* inputs (i.g., managerial oversight) within firms. It is plausible that the market would have a more difficult time mediating transfers of knowledge inputs than of physical goods. We provide suggestive evidence in favor of the intangible inputs hypothesis: acquired establishments begin to resemble – both in terms of their shipment destinations and products produced – establishments from the acquiring firm." (Pg. 30).

ACEMOGLU et al. (2007) investigated the reasons behind business organization decision to more centralized or decentralized formats. They show that a high level of technical specificity of a particular activity may induce a decentralized decision-making model. Their conclusions show that the increase in technological complexity (technical specificity) provides more decentralized command structures, in which the managers of the core-business areas have greater decision-making autonomy under the increasing

information asymmetry between head managers and department managers; this is a classic principal-agent model in which delegation costs trade-off its benefits.

If we understand outsourcing as the next step, then the presented model generates new perspectives concerning value-added services. This outsourcing format does not address the external delegation of advanced activities previously performed within the company. In fact, they represent the emergence of solutions to escalating internal challenges manufacturing enterprises face, but which, given the high level of complexity that these challenges have achieved, could no longer emerge internally (ARBACHE, 2014). More than this, the multiplication and accumulation of solutions available in the market has loosened the frontiers of the innovative capacity of the whole economy, not only implying cost reductions but making previously unimaginable products and processes possible (ROSENBERG, 2006).

The extrapolation of the boundaries of the company in its core activities places it as a hub in a web of solutions that may or may not have been elaborated initially for its specific problems - these solutions are mainly the value-added services¹². This type of outsourcing that we shall call "netsourcing" is a relevant new concept in the way companies set up themselves for production. Former internal R&D labs of US manufacturing corporations have become collaborative hub amongst corporate networks, government laboratories, and universities, exchanging research agendas and technology solutions (MOWERY & ROSENBERG, 2005), rather than just conducting internal research. For this type of outsourcing, companies net-source what they need through customization; there is no shelf where they may find what they need, in these cases.

Not being aware of these collaborative networks has led economic research to call 'deindustrialization' a phenomenon of unprecedented industrial sophistication that goes beyond corporate and industry boundaries (MOWERY & ROSENBERG, 2005).

The US manufacturing development generated, throughout the post-war, such a large scale and such a sophisticated need for solutions of all kinds that companies and a whole

¹² See (FRANCOIS & WOERZ, 2007) for empirical evidence of the growth of indirect export services through manufacturing goods and the challenges in the statistical recording. For a classic case of this literature - the services content in Apple's devices - see (KRAEMER et al., 2011).

industry specialized in providing them could flourish (BERLINGIERI, 2013). Also, shorter product obsolescence cycles stressed R&D and raised its costs, making feasible the appearance of dedicated companies that would be able to outstrip the sunk costs and the fixed costs related to these activities (ROSENBERG, 2006).

The idea of deindustrialization in the American economy comes from not realizing that sectoral classification and delimitation conceal the very essence of the evolution of industrial production and its relationship with value-adding services. Even more important, this concept disregards productivity differentials that modify the relative price structure.

The growth of the service sector in the US economy as evidence of structural change disregards the ever-increasing blurring amidst corporate and industry boundaries. DARTE and RESTUCCIA (2010) use this perception to show that the significant and persistent differences in labor productivity between developed and developing nations are based mainly on the difference in productivity in the service sector since this differential is relatively small in manufacturing and long-declining in agriculture. As economic growth increasingly depends on advances in the services sector, productivity differentials between countries remain.

RODRIK (2013a and 2013b) shows that the twentieth century did not witness income convergence between advanced and non-advanced countries. However, it found empirical evidence that the manufacturing sector experienced productivity convergence. Believing in the idea of structural changes as a lever for development, RODRIK found himself in a paradox while observing that there was something different between modern industry and old industry: there was a significant drop in the employment-elasticity of manufacturing growth over time as a result of capital-intensive and labor-saving (especially low-skilled jobs) technologies ubiquity.

Productivity in these manufacturing segments will tend to converge, for, as stated (BAUMOL, 1967), human labor is only one piece that has not yet been replaced by a machine. If manufacturing activity requires human labor – as a "tool", not as a solution-maker – the most rational option is to find where this "tool" is cheaper. Even the more traditional industries can benefit from those new value-added services, thus reducing the

appeal of the low-cost job in developing countries (VALLADÃO, 2016) and (HOBSEBORN, 2002).

The non-convergence of income between developed and developing countries would occur precisely and mainly in the service sector, a sector in which the secular and endogenous result of increasing technological advances in the manufacturing capabilities in developed countries shows off.

BAUMOL (1967) brings critical concepts to understand how the success of the manufacturing sector leads to its "shortening" in national accounts, creating an inaccurate perception of the process. His argument is based on the division of two large economic groups: one technologically progressive and one technologically non-progressive. This differentiation is based on the capacity of one of the groups to expand its output through innovations, capital accumulation, and economies of scale. However, ultimately, this differentiation comes from the role that human labor plays in economic production.

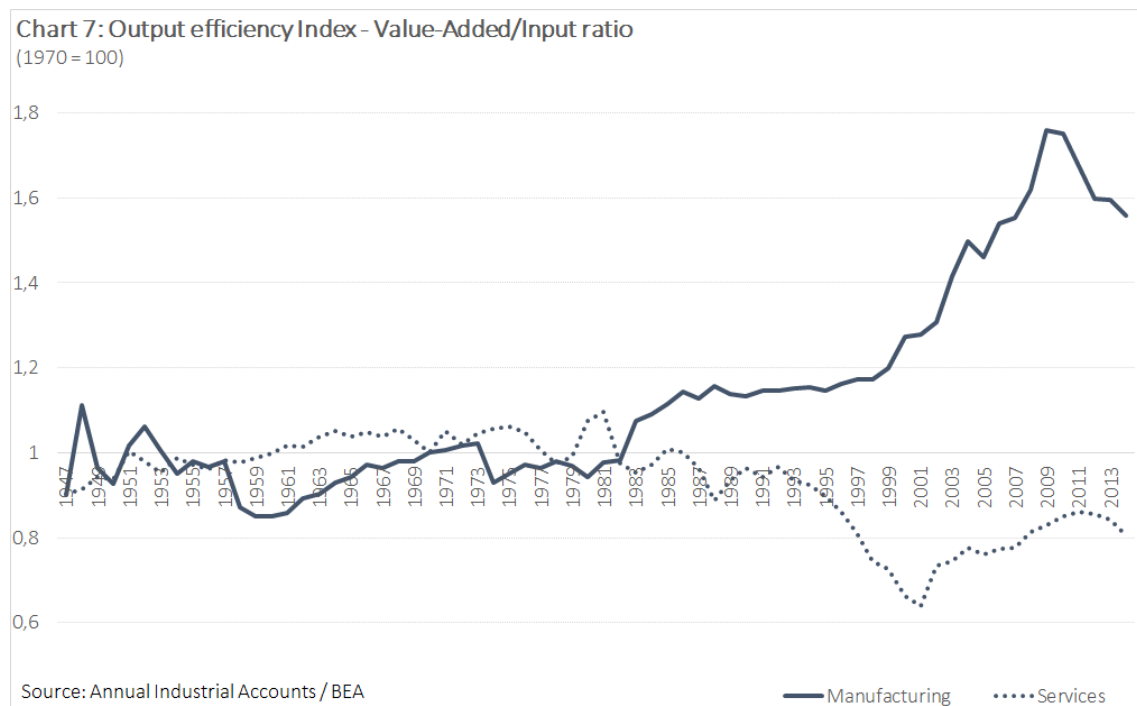
Baumol does not refer to industries other than manufacturing as less critical or less sophisticated. He only shows that the amount of human labor in a given industry depends on the stage of technological maturity that requires more or less human work, which means that human labor is necessary only until machines can do the same work more accurately, faster, and therefore cheaper. It does not happen in a large number of economic activities in which human labor is almost irreplaceable - that is, services (and value-adding in particular). In these cases, the higher its importance for the economy as a whole - read, the bigger its demand - more and more workers are to be allocated there.

Let us take for granted the inexorable connection between manufacturing and services (ARBACHE, 2014; SAVONA, 2016) and call the services sector a "solution sector". For the more significant challenges faced by manufacturing companies, the solution sector of the economy is more and more triggered. In general, the solutions that this sector provides come along with scientific and technological advances - hence with automation.

The manufacturing sector, then, increases its capital/worker ratio and its productivity. However, the solutions that the service sector creates for the manufacturing sector are

not generally applicable to itself: manufacturing standardization possibilities are vastly superior to that of the service sector (especially value-added services). If the expansion of the services sector relies more on the addition of workers and less on productivity gains (by capital accumulation), economic growth and industrial progress will lead, as a trend, to greater participation of the services sector in the economy. Chart 2 shows this: the value-added quantum of services grew, and their relative prices increased while an increase in manufacturing value-added prices did not follow the growth in the value-added quantum in the manufacturing industry.

Back to RODRIK's dilemma, BAUMOL's thoughts may be the answer, and it is summarized in Chart 7. The ratio between the value-added and intermediate inputs quantum indexes have increased substantially over time in the manufacturing sector, while it has stood still and in the services sector. As expected from BAUMOL's reading, the expansion of the value-added of the service sector does not occur through the more efficient use of inputs, and the stable/decreasing proportion of this ratio shows that the increase in output results from equal or increasing amounts of input.



The manufacturing sector shows an opposite behavior: developing countries only experience productivity/income convergence in this industry as technological advances born in networked solutions in developed countries reach worldwide market diffusion,

including developing nation's industrial base (ARBACHE, 2015). As discussed above, output growth in the service sector does not occur due to tangible productivity gains; nevertheless, the value-added by these activities are increasing, a fact associated with the change in relative prices. If the technological paradigms of manufacturing production are determined in developed nation's sophisticated service sector, and there are few reasons to move it to developing countries, then there is evidence of non-convergence of productivity/income for the economy as a whole.

GONZALEZ et al. (2015) studied the connected development of service and manufacturing industries in a paper on global value chains (GVC). According to the authors, the emergence of a dynamic and sophisticated service sector depends on consistent and persistent demand for advanced solutions, which in the case of the US has been provided by the manufacturing sector. Discussing development strategies, the authors state that:

“... the higher the domestic specialization in Business Services (BS) backward-linked industries (i.e., sectors with the highest intermediate demand for services), the higher the propensity to participate in BS GVCs directly and indirectly (.). In the absence of a strong domestic presence of backward linked manufacturing industries to BS, it is unlikely that a (developing) country would build a GVC in these sectors from scratch, or develop the capabilities to upgrade existing low value-added services and develop high value-added BS to join the upstream segments of existing GVCs and serve international markets.”(Pg. 3).

The idea that deserves attention in this quote lies in understanding the conditions that led the economies to evolve from the rural and agricultural world to the urban and industrial one, and then to the current (KUZNETS, 1973). Industries were not born from Schumpeterian forces within the agricultural activity. A minimal set of radical innovations (the steam engine is its most prominent symbol) to ease the extraction of coal came about despite any productive dynamics in farming, although it has benefited from those advances decades ahead.

It is not the case for the "transition" from the industrial to the present world. As argued by GONZALEZ et al. (2015), the services industries are becoming more and more prominent because of the unique technical sophistication (relative to its own time, obviously) of the industrial world. KUZNETS (1973) in his seminal contribution to the debate on economic development and structural changes highlighted the distributive

conflicts - income, power, and prestige - arising from the rise and fall of different productive structures. Kuznets states that:

“Economic growth perforce brings about a decline in the relative position of one group after another – of farmers, of small-scale producers, of landowners – a change not easily accepted, and, in fact, as history teaches us, often resisted. The continuous disturbance of preexisting *relative* position of the several economic groups is pregnant with conflict – despite the rises in absolute income of product common to all groups. In some cases, these conflicts did break out into overt civil war...” (Pg. 252).

Concern over the apparent loss of relevance of the US manufacturing sector in no way resembles the conflicts pointed out by Kuznets. The misunderstanding of the above discussion is a better explanation for this concern than a supposed conflict between antagonistic capitalist classes (SMIL, 2013; DiMICCO, 2015). Services and manufacturing industries are two sides of the same coin, and their symbiotic and synergetic relationship (ARBACHE, 2014) place them as "allied" and not antagonistic forces.

4. Conclusions

This paper offers evidence that the so-called American deindustrialization is a relative prices dynamics underneath manufacturing and services progress over time. The deflationary pattern of the manufacturing sector does not necessarily imply a less relevant role in the economy since the theoretical perspectives discussed above have already previewed it considering specific productivity evolutions and human labor role in each industry. Ricardo's pricing theory, the Kaldor-Verdoorn's Law, and Baumol's Disease laid ground to explain that price dynamics.

More recent theoretical approaches point out to a growing synergistic and symbiotic relationship between the manufacturing and service sectors. In the aftermaths, value-added services – which are increasingly gaining notoriety as responsible for more competitiveness, are a consequence of a never-seen manufacturing sophistication in a virtuous circle that drives services sector, technology, and innovation.

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