

<https://doi.org/10.20396/rbest.v2i.13879>

ARTICLE

Macroeconomic dynamics and the evolution of formal manufacturing employment (2003-2016)

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Abstract

This study aims to analyse the evolution of the formal employment in the sub-sectors of the manufacturing industry between 2003 and 2016. The period has been divided into three according to the moment of economic cycle: the moment of greatest GDP growth between 2003 and 2008 (i), going through the economic slowdown period, between 2008 and 2013 (ii), until the phase of strong setback between 2013 and 2016 (iii). There was an intense growth of formal employment in the Brazilian economy between 2003 and 2013, greater than GDP growth. This performance showed very favorable rates until 2008 and then cooled down, but the indicators of formal employment, despite the slowdown in growth rate, this period showed employment rates well beyond the evolution of GDP. After 2013, this scenario has reversed strongly, both GDP and formal employment indicators showed negative results. The manufacturing industry, has demonstrated, since then, significant reduction of high added-value products and the number of jobs. The article questions the great difficulty of the Brazilian economy to sustain higher rates of GDP in times of worsening of the international scenario, especially in relation to industrial GDP and industrial employment.

Keywords: Economic cycle; Manufacturing employment; Brazil.

JEL: J01, J08, J49, I38, F66.

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Dinâmica macroeconômica e evolução do emprego formal na manufatura (2003-2016)

Resumo

O objetivo deste estudo é analisar a evolução do emprego formal nos subsetores da indústria de transformação entre 2003 e 2016. O período foi dividido em três de acordo com o ciclo econômico: o momento de maior crescimento do PIB entre 2003 e 2008 (i), passando pelo período de desaceleração econômica, entre 2008 e 2013 (ii), até a fase de forte revés entre 2013 e 2016 (iii). Houve um intenso crescimento do emprego formal na economia brasileira entre 2003 e 2013, muito superior ao crescimento do PIB. Esse desempenho mostrou taxas muito favoráveis até 2008 e depois arrefeceu, mas os indicadores de emprego formal, apesar da desaceleração da taxa de crescimento, neste período mostraram taxas de emprego muito além da evolução do PIB. Após 2013, esse cenário reverteu-se fortemente, tanto o PIB quanto os indicadores de emprego formal apresentaram resultados negativos. A indústria de transformação demonstrou, desde então, redução significativa de bens com alto valor adicionado e do número de empregos. O artigo questiona a grande dificuldade da economia brasileira em sustentar taxas mais altas do PIB em tempos de piora do cenário internacional, principalmente em relação ao PIB industrial e ao emprego industrial.

Palavras-chave: Ciclo econômico; Emprego industrial; Brasil.

Dinámica macroeconómica y evolución del empleo formal en la manufatura (2003-2016)

Resumen

Este estudio tiene como objetivo analizar la evolución del empleo formal en los subsectores de la industria manufacturera entre 2003 y 2016. El período se dividió en tres, de acuerdo con el ciclo económico: el momento de mayor crecimiento del PIB entre 2003 y 2008 (i), pasando por el período de desaceleración económica, entre 2008 y 2013 (ii), hasta la fase de fuerte retroceso entre 2013 y 2016 (iii). Hubo un intenso crecimiento del empleo formal en la economía brasileña entre 2003 y 2013, mucho más alto que el crecimiento del PIB. Este desempeño mostró tasas muy favorables hasta 2008 y luego se enfrió, pero los indicadores formales de empleo, a pesar de la desaceleración en la tasa de crecimiento, en este período mostraron tasas de empleo mucho más allá de la evolución del PIB. Después de 2013, este escenario se revirtió fuertemente, tanto el PIB como los indicadores de empleo formal mostraron resultados negativos. La industria manufacturera ha mostrado desde entonces una reducción significativa de los bienes de alto valor añadido y el número de puestos de trabajo. El artículo cuestiona la gran dificultad de la economía brasileña para mantener tasas más altas de PIB en tiempos de empeoramiento del escenario internacional, principalmente en relación con el PIB industrial y el empleo industrial.

Palabras clave: Ciclo económico; Empleo industrial; Brasil.

Dynamique macroéconomique et évolution de l'emploi formel dans le secteur manufacturier (2003-2016)

Résumé

Cette étude vise à analyser l'évolution de l'emploi formel dans les sous-secteurs de l'industrie manufacturière entre 2003 et 2016. La période a été divisée en trois, selon le cycle économique: le moment de la plus forte croissance du PIB entre 2003 et 2008 (i), en passant par la période de ralentissement économique entre 2008 et 2013 (ii), jusqu'à la phase de recul sévère entre 2013 et 2016 (iii). Il y a eu une croissance intense de l'emploi formel dans l'économie brésilienne entre 2003 et 2013, bien supérieure à la croissance du PIB. Cette performance a montré des taux très favorables jusqu'en 2008 puis s'est calmée, mais les indicateurs formels d'emploi, malgré le ralentissement du taux de croissance, ont montré au cours de cette période des taux d'emploi bien au-delà de l'évolution du PIB. Après 2013, ce scénario s'est fortement inversé, tant les indicateurs du PIB que de l'emploi formel ont montré des résultats négatifs. L'industrie manufacturière a depuis montré une réduction significative des produits à haute valeur ajoutée et du nombre d'emplois. L'article questionne la grande difficulté de l'économie brésilienne à maintenir des taux de PIB plus élevés en période de dégradation du scénario international, principalement en relation avec le PIB industriel et l'emploi industriel.

Mots clés: Cycle économique; Emploi industriel; Brésil.

Introduction

This article intends to analyze the evolution of manufacturing jobs considering the performance of the Brazilian manufacturing sector in the period from 2003 to 2016. The paper makes a detailed empirical analysis of the expansion of “formal jobs” (those with formal registration, which are protected by labor law) relating the profile of the national industrial structure.

The current Brazilian macroeconomic dynamics started in the 1990s with the economic opening, marked by exchange rate volatility and high interest rates. It is characterized by the loss of an important part of the effects of domestic demand to the foreign market, reducing the multiplier effect of investment and causing a downward movement in the national production chain. This process prevents the development of the manufacturing sector by hindering higher investment rates and the advance of productivity. Robust economic growth even in favorable moments is difficult to happen because of domestic economy's dependence on the dynamics of the international market. In addition, it reinforces the difficulties for the resumption of growth in periods with an unfavorable external context, as occurred after the international crisis of 2008. This situation is further aggravated by the high participation of foreign capital compared to national capital in the most dynamic sectors of the productive structure and by the reduction of the State's intervention capacity. That is the result of the transformations that occurred with the liberal reforms of the 1990s, through privatizations, mergers, and acquisitions. According to the World Bank (2019, October 14), the country's growth rate has been slowing since the beginning of the decade, from an annual growth rate of 4.5% (between 2006 and 2010) to 2.1% (between 2011 and 2014). There was a significant contraction in economic activity in 2015 and 2016, with the GDP dropping by 3.6% and 3.4% (respectively). The economic crisis was a result of falling commodity prices and the country's limited ability to carry out necessary fiscal reforms at all levels of government.

Despite the weaknesses, while there was strong demand from the international economy and an internal economic, political and institutional environment aimed at the development of a mass consumption market, as verified between 2003 and 2008, there was economic growth and intense generation of formal employment, well above of GDP growth, even after the 2008 external crisis. However, despite the high rates of formal employment in the second period, between 2008 and 2013, the limits of this growth were becoming clear, when the industrial sector was deeply affected by the retraction of the foreign market and the strong intensification of competition between the economies producing manufactured goods. That performance lead to a retraction in investments and the disorganization of domestic

production, with the consequent deceleration of GDP and the growth rate of formal employment, sustained, since then, by non-tradable sectors. This scenario confirms the weight of manufacturing as an explanatory factor for the performance of GDP and employment, which was clear in the crisis period (2014-2016), when, in addition to the industrial GDP and employment declines were more intense. They were much closer to each other.

It is necessary to highlight that the Brazilian labor market had an average rate of about 52% of informal jobs along the period (2003-2014) according to the National Households Sample Survey (PNAD-IBGE). Informal jobs are those without any social protection. However, the industrial sector offers formal jobs fundamentally. The situation starts to get worse at the beginning the end of 2015 (informal employment growth). The combined rate of unemployment and potential workforce shows worsening in the labor market, highlighted by a growing trend of this proportion (11.9% for the first quarter of 2015 to 19.3% for the first quarter of 2016 according to the new version of the survey (PNAD Contínua-IBGE).

The industrial employment performance until 2008 had a strong relationship with the exchange rate, insofar as the overvaluation of the currency (Real) that occurred in the period. That has played an important role in increasing domestic market demand and, on the other hand, it made it possible for some manufacturing segments to expand their production and generate jobs due to the ability to adapt to the valued currency, through much importation of intermediate goods, of higher cost, for internal processing. Therefore, even though there was a lot of leakage of demand for the foreign market, it enabled the generation of industrial employment inside the country.

The greater dynamism of the manufacturing industry in this phase, with relatively high generation of jobs, was of crucial importance for the dynamics of sectoral employment in general. Industrial sector has strong interactions in the system of inter and intrasectoral relations of the economy, through its linkage power. In other words, in the most dynamic period of the economy, industry played a fundamental role in the evolution of total formal employment. This dynamics, in turn, enabled other, less structured segments to become more structured, whether in the non-tradable sectors or in the industrial sector itself, thus formalizing more employment contracts. The situation also favored by institutional changes and by greater regulation and inspection by the public authorities.

In substance, with the impact of the 2008 international crisis, the Brazilian economy suffered also. Domestic demand and exports have downsized, affecting the sectors of activity as a whole, but more intensely the manufacturing sector, which showed a significant slowdown in the pace of employment growth. There was a negative impact on the performance of formal employment sector, but that remained with favorable indicators supported by non-tradable sectors.

The behavior of the manufacturing industry and the generation of employment in the sector is part of a mode of operation of the Brazilian economy marked by the movement of strong appreciation of the currency (Real), which implied a process of leakage of the dynamic effects of effective demand for the external market. This fact can be observable to the extent that, in the phase of greatest growth, the rates of GDP were lower than the growth of consumption plus investment, and industrial production registered a smaller increase than the increase in GDP, however, imports presented rates higher than all these indicators. In other words, while there was faster economic growth, the sector increased investments and it was able to generate jobs, due to the ability to adapt part of the industrial segments to the new currency levels (valued Real), through a lot of import of parts and components for internal processing.

Oreiro and D'Agostini (2016) claim that medium and long-run macroeconomic stability has not been achieved. Persistent real exchange rate overvaluation and increase in primary expenditures as a ratio to GDP cause deindustrialization of Brazilian economy and fiscal dominance regime comes back as usual. The reduction of the potential growth makes it impossible for the public sector to generate primary surplus necessary to stabilize public debt.

This macroeconomic dynamics is characterized by the volatility of the domestic currency, the high interest rate and relatively low investment rates. This implies in the loss of an important part of the dynamic effects of domestic demand abroad, resulting in a reduction of the multiplier and accelerator effects of investment and, therefore, forming a less dense industrial structure in the country. Furthermore, it discourages investments in sectors with a higher technological content, leading to regressive specialization, reduced competitiveness and productivity, which reinforces the subordinate model of external insertion and the tendency to reprimand the export agenda. This configuration intensifies the difficulties for the resumption of growth in periods with an unfavorable external scenario, as verified after the international crisis of 2008, which is further aggravated by the reduction of the intervention capacity of the Brazilian State, after the dismantling of the public equipment with the economic opening of the 1990s (C. Baltar, 2013).

This article has four sections including this introduction. Next section explores the behavior of Brazilian economic growth and improvements in social inclusion from 2003 on. Section 2 shows in detail the evolution of generation of jobs from 2003 to 2016, empirically. In order to facilitate the understanding of employment behavior in view of international economic dynamics three sub-periods are considered: (i) 2003-2008, (ii) 2008-2013 and (iii) 2013-2016). Final section gives a summary of the main arguments presented in the article.

1. The macroeconomic dynamics of growth with social inclusion

The commodity boom in the early 2000s, with a sharp increase in prices and demanded quantities, favored the economic activity of countries exporting these types of goods, such as Brazil. Thus, in addition to the strong increase in Brazilian exports of commodities, the country started to export more manufactured goods, a process that also benefited from the devaluation of the real since 1999, which resulted in a surplus of our trade balance. The growth rate of Brazilian exports has accelerated considerably since 2003, from an average annual growth of 5.6% (1990-2002) to 22.8% (2003-2006) (Hiratuka & Sarti, 2015).

Household consumption increased from 1.7% to 3.2% per year (2003-2006) according to Ipeadata (2019), because of the growth in employment, especially in formal work. It was also due to the positive effect on the income of a large share of the population, due to the increase in income from work, income transfers, and the continued increase in the purchasing power of minimum wage. Moreover, the positive impact on labor income benefited the vast majority of retired and pensioners (INSS). This context improved even more with the expansion of credit for consumption, especially in 2004 and 2005. Credit granting grew faster after 2004, for both companies and consumers. The increase in the flow of foreign capital in the domestic market and the greater external funding from banks and companies has favored the expansion, due to the high liquidity in the international financial market and the high differential of domestic and foreign interest rates (P. Baltar *et al.*, 2010). That also happened with personal credit highlighting the innovation of payroll loans, a downward trend in inflation, a reduction in nominal and real interest rates, and longer payment terms.

The strong increase in consumption, especially durable goods, led to an increase in investments after 2005, which grew by an average of 10.0% per year between 2005 and 2008. The increase in credit to companies increased the expansion of the productive capacity of the economy, despite the real interest rate still at a very high level, albeit on a falling trajectory. Public investments were resumed at a slower pace than other components of demand, and intensified after 2007, with the Growth Acceleration Program (PAC), a federal government benefiting developing in the country (Amitrano, 2011).

The resumption of capital flows to developing countries, which in Brazil took place less in the form of foreign loans and more in direct and portfolio investments, allowed the expansion of the domestic financial market, enabling the growth in the issuance of debt and property securities large companies, and thus expanding their debt capacity in national currency (Prates, 2006). The greater inflow of foreign capital enabled the considerable accumulation of foreign exchange reserves, reducing Brazilian external vulnerability, and

allowing the full payment of the debt to the IMF in 2005, in addition to preserving the balance of payments. There was a drop in the current account balance, due to higher imports with the resumption of growth, reinforced by the appreciation of the currency. This economic dynamics implied a continuous process of appreciation of the national currency (P. Baltar *et al.*, 2010; Barbosa & Pereira de Souza, 2010), even with the policy of expanding international reserves. All of that contributed to reducing the price of imports, holding inflation rates at low level and raising the purchasing power of wages, despite the negative effects on the external competitiveness of manufacturing and the consequences for the national productive structure. This context was favorable to economic dynamics in a virtuous cycle, even with a still relatively high level of interest rates.

Government policy choices reinforced the virtuous scenario in order to advance a mass consumption market and promoting greater inclusion of the base of the social pyramid, through an institutionality that included a series of public policies. Significant increase in the minimum wage increases purchasing power, Benefício de Prestação Continuada (BPC), and Programa Bolsa Família expanded access to credit for consumption for to poor individuals and families. Other policies such as support to family farming, expansion of Development Bank (BNDES) credit lines, policies against child and forced labor contributed altogether to improve living, working conditions and income distribution among households and individuals.

Such economic dynamics happened in a very favorable international scenario, which changed profoundly after the 2008 crisis – and an internal growth strategy that, as explained, implied a continued national currency appreciation. Despite the negative effects on the productive structure and the reduction in gains of the trade balance, the appreciated currency contributed to curb production costs, by lowering import prices, keeping inflation at low level and raising the purchasing power of wages. It was possible to observe then the expansion of demand as a result, both from tradable and non-tradable sectors, however, very intensely from the latter, which, under more favorable institutional conditions, expanded the formalization of establishments and the generation of formal jobs.

Although it is an important element for the growth dynamics of the period, the continued appreciation of the currency (Real) had a negative impact on the national production structure and on the result of the trade balance. This was because part of the domestic demand starts to move towards foreign market. It grew about 15.0% per year in the period. The features of the Brazilian productive structure and the profile of the Brazilian insertion in the global production chains reinforced this profile. In this way, part of the dynamism that the exchange rate allowed led to the loss of the dynamic potential of the domestic market also, hampering the development of the manufacturing sector. GDP grew (4.9% per year), but with less intensity, compared to the growth of consumption plus investment (5.7% per year), and

the production of the manufacturing industry grew less (4.5% per year) than GDP growth. Therefore, in addition to reinforcing the weaknesses of the Brazilian productive apparatus, it caused a decrease in the trade balance along the period.

A more careful analysis of the Brazilian economy's operating structure since the 1990s (C. Baltar, 2013) shows that, since then, a strong dependence between the internal economic dynamics and the performance of the international economy, both in commercial and financial terms, through the variation of the real exchange rate as one of the determinants of internal absorption. It shows that in a favorable international situation the greater capital inflow allows to cover possible deficits in current transactions with positive balance of payments balances. That caused optimistic expectations in economic agents, which stimulates the growth of demand. Meanwhile, demand raises economic growth improves productivity in non-tradable sectors, nominal wage increases and greater cost transfers to the prices of these goods make them more expensive than tradable goods.

In this context, even with greater growth in the economy in a favorable international situation for the balance of payments, exchange rate performance that stimulates imports damage the segments of tradable goods even with greater investments. The country does not have comparative advantages in this field. On the contrary, in an unfavorable international situation, the relative prices of tradable goods would stimulate an increase in investments in these sectors, but this performance is impaired insofar as, under these conditions, demand falls. In other words, the better performance of GDP in the period (2003-2008), did not change the level of dependence of the domestic economy in relation to the international economy, evident in the slowdown in GDP growth after the international crisis of 2008.

Manufacturing industry that Brazil managed to preserve, still sufficiently diversified and integrated, remains crucial to the country's economic growth, through the performance of important investments in various segments of the industry (Sarti & Hiratuka, 2011) and with considerable impact on job creation (period 2003 to 2008). However, the appreciated currency (Real) in favorable to investment circumstances implied a sharp increase in imports of manufactured products, especially those with more sophisticated technology, which resulted in the lower growth rate of industrial production at a time when GDP was performing reasonably, when comparing all other periods of our industrialization process, since 1930 (Cano, 2012; P. Baltar *et al.*, 2010).

The macroeconomic dynamics that characterized the period between 2003 and 2008 involves a mode of operation of the development paradigm of the globalized era, based on economic growth with lower inflation. Most Latin American countries, including Brazil, adopted it. This paradigm is quite different compared to the previous model, in which a

development strategy based on Industrialization by Import Replacement (ISI) prevailed, with strong State interference, investing directly in the production of strategic sectors for the advancement of verticalization and diversification of production chains (Belluzzo & Almeida, 2002; Carneiro, 2002).

The weakening of the Brazilian state apparatus started with the series of privatizations of several state-owned companies and utilities, as part of the liberalizing reforms (1990s). An intense merger and acquisition occurred, and this exceeded the limits of the privatized segments promoting an advance in the denationalization of capital ownership. Thus, in addition to the weakening of the intervention capacity of the Brazilian State, the opening process resulted in a new configuration of capital ownership with a sharp reduction in the weight of state capital and an intense increase in the weight of foreign capital compared to national capital. That implied in the rupture of the old development pattern based on the tripod: a) public company, b) foreign company and, c) private national company. This represented significant changes with respect to investment decisions, which began to suffer from the interference of the global scenario more intensely, affecting the levels of Brazilian growth consequently, which are higher in times of improvement in the international situation and cool down in times of worsening international economy (Carneiro, 2002; C. Baltar, 2013).

Furthermore, with the deregulation and intense development of the financial market, economic policies become subordinate to the financial system, in which one of the main assets is the public debt. That dynamics requires the State to guarantee remuneration and appreciation permanently. Therefore, monetary policy has as main objective the stability of the economy and fiscal policy, not only has the function of guaranteeing the control of the public deficit, but also the solvency of the public debt (Coutinho & Belluzzo, 1996; Lopreato, 2006; Kregel, 2004). In other words, speculative logic of valuing wealth stocks linked to government bonds directly. The State must use public resources in order to guarantee the sustainability of debt over time, through high interest rates. That order subordinates economic policy and prevents the State from acting more effectively in order to stimulate development, negatively affecting the labor market (Belluzzo, 2019).

The growth with social inclusion observed between 2003 and 2013, characterized by the reduction of inequality in the labor market, was able to change the dynamics described.

Anyway, despite the weaknesses of Brazilian economic structure, while the international economy was favorable it was possible to grow and generate formal jobs, even in the manufacturing sector. The difficulties became more clear after the external crisis of 2008, when the international market retracted and there was an increase in idle capacity in the export economies of manufactured goods, intensifying global intercapitalist competition.

The increasing competition from imported products affected Brazilian manufacturing industry profoundly. Industry's mishaps manifested itself in GDP performance, much more than in other economies where industry does not have such a relevant participation in determining GDP. Meanwhile, balance of payments problems became more evident, as international market demand cooled down, affecting Brazilian exports, while imports remained high still. There was an enormous difficulty for the reorganization of local production and, given the unfavorable external environment, investments cooled down sharply. In other words, it became increasingly difficult to maintain the high import coefficients, involving mainly inputs, but also final goods.

In order to continue growing and generating jobs in this scenario, the transformation industry would have had to increase its investments in the expansion of productive capacity strongly, despite the increase in tax incentives and exemptions from the federal government. The intense chaining power of manufacturing and its multiplier effect, the economy as a whole was strongly impacted as a result, slowing the pace of GDP growth (Serrano & Summa, 2015). However, the employment in the manufacturing sector sustained the growth until at least 2014.

Since mid-2013, the Dilma government abandoned its reindustrialization strategy. At the beginning of the second term, it adopted a recessionary macroeconomic policy, with severe fiscal austerity (Mello & Rossi, 2018). The political and economic crisis, the recession process of the years 2015 and 2016 greatly aggravated the difficulties of the manufacturing sector with a significant retraction in employment from then on.

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2. The evolution of formal employment in the manufacturing industry

2.1. The 2003-2008 period

The manufacturing industry, in the phase of accelerating growth (2003-2008), presented an excellent performance in the generation of formal employment. That performance occurred even taking into account the unfavorable scenario to the external competitiveness of Brazilian manufacturing, through the continued movement of overvaluation of the currency (Real), in addition to all the problems exhaustively pointed out previously.

The manufacturing industry during the growth of aggregate demand, despite the appreciation of the national currency and the consequences on competitiveness, increased investments, resulting in a good performance of the industrial product of 4.5% per year. However, this result implied a much higher increase in formal employment (40.0%, almost

7.0% per year), above the average variation of the group of sectors (35.9%). More than 2 million formal jobs between 2003 and 2008 created, representing almost 20% of the absolute growth in total formal employment.

The most technologically sophisticated and organized manufacturing sector adapted themselves to valued currency, importing technologically sophisticated inputs, performing strong increased demand with a lot of internal processing. In other words, formalization of companies and expansion of formal work contracts were not the only explanation for the maintenance of the jobs when the GDP growth starts slowing down.

This latter behavior was mainly driven by the segments of the manufacturing industry that were able to respond to the strong competition from the import of final goods, as in the case of the transport material industry and the segment of machinery and equipment. These which even with a lot of imports of parts and components, meaning a lot of internal processing, and, therefore, in job creation. The import of technologically more sophisticated components has damaged the added-value in these sectors although. Unlike what happened, for example, with the textile sector, footwear sector and wood and furniture segment, in which employment, suffered more strongly from competition of imported products. They had no way of reacting to lower costs by importing the most expensive inputs. It is also essential to highlight the weight of the manufacturing industry in relation to all sectors, practically equaling the trade and repair sector, which favored the considerable contribution of its performance to growth of formal employment for all sectors in the period (almost 20.0%). It registered a proportional growth in employment in addition to the total increase in all sectors.

The significant performance of employment in the manufacture shows the increase in its share of total employment between 2003 and 2008 and the importance of the sector for the labor market in Brazil despite the appreciation of the national currency.

The subsectors that most contributed to the performance of manufacturing in the period 2003-2008:¹ the food industry, the machinery and equipment segment, the clothing and accessories industry, the auto industry, and the metal products segment (Table 1). Five subsectors out of twenty-three contributed more than half of the generation of industrial employment (57.6%), almost 1.3 million formal jobs more in the period. It should be highlighted that 25.7% were contributions from the auto industry, metal products and machinery and equipment segments, despite the fact that these subsectors are characterized by a high import rate, what could lessen local employment. The imports are complementary to production, mainly of parts and components. However, there was a lot of internal processing with a lot of job creation, while consumption remained increasing.

¹ The data refer to the number of employees in September 30 of each year in such a way that in 2008 it still does not capture the substantial fall in employment that occurred in the third quarter.

Table 1. Variation of formal employment according to sub-sectors of the manufacturing industry, 2003-2008.

Manufacturing Industry Subsectors	2003		2008		2003/08	2003/08
	N	Share (%)	N	Share (%)	Contr. (%)	Δ (%)
Food products and beverages	1,073,326	20.0	1,570,594	20.9	23.2	46.3
Tobacco products	14,473	0.3	16,417	0.2	0.1	13.4
Textile products	283,136	5.3	349,492	4.7	3.1	23.4
Clothing and accessories	454,824	8.5	639,318	8.5	8.6	40.6
Leather goods, travel goods and footwear	360,638	6.7	429,008	5.7	3.2	19.0
Wood products	237,763	4.4	219,476	2.9	(0.9)	(7.7)
Cellulose, paper and paper products	123,581	2.3	165,824	2.2	2.0	34.2
Editing, printing and playback of recordings	186,966	3.5	230,178	3.1	2.0	23.1
Coke, oil refining, and alcohol production	84,238	1.6	163,831	2.2	3.7	94.5
Chemicals	290,871	5.4	360,934	4.8	3.3	24.1
Rubber and plastic items	288,534	5.4	435,152	5.8	6.8	50.8
Non-metallic mineral products	283,895	5.3	365,106	4.9	3.8	28.6
Basic metallurgy	199,598	3.7	266,446	3.6	3.1	33.5
Metal products (except machinery and equipment)	324,469	6.1	501,870	6.7	8.3	54.7
Machinery and equipment	286,301	5.3	489,725	6.5	9.5	71.1
Office machines and computer equipment	21,162	0.4	46,460	0.6	1.2	119.5
Electrical machines, equipment and materials	121,049	2.3	196,931	2.6	3.5	62.7
Electronic material and communications equipments	64,693	1.2	90,321	1.2	1.2	39.6
Hospital medical instruments and similar equipments	39,093	0.7	62,187	0.8	1.1	59.1
Manufacture and assembly of motor vehicles	283,050	5.3	453,849	6.1	8.0	60.3
Manufacture of other transport equipment	50,609	0.9	101,788	1.4	2.4	101.1
Manufacture of furniture and various industries	271,291	5.1	315,694	4.2	2.1	16.4
Recycling	14,083	0.3	28,890	0.4	0.7	105.1
Total	5,357,643	100.0	7,499,491	100.0	100.0	40.0

Source: MTE. RAIS and CAGED.

Note: Data referring to the number of employees in September 30 of each year. The fall in employment occurred only in the fourth quarter of 2008.

Manufacturing industry's data shows an increasing share in the employment of the following segments over time: manufacture of office machines and computer equipment, manufacture of other transport equipment, manufacture of coke, oil refining, preparation of nuclear fuels and alcohol production, manufacture of machinery and equipment, manufacture and assembly of motor vehicles, trailers and bodies, and manufacture of metal products. These are industrial activities with some technological complexity. The performance was possible to happen even in a scenario of strong increase in aggregate demand and adaptation of the

subsectors to the appreciation of the national currency, with a lot of import of parts and components, technologically more sophisticated.

On the opposite side, the main traditional sectors lost share in total employment, without so many possibilities to compensate for the appreciation of the national currency by importing sophisticated components (with an important weight in the costs of the final product). The wood products, the leather preparation and leather goods, travel and footwear manufacturing segment (which reduced its share from 6.7% to 5.7%), and manufacture of textile products (5.3% to 4.7%) are examples of that behavior.

However and despite all the difficulty of the Brazilian industrial sector and even considering the problem of oversizing of the data base (RAIS and CAGED), manufacturing industry contributed significantly to the growth of employment between the years 2003 and 2008, with an average annual rate of almost 7.0%, far above the annual average growth of formal employment for all workers. Meanwhile, GDP variation average was 4.9%. In other words, while there was dynamism in the domestic market and a favorable international scenario, the manufacturing industry had an important contribution to the advancement of formal employment in Brazil (20.0%).

Thus, in spite of the recurring creed on the issue of loss of share of the sector of the manufacturing industry in the national product, the sector presented an expressive performance in the generation of formal employment in the five years that preceded the international crisis while there was growth of GDP. Its share surpassed the performance of several non-tradable sectors that had a significant contribution in formal employment, such as transport, storage communications sector (36.3%) and the real estate activities, rents and services provided to companies sector (39.8%).

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2.2. The 2008-2013 period

The performance of economic activity along the period, fell down 1.8 pp compared to the previous period (4.9% to 3.1% per year). The added-value of the manufacturing industry has reduced even more intensely (4.5% per year to 0.4%). In this context, the indicators of formal employment in the manufacturing industry were quite unfavorable, with just over 717 thousand jobs generated in this period, against more than 2 million in the previous one. The sector recorded the greatest contribution to the drop in the pace of growth formal employment, taking into account the sector's participation in the set of sectors. Thus, considering its weight, the strong retraction in the growth rate of formal employment in the manufacturing industry, (40.0% to 9.6%), it implied an intense retraction of its contribution to the generation of formal employment (7.8%), just over 2.5 times less than the contribution

in the first period (20.0%). The decrease in the sector's participation was from 18.4% to 16.5% (Table 2).

Table 2. Variation of formal employment according to sub-sectors of the manufacturing industry, 2008-2013.

Manufacturing Industry Subsectors	2008		2013		2008/13	2008/13
	N	Share (%)	N	Share (%)	Contr. (%)	Δ (%)
Food products and beverages	1,570,594	20.9	1,666,625	20.3	13.4	6.1
Tobacco products	16,417	0.2	16,505	0.2	0.0	0.5
Textile products	349,492	4.7	345,955	4.2	(0.5)	(1.0)
Clothing and accessories	639,318	8.5	703,212	8.6	8.9	10.0
Leather goods, travel goods and footwear	429,008	5.7	423,743	5.2	(0.7)	(1.2)
Wood products	219,476	2.9	197,402	2.4	(3.1)	(10.1)
Cellulose, paper and paper products	165,824	2.2	182,410	2.2	2.3	10.0
Editing, printing and playback of recordings	230,178	3.1	232,364	2.8	0.3	0.9
Coke, oil refining, and alcohol production	163,831	2.2	40,529	0.5	(17.2)	(75.3)
Chemicals	360,934	4.8	548,602	6.7	26.1	52.0
Rubber and plastic items	435,152	5.8	463,290	5.6	3.9	6.5
Non-metallic mineral products	365,106	4.9	460,166	5.6	13.2	26.0
Basic metallurgy	266,446	3.6	254,292	3.1	(1.7)	(4.6)
Metal products (except machinery and equipment)	501,870	6.7	557,263	6.8	7.7	11.0
Machinery and equipment	489,725	6.5	604,093	7.4	15.9	23.4
Office machines and computer equipment	46,460	0.6	51,193	0.6	0.7	10.2
Electrical machines, equipment and materials	196,931	2.6	227,268	2.8	4.2	15.4
Electronic material and communications equipments	90,321	1.2	91,181	1.1	0.1	1.0
Hospital medical instruments and similar equipments	62,187	0.8	81,756	1.0	2.7	31.5
Manufacture and assembly of motor vehicles	453,849	6.1	511,124	6.2	8.0	12.6
Manufacture of other transport equipment	101,788	1.4	136,672	1.7	4.9	34.3
Manufacture of furniture and various industries	315,694	4.2	388,210	4.7	10.1	23.0
Recycling	28,890	0.4	33,596	0.4	0.7	16.3
Total	7,499,491	100.0	8,217,451	100.0	100.0	9.6

Source: MTE, RAIS and CAGED.

Note: Data referring to the number of employees in September 31 of each year. The fall in employment occurred only in the fourth quarter of 2008.

The manufacturing segments with negative results, contributing more intensely to the retraction in the growth rate of employment in the sector were: coke manufacturing, oil refining, elaboration of nuclear fuels and alcohol production, manufacture of wooden products, basic metallurgy, preparation of leathers and manufacture of leather goods, travel articles and

footwear and manufacture of textile products. Formal employment across these sectors decreased by 11.6% and their participation, which in 2008 was just over 19.0%, fell to 15.4%, causing a sharp drop in the contribution considering the five subsectors altogether, from 12.3% of positive contribution, to a negative contribution of 23.2% (Table 2). This result is indicative of the sharp slowdown in the activity of these sectors – most affected by the international crisis, due to the fall in demand and prices, as is the case in the oil sector, but also by greater direct competition from the final product, in subsectors unable to take advantage of importing more inputs that are expensive. Those are the textile and leather and footwear segments, but the wood products and basic metallurgy segments also. It is possible to verify that just looking at the numbers of foreign trade and the physical production of each element.

The electrical equipment industry and the auto industry experienced a sharp slowdown in employment growth. The first one raised the contribution and the second maintained the same level. The machinery and equipment industry, as well as the medical-hospital instrumentation and precision and optical instruments industry, experienced a sharp slowdown in employment. However, when presenting variations well above the total variation in industrial employment, they increased the contribution to employment in the sector as a whole. These are sectors with high import rates did not mean a direct reduction in local employment.

The best performances were with the segments: manufacture of furniture and various industries, manufacture of non-metallic mineral products and manufacture of chemical products. Altogether, they meant the creation of 1.4 million formal jobs, increasing them in almost 34% and responsible for the explanation of 50% of the total average increase in employment in the manufacturing industry between 2008 and 2013, even registering a drop in exported quantities and a very strong growth in the imported quantum. That would indicate a greater internal processing of parts and componentes. The non-metallic minerals segment had a strong demand from the civil construction sector, which, in turn, showed a very expressive increase in formal employment also, despite the slowdown in the growth rate between 2008 and 2013, registering the highest rate variation compared to rates in other sectors of activity (Table 2).

However, the growth of this job (2008 and 2013, almost 1.9% per year), without a significant increase in the total production of manufactured goods, points out the importance of formalizing activities and labor contracts. It also shows the importance of the increase in the number of companies that started to make the declaration to the government authority (Ministry of Labor and Employment – RAIS database and CAGED database), reflecting the improvement in business structuring.

The drop in the growth rate of total formal employment (2008 and 2013), compared to the previous period was undoubtedly pulled, above all, by the manufacturing industry, highlighting the basic metallurgy sector, which is greatly impacted by the slowing down of the automobile industry. It also shows those sectors most affected by the import of final goods, as is the case of the textile and leather products segments and footwear. The oil sector had a poor performance, however, as already pointed out, because of possible RAIS/CAGED classification problems. It should be considered together with the chemical products sector, which altogether demonstrated a good performance. Anyway, if formal employment in general still showed good results after the international crisis of 2008, it was due to the non-tradable segments, with emphasis on the sectors: civil construction (48.9%), accommodation and food, transport, storage and communications (38.5%), trade, repair of motor vehicles, personal and domestic objects (29.6%), and real estate activities, rentals and services provided to companies (38.0%).

2.3. The 2013-2016 period

The effects of the intensification of the economic crisis after 2013, the consequent recession of the years 2015 and 2016, the strong retraction of economic activity in general and the behavior of industrial activity had consequences on formal employment in general and in the sector manufacturing especially, with negative performance.

The annual average of GDP between 2013 and 2016 was negative (3.4%), being even more intense the fall of the activity of the manufacturing industry, which registered a negative average in the added-value (6.3%). The result of the formal employment of the manufacturing industry was disastrous (-13.5%) in the total of the three years (or -4.7% per year), a drop much higher than the fall of the set of activity sectors (-3.9%, or -1.3% per year). These figures show and reinforce the impacts that the manufacturing sector has been suffering since the international crisis of 2008, when the Brazilian economy suffered, either due to the strong fall in domestic demand, as well as due to the reduction in its exports. This scenario was deeply aggravated by the contractionary economic policy strategy adopted, affecting the sectors of activity as a whole, but more intensely manufacturing industry.

It is important to highlight the fall in formal employment in all sub-sectors of the manufacturing industry (Table 3). The most technology-intensive sub-sectors were those with the worst results (600 thousand fewer jobs), well above the negative results of the industry as a whole. Those sub-sectors import a lot of parts and components which means a significant generation of local assembly jobs. They are the following segments: manufacture of office machines and computer equipment, manufacture and assembly of motor vehicles, trailer and

bodies, manufacture of other transport equipment, manufacture of metal products except machinery and equipment, basic metallurgy, manufacture of electronic material and communication devices and equipment, manufacture of machinery and equipment, edition printing and reproduction of recordings and manufacture of machines, electrical appliances and materials. These subsectors retracted (22.2%) and the share (from 32.4% to 29.2%) altogether.

Table 3. Variation of formal employment according to sub-sectors of the manufacturing industry, 2013-2016.

Manufacturing Industry Subsectors	2013		2016		2013/16	2013/16
	N	Share (%)	N	Share (%)	Contr. (%)	Δ (%)
Food products and beverages	1,666,625	20.3	1,645,073	23.1	1.9	(1.3)
Tobacco products	16,505	0.2	14,233	0.2	0.2	(13.8)
Textile products	345,955	4.2	287,442	4.0	(5.3)	(16.9)
Clothing and accessories	703,212	8.6	586,294	8.2	10.5	(16.6)
Leather goods, travel goods and footwear	423,743	5.2	361,599	5.1	(5.6)	(14.7)
Wood products	197,402	2.4	172,252	2.4	(2.3)	(12.7)
Cellulose, paper and paper products	182,410	2.2	174,064	2.4	0.8	(4.6)
Editing, printing and playback of recordings	232,364	2.8	189,767	2.7	3.8	(18.3)
Coke, oil refining, and alcohol production	40,529	0.5	34,425	0.5	(0.6)	(15.1)
Chemicals	548,602	6.7	520,781	7.3	2.5	(5.1)
Rubber and plastic items	463,290	5.6	406,572	5.7	5.1	(12.2)
Non-metallic mineral products	460,166	5.6	397,034	5.6	5.7	(13.7)
Basic metallurgy	254,292	3.1	200,005	2.8	(4.9)	(21.3)
Metal products (except machinery and equipment)	557,263	6.8	436,448	6.1	10.9	(21.7)
Machinery and equipment	604,093	7.4	493,143	6.9	10.0	(18.4)
Office machines and computer equipment	51,193	0.6	36,264	0.5	1.3	(29.2)
Electrical machines, equipment and materials	227,268	2.8	188,197	2.6	3.5	(17.2)
Electronic material and communications equipments	91,181	1.1	61,017	0.9	2.7	(33.1)
Hospital medical instruments and similar equipments	81,756	1.0	76,922	1.1	0.4	(5.9)
Manufacture and assembly of motor vehicles	511,124	6.2	368,516	5.2	12.9	(27.9)
Manufacture of other transport equipment	136,672	1.7	100,656	1.4	3.2	(26.4)
Manufacture of furniture and various industries	388,210	4.7	326,894	4.6	5.5	(15.8)
Recycling	33,596	0.4	31,624	0.4	0.2	(5.9)
Total	8,217,451	100.0	7,109,222	100.0	100.0	(13.5)

Source: MTE. RAIS and CAGED.

Note: Data referring to the number of employees in September 31 of each year.

The results still negative but above the general average result of the industry are for the textile products subsectors of manufacturing: leather and footwear, coke, oil and fuel refining, of non-metallic minerals and furniture (fell by 15.6%, but maintained their share at 28%).

The subsectors that, despite the poor performance, had better results than the industry as a whole were the food and beverage segments: wooden, paper and cellulose, chemical products, rubber and plastic items, medical, optical and industrial automation equipment, in addition to the recycling segment.

These subsectors lost around 147 thousand jobs altogether, something like four times less than the worst performing subsectors, shrinking (4.6%) 8.9 pp less than the general average retraction of the industry, which meant an increase of participation (38.6% to 42.6%).

Final considerations

This article contributes to an analysis of Brazilian formal employment focusing on the manufacturing sector in three periods of economic activity.

During the first period (2003-2008) empirical evidence reveals intense formal employment growth far beyond the GDP growth. This performance showed very favorable rates until 2008.

The second period (2008-2013), the indicators of formal employment, despite the slowdown in the growth rate, still continued to grow at a rate much higher than the GDP (growth rate) compared to the first period (2003-2008) but there was a slowdown in growth dynamics.

The growth of the economy marked by the sharp rise in formal employment, increased in average remuneration and decreased in the relative dispersion of wages in general and especially in this type of in the industrial employment between the years 2003 and 2013. The main reasons were: (a) the real growth of minimum wage and (b) the growth of base wages in occupational categories; both far beyond the inflation rate.

The period was divided into two distinct moments, separated by the year 2008, momento of the international crisis, when the most intense GDP growth between 2003 and 2008 – in a favorable world economic scenario – slowed down. This growth, however, even in its most intense phase (2004 and 2008), was marked by leakage of the dynamic effects of the effective demand out of the country, which can be verified by the fact that the GDP growth and the rates were lower than growth in consumption plus investment (far beyond the GDP

growth). Industrial production registered a less intense increase than GDP, while imports, mainly of manufactured products, presented rates above all these indicators. This fact is due to institutional changes that occurred in the period. One of them was the increasing formalization of small companies, mainly affecting activities that do not compete with the production of other countries. The intense generation of formal employment, in addition, have benefited from demographic changes, in progress since the end of the 1960s, and which, together with changes in share rates by age and sex, meant less economically active population growth over the 2000s.

The scenario changed with the slowing down of GDP growth after 2008, which became more intense as of 2011. The causes that lie behind this were due to the exhaustion of a credit cycle not offset by and increase investment and a slowdown in consumption consequently. This occurred in spite of all government efforts to advance PAC projects, mainly housing infrastructure, in an attempt to lower the basic interest rate of the economy and BNDES' efforts to create a capital market that would support private investment, as well as tax and credit exemptions and incentives expanded by the federal government. Even with the reduction in the GDP growth rate, the labor market still shows good results, which still favored consumption. The strategy to compensate the slowdown in consumption by accelerating investment was hampered by the international situation. The international crisis increased the idle capacity of the economies exporting manufactured goods and increased international competition, negatively affecting Brazilian industrial production. Industrial production decreased after 2010 and, consequently, between 2008 and 2013 the sector had no longer the generation of jobs it presented between 2004 and 2008.

The slowdown in investment and exports was a key element in the slowdown in GDP after 2008, aggravating the effects on consumption. The dependence on the performance of the Brazilian economy in relation to the international economy, established since the 1990s hampered, mainly, the investment in the construction of productive capacity of high technological content. This made it difficult to overcome the technical productive delay that the country has accumulated and that has deepened over time.

The dependence of the economy's performance in relation to the international situation has not changed with the growth with social inclusion and the expansion of the mass consumption market, between 2003 and 2013. The import of technologically more sophisticated products prevented a more robust GDP growth in favorable international moments and reinforced the difficulties to maintain growth in periods with an unfavorable external scenario, as verified after the 2008 external crisis.

After 2013 (third period), the scenario has changed substantially, both GDP and formal employment indicators showed negative results. Formal employment fell deeply in

manufacturing industry from 2013 to 2016 especially among most technology-intense sub-sectors, well above the negative results of the industry as a whole. There was a phase of strong economic setback.

Anyway, despite the weaknesses of this way of functioning of the Brazilian economy after the commercial and financial opening, in the 2000s formal employment grew intensely. However, despite the growth rates of formal employment remaining relatively high after 2008, the limits of economic growth have become clear, especially the stagnation of industrial production, which is deeply affected by the reduction in investments and exports of manufactured goods. Reduction in investments and exports of manufactured goods aggravated the effects of the slowdown in consumption on GDP growth and the pace of formal employment growth itself, sustained, at that moment, by activities that did not compete with production from other countries.

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Received on 2 December 2019.

Revised on 10 March 2020.

Approved on 19 June 2020.