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# Output Growth and Household Consumption in Brazil from 2000 to 2016: a structural decomposition analysis

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Dissertação de Mestrado apresentada ao Programa de Pós-Graduação em Economia (PPGE) do Instituto de Economia da Universidade Federal do Rio de Janeiro, como parte dos requisitos necessários para a obtenção do grau de Mestre em Economia.

Universidade Federal do Rio de Janeiro

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Orientador: Fábio Neves Perácio de Freitas
Co-orientadora: Esther Dweck

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*Ocorre, é claro, ocasionalmente, de nos depararmos com a atitude de que "o que você não sabe não pode machucá-lo" e que o conhecimento pode ser perigoso: pode gerar um desejo de fazer mudanças no sistema. A experiência desses anos parece, no entanto, ter convencido não apenas a maioria dos economistas - com algumas notáveis exceções - mas também o público em geral de que a falta de conhecimento econômico pode ferir gravemente.*

*Leontief (1971, p.6, own translation)*

*One runs up, of course, occasionally against the attitude that "what you don't know can't hurt you" and that knowledge might be dangerous: it may generate a desire to tinker with the system. The experience of these years seems, however, to have convinced not only most economists—with a few notable exceptions—but also the public at large that a lack of economic knowledge can hurt badly.*

*Leontief (1971, p.6)*

# Resumo

Os anos entre 2000 e 2016 foram marcados por mudanças significativas na dinâmica do crescimento econômico e do consumo das famílias no Brasil. A década de 2000 testemunhou um crescimento econômico sustentado após duas décadas de baixo dinamismo da economia brasileira. Uma característica notável deste recente episódio de crescimento é ele ter sido acompanhado por uma rápida expansão do consumo das famílias e pela difusão dos padrões de consumo para grandes porções da população, com a inclusão de muitas pessoas no mercado consumidor. Esse dinamismo, no entanto, não perdurou na década seguinte. A década de 2010 foi marcada pela desaceleração do crescimento e, desde 2016, o país enfrenta uma recessão. O objetivo deste trabalho é entender como evoluíram as taxas de crescimento e as estruturas setoriais do consumo das famílias e do valor bruto da produção do Brasil entre 2000 e 2016. Buscamos compreender os determinantes da mudança estrutural observada e identificar a presença de processos de causalidade cumulativa entre estrutura de consumo e estrutura produtiva. Realizamos duas análises de decomposição estrutural: uma para o crescimento do consumo das famílias e outra para o crescimento do valor bruto da produção. A primeira fornece uma medida da contribuição das mudanças em um componente exógeno e quatro componentes endógenos – as propensões a consumir, os salários médios, a produtividade do trabalho e o crescimento do produto – para o crescimento do consumo por atividades. Da mesma forma, a segunda decomposição mede a contribuição das mudanças nos componentes da demanda agregada sobre o crescimento da produção para cada atividade econômica. A novidade deste estudo é a aplicação da técnica de análise de decomposição estrutural à variação do consumo das famílias. Também aprimoramos a metodologia utilizada em trabalhos anteriores para endogeneizar o consumo. Utilizamos uma série de matrizes Insumo-Produto, valoradas a preços constantes e a preços relativos constantes construídas pelo GIC-UFRJ para o período 2000-2016. Utilizamos dados referentes aos salários e ocupações por setor da Pesquisa Industrial Anual Brasileira (PIA) e várias classificações disponibilizadas pelo IBGE. Constatamos que as mudanças estruturais na produção e no consumo se reforçaram mutuamente nos períodos de expansão econômica e observaram a alta relevância do investimento e dos gastos do governo na determinação do crescimento econômico.

**Palavras-chaves:** Análise de Decomposição Estrutural, Metodologia Insumo-Produto, Consumo das Famílias, Mudança Estrutural, Economia Brasileira.

# Abstract

The years between 2000 and 2016 were marked by significant changes in the dynamics of economic growth and household consumption in Brazil. The decade of 2000, witnessed a sustained economic growth after two decades of low dynamism of the Brazilian economy. A notable feature of this recent episode of growth is that it was accompanied by a fast expansion of household consumption and the diffusion of consumption patterns for larger portions of the population, with the inclusion of many people in the consumer market. This dynamism, however, did not last in the following decade. The 2010s were marked by deceleration of growth and since 2016 have been experiencing a recession. The objective of this work is to understand the household consumption and output growth trajectories in Brazil and the evolution of their sectorial structures, between 2000 and 2016. We aim to understand the sources of the structural change observed and identify the presence of cumulative causation processes between consumption and production structures. We performed two structural decomposition analysis (SDA): one for household consumption growth and another for gross output growth. The first provides a measure of the contribution of changes in one exogenous component and four endogenous components – the propensities to consume, average wages, labor productivity and output growth to household consumption growth. Likewise, the second decomposition measures the contribution of the changes in the components of the aggregate demand on output growth for each economic activity. The novelty of this study is the application of the structural decomposition analysis technique to the household consumption variation. We also improved the methodology used in former works to endogenize consumption. We used a series of IO matrices valued at constant prices and at constant relative prices constructed by GIC-UFRJ for the period 2000-2016. We also used data related to the wages and occupations by industry from the Brazilian Annual Industrial Survey (PIA), and several classifications made available by IBGE. We found that structural change in output and consumption reinforced each other in the periods of economic expansion and observed the high relevance of investment and government spending in the determination of the economic growth.

**Key-words:** Structural Decomposition Analysis. Input-Output Applications. Household Consumption. Structural Change. Brazilian Economy.

# List of Graphs

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# List of Variables

| *Variable* | *Dimension* | *Description* | *Construction* |
|---|---|---|---|
| $A$ | (42x42) | Domestic technical coefficients | Database |
| $A_T$ | (42x42) | Total technical coefficients (domestic + imported origin) | Database |
| $\bar{A}$ | (42x42) | Induced consumption Leontief matrix | $\bar{A} = A + A_c$ |
| $A_c$ | (42x42) | Domestic propensities to consume | $A_c = \hat{v} c_w w'$ |
| $A_{cT}$ | (42x42) | Total propensities to consume (domestic + imported origin) | $A_{cT} = \hat{v} c_{wT} w'$ |
| $c^p$ | (42x1) | Sectoral relative price vector for household consumption of domestic origin | $c_i^p = f_i^C / c_i^v$ |
| $c_w$ | (42x1) | Average propensity to consume products of national origin | $c_{w_i} = \frac{f_i^C}{W}$ |
| $c_{wT}$ | (42x1) | Average propensity to consume products of national and imported origin | $c_{wT_i} = \frac{c_{T_i}}{W}$ |
| $d_{cw}$ | (42x1) | Average propensities to consume non-durable goods and services of national origin | $d_{cw} = \hat{v}\, c_w$ |
| $d_{cwT}$ | (42x1) | Average propensities to consume non-durable goods and services of national and imported origin | $d_{cwT} = \hat{v}\, c_{wT}$ |
| $f$ | (42x1) | Domestic final demand | Database |
| $f^{aut}$ | (42x1) | Domestic autonomous final demand | $f^{aut} = f - f^{C_{ind}}$ |
| $f^{\mathrm{C}}$ | (42x1) | Domestic consumption of households by industry | Database |
| $f^{C_{aut}}$ | (42x1) | Domestic autonomous final consumption of households by industry | $f^{C_{aut}} = f^C - f^{C_{ind}}$ |
| $f^{C_{ind}}$ | (42x1) | Domestic induced final consumption of households by industry | $f^{C_{ind}} = A_c x$ |
| $f^{C^v}$ | (42x1) | Household consumption at constant relative prices | Database |
| $f^{\mathrm{G}}$ | (42x1) | Domestic government spending by industry | Database |
| $f^I$ | (42x1) | Domestic investment by industry | Database |
| $f^X$ | (42x1) | Domestic exports by industry | Database |
| $f_T$ | (42x1) | Domestic final demand | Database |
| $f_T^{aut}$ | (42x1) | Total autonomous final demand (domestic + imported origin) | $f_T^{aut} = f_T - f_T^{C_{ind}}$ |
| $f_T^C$ | (42x1) | Total final consumption of households by industry (domestic + imported origin) | Database |

| *Variable* | *Dimension* | *Description* | *Construction* |
|---|---|---|---|
| $f_T^{C_{aut}}$ | (42x1) | Total autonomous final consumption of households by industry (domestic + imported origin) | $f_T^{C_{aut}} = f_T^C - f_T^{C_{ind}}$ |
| $f_T^{C_{ind}}$ | (42x1) | Total induced final consumption of households by industry (domestic + imported origin) | $f_T^C \otimes v$ |
| $f_T^G$ | (42x1) | Total government spending by industry (domestic + imported) | Database |
| $f_T^I$ | (42x1) | Total investment by industry (domestic + imported) | Database |
| $f_T^X$ | (42x1) | Total exports by industry (domestic + imported) | Database |
| $\bar{L}$ | (42x42) | Induced consumption Leontief matrix inverse | $\bar{L} = (I - \bar{A})^{-1}$ |
| $l$ | (42x1) | Occupations by industry | Database |
| $l_x$ | (42x1) | Labor technical coefficients by industry | $l_{x_i} = l_i / x_i$ |
| $\mu$ | (42x1) | Final demand domestic production ratio vector | $\mu_i = f_i / f_{T_i}$ |
| $\mu^{aut}$ | (42x1) | Autonomous final demands domestic production ratio vector for | $\mu_i^{aut} = f_i^{aut} / f_{T_i}^{aut}$ |
| $\mu^A$ | (42x42) | Domestic technical coefficients domestic production ratio matrix | $\mu_{ij}^A = A_{ij} / A_{T_{ij}}$ |
| $\mu^{A_c}$ | (42x42) | Total technical coefficients domestic production ratio matrix | $\mu_{ij}^{Ac} = A_{c_{ij}} / A_{cT_{ij}}$ |
| $\mu^{C_{aut}}$ | (42x1) | Autonomous consumption domestic production ratio vector | $\mu_i^{C_{aut}} = f_i^{C_{aut}} / f_{T_i}^{C_{aut}}$ |
| $\mu^d$ | (42x1) | Propensities to consume domestic production ratio vector | $\mu_i^d = d_{cw_i} / d_{cwT_i}$ |
| $\mu^G$ | (42x1) | Government spending domestic production ratio vector | $\mu_i^G = f_i^G / f_{T_i}^G$ |
| $\mu^I$ | (42x1) | Investment domestic production ratio vector | $\mu_i^I = f_i^I / f_{T_i}^I$ |
| $\mu^X$ | (42x1) | Exports domestic production ratio vector | $\mu_i^X = f_i^X / f_{T_i}^X$ |
| $v$ | (42x1) | Share of endogenous consumption by industry | Database[1] |
| $W$ | (1x1) | Total mass of wages of the economy | $\sum w_i$ |
| $w$ | (42x1) | Mass of wages by industry | Database |
| $w_x$ | (42x1) | Share of wages in industries' output | $w_{x_i} = w_i / x_i$ |
| $w_l$ | (42x1) | Inverse of productivity | $w_{l_i} = w_i / l_i$ |
| $x$ | (42x1) | Gross output by industry | Database |

[1] See Appendix A.

*Mathematical symbols and operations*

| | |
|---|---|
| $\otimes$ | Hadamard product |
| $\Delta$ | Operator of finite difference |
| ^ | Diagonal operator |
| $I$ | Identity matrix |
| $\imath$ | Unitary or summation vector |

# Contents

# Introduction

Significant changes in the dynamics of economic growth in Brazil marked the years between 2000 and 2016. The decade of 2000, especially since 2005, witnessed a sustained economic growth after two decades of low dynamism of the Brazilian economy. However, this recent episode of growth differs essentially from the economic "miracle" of the 1970s. At that time, growth and diffusion of modern durable goods occurred in a context of exclusion of most of the population. On the contrary, one important characteristic of this recent period was the expansion and diffusion of consumption patterns for larger portions of the society

The resumption of economic growth in Brazil in the 2000s occurred in a context of strong reduction of external vulnerability. The improvement in the current account and the resumption of large capital inflows allowed the government to repay, in late 2005, all IMF loans to reduce total external debt; and to accumulate large amounts of reserves, increasing the economic policy space. The favorable external scenario also allowed the appreciation of the exchange rate and the reduction of the interest rate (especially after 2006), still maintaining a large differential in relation to the central countries' rates (Serrano and Summa, 2011).

The robust economic growth, the increase in the minimum wage and the formalization of wage labor allowed the consumption expansion at a fast rate. On top of that, the expansion of government transfers and consumer credit, coupled with the reduction in the cost of living[2], increased the number of households that had enough purchasing power to diversify their consumption basket. Therefore, along with the faster economic growth, many people were incorporated to the consumption market, contributing to the strong growth of household consumption observed in 2000's decade, and also affecting consumption patterns (Bielschovsky, 2014).

Nevertheless, the dynamism did not last in the following decade, marked by the deceleration of output and household consumption growth. Since 2011, the changes in external

[2] In particular, there was a strong reduction of industrial goods prices relative to wages due to international price reduction and to the exchange rate appreciation.

scenario and some macroeconomic policies help to understand the worsening in the economic result. However, since 2015, a deepening in austerity measures undermined the pillars that sustained growth in the previous decade. During 2015-2017, the government implemented a severe fiscal consolidation with major cuts in public investments and other government spending causing huge impacts on unemployment and public finances (Dweck, Tonon and Krepsky, 2018).

The objective of this study is to analyze the period from 2000 to 2016, aiming to understand the trajectories of household consumption and output growth itself. Important changes in the structure of household consumption took place in the period, with the spreading out of durable goods consumption and consumers spending more on food away from home, private transportation and other services (Medeiros, 2015). These changes in the composition of demand engendered transformations in the productive structure, which implied changes in the structure of income and employment. These transformations, in turn, have implications for economic growth and consumption patterns. As proposed by Rugitsky (2017), this may lead to a cumulative causation process, when consumption growth leads to change in the employment structure, which feedbacks to consumption patterns.

Accordingly, in addition to investigate the sources of the structural change observed, we seek to understand how changes in patterns of growth and consumption co-determine the productive structure, identifying cumulative causation processes between consumption and productive structure.

The study applies a structural decomposition analysis (SDA), which allows the quantification of the impact on the growth of any aggregate by the variations of its components. We carried out two growth rate decompositions: one for the household consumption and the other for the gross output. We suppose that household consumption has an exogenous component – associated with factors such as availability and access to credit and personal wealth – and an endogenous component – depending on variables such as propensities to consume, average wages, labor productivity and the composition and scale changes of the gross output.

The growth decomposition of household consumption will provide a measure of the contribution of each component mentioned above by industry. In each sub period, it is possible to identify either the induced or the autonomous components as the most relevant to explain the

trajectory of household consumption. On top of that, we can infer a possible cumulative causation process between consumption pattern and output growth through the analysis of the contribution of output variation to consumption growth by industry and its composition and scale effects.

Likewise, the growth decomposition of the gross output will measure the contribution of technical change and of the final demands on the output growth by industry. This will allow us to identify and understand the sources of structural change in the period under study.

In both decompositions, we will also make explicit the change in trade pattern for the relevant variables. It consists in a measure of the effect of the changes in domestic content in the different components of demand. This measurement will provide important information to portrait the economic scenario of the period under study.

Besides this introduction, this work is divided into three chapters and one section of final remarks. In Chapter 1 we present, in one section, a brief review of the literature aiming to address the concepts of structural change and cumulative causation, that will be used on the development of the dissertation and briefly discuss the theoretical roots of the input-output techniques. In the following section, we present some features of the dynamics of Brazilian economic growth and household consumption in the period. We believe that the performance of the economy is important to understand the process of structural change. In Chapter 2, we present the methodology used to develop the empirical part of the dissertation, largely based on input-output techniques. There is one section explaining details on the database and another on the calculations of both structural decompositions: of output and household consumption growth. Chapter 3 brings the SDA results and its analysis under the light of recent Brazilian economic policy. There is also an Appendix with further details on the methodology and the complete tables of results and correspondences.

# Chapter 1 - Structural change and consumption in Brazil from 2000 to 2016

## 1.1 Structural Change, Development and the Roots of Input-Output Analysis

In this section, we aim to present theoretical aspects of the input-output analysis, which are the core of the empirical exercise performed in this dissertation, and explain some concepts that we will use later. We will discuss the theoretical roots of the input-output technique evidencing that it is compatible with Classical and Keynesian approaches and we will briefly go through concepts of development, structural change and cumulative causation that are central to our analysis.

According to Cornwall and Cornwall (2001, p.10) "the interaction between performance and economic structure is the key to understanding the basic processes of macroeconomic development". The authors consider that a good explanation of macroeconomic performance in the advanced capitalist economies cannot be restricted to key macroeconomic performance indicators, for example, the gross domestic product (GDP) growth and unemployment rates. It is important to consider in the analysis the structural changes that have taken place over the period of study. Syrquim (1988, p.205) also defines economic development as "an interrelated set of long-run processes of structural transformation that accompany growth".

In the short run, economic performance is constrained by an initial set of structural variables, including institutions, and it determines the performance of the economy, in special, the level and growth rate of aggregate demand. However, in the long run, economic performance induces changes in the economic structure. This process leads to a causal sequence of events, as the current performance of the economy depends upon previous changes in structures and will affect the future performance of the economy through the structural changes it provokes. The relation between economic performance and structural change over time can be seen as an interaction between the 'demand side' and the 'supply side' of the economy, where the latter represents a set of structural characteristics (Cornwall and Cornwall, 2001).

Svennilson (1954) also perceived economic changes as the interaction between the different types of 'transformation'[3] and the growth of national income and output. For example, innovations may cause changes on production technology and through their impact on prices and costs it can affect the output's growth rate. Changes in the sectoral composition of capital and labor may also entail differences in the level and rate of growth of factor productivity. On the other hand, an economy's growth rate also affects the speed and nature of the transformation. This happens because, income growth causes changes in the distribution of final demand and output growth affects the demand for intermediate goods, capital and labor, and also impacts the rate of technological progress (Cornwall, 1977).

Myrdal (1944) was the first author to use the term 'circular causation of a cumulative process' and 'virtuous' and 'vicious circles' to describe processes in which the economic change is seen as an endogenous phenomenon. The concept was further explored by other authors. Kaldor, for example, also made important contributions to the theory of unbalanced growth. In formulating his well-known laws regarding the development of industrial economies, Kaldor tackles the principle of cumulative causation essentially as a self-reinforcing notion of interdependence between the growth rate of manufacturing output and increasing returns, which the author argued had empirical support of the Verdoorn Law (Toner, 1999).

Kaldor's propositions aimed to explain the differences in the countries growth dynamics with emphasis on aggregate demand. For the author, the different levels of aggregate demand among countries was a result of the differences in their production structures. Kaldor considered manufacturing industry the main driving force of economic growth. The central point of this approach is that the industrial sector would operate with increasing returns to scale, influencing productivity growth throughout the economy (Pasinetti, 1983). Growth in aggregate output, in

[3] Svennilson (1954) and Hirschman (1958), gave special emphasis to the concepts of 'transformation', or 'unbalanced growth' of market economies. In Svenilson's analysis the concept of transformation included: changes in the sectoral composition of the output, with growth or decline of certain activities as technology and consumer preferences change; redistribution of capital and labor between industries and regions; changes in the relationship among exports, imports and the domestic industry; the development of new products; and the distribution of consumption among products (Svennilson, 1954; Cornwall, 1977).

Kaldor's late works, is not constrained by labor supply but driven fundamentally by demand[4] (Thirlwall, 1983).

Cornwall and Cornwall (2001) recommend long-run performance to be modelled as the outcome of an interaction between economic performance and the evolving structure of the economy. In this sense, the Input-Output Analysis, developed by Wassily Leontief[5], is powerful tool to study economic performance, as far as it enables accounting for this interaction.

The input-output analysis inception is often dated from the early writings of Leontief. One of this writings is his 1928 paper 'Die Wirtschaft als Kreislauf' (The economy as a circular flow), that comprehended part of his dissertation thesis where Leontief put forward a two-sectoral input-output system which was designed to describe the production, distribution and consumption aspects of an economy as a single process (Leontief, 1928). Another important reference is his 1936 paper on 'Quantitative input-output relations in the economic system of the United States' (Leontief, 1936). Because of its applied character, this paper has been considered 'the beginning of what has become a major branch of quantitative economics' (Rose and Miernyk, 1989, p. 229 *apud* Kurz and Salvadori, 2000).

What Leontief was able to accomplish was the construction of a ‘photograph’ of the economy itself that shows how the sectors are related to each other: which sectors supply others for services and products, and which sectors buy from whom. The result was a unique and understandable view of how the economy works and how each sector becomes more or less dependent on others (Guilhoto, 2011). This interdependence system is formally demonstrated in a table known as the input-output table.

The input-output table describes the flow of goods and services between the different sectors of an economy over a given period, usually a year. Input-output analysis is meant to

[4] In Kaldor’s model demand-led growth could be limited only by the balance of payments constraint, so that exports are also of great importance in explaining countries' growth, as they are both a source of aggregate demand and foreign currency, relieving external constraint (Lamonica and Feijó, 2011).

[5] Wassily Leontief was born in 1905 in St Petersburg. He lived and studied there until he went to Berlin to work on his doctorate. In 1928 he published a part of his thesis titled 'Die Wirtschaft als Kreislauf' (The economy as a circular flow). In 1932 he joined the Harvard University and began the construction of the first input-output tables of the American economy. These tables and the corresponding mathematical model were published in 1936 and 1937. Leontief was a professor at Harvard University until 1975, having received the Nobel Prize in economics in 1973. From 1975 to 1999 he was a professor in the economics department of the New York University (Leontief, 1941; Guilioto, 2011; Kurz and Salvadori, 2000).

provide a detailed quantitative description of the structural characteristics of a given economic system. The interdependence among the different sectors is described by a set of linear equations whose coefficients reflect the system's structural properties. The values of this coefficients are determined empirically, being commonly derived from statistical input-output tables (Kurz and Salvadori, 2000). According to Baumol (2000), Leontief's analysis transformed the purely theoretical analysis of the economic theory (referring to the classical economic theory) into an economic tool that can be used in empirical work and serve as the basis for economic policy.

In the literature on input-output analysis is frequently found the view that the Leontief-system is an offspring of the general equilibrium model put forward by Léon Walras in his *Eléments d'économie politique pure* (Walras, 1874). Leontief has himself expressed the opinion that his analysis and that of Walras were compatible with one another (Kurz and Salvadori, 2000). One example is a passage of his 1966's book where he defines his input-output method developed in the 1930s and 1940s as: "an adaptation of the neo-classical theory of general equilibrium to the empirical study of the quantitative interdependence between interrelated economic activities" (Leontief, 1966, p. 134).

Nevertheless, Leontief's approach is firmly rooted in the classical tradition of economic thought and presents some aspects difficult to reconcile with Walras's general equilibrium model. Based on the circular flow theory, the origins of Leontief's input-output theory may be related to predecessors of physiocrats, such as William Petty and Richard Cantillon, to François Quesnay´s *tableau économique*, to Ricardo´s corn model and to the Marxist schemes of reproduction. More recent contributions, that has also been shown compatible to Leontief's theory, can be found in the works of von Neumann, Sraffa, Pasinetti and other authors belonging to the Classical or Sraffian tradition (Guilhoto, 2011; Kurz and Salvadori, 2000).

Not only his early contribution but also his following works can be embedded in the classical approach as far as his input-output analysis preserved the concept of production as a circular flow: commodities are produced by means of commodities. The production as a circular flow is an essential feature of Classical economic theory and can be traced back to William Petty and Richard Cantillon and was most effectively expressed by François Quesnay (Kurz, 2011).

Therefore, Leontief did not, as some interpreters may say, adopt the Walras-Cassel supply-side view of production. In the second edition of *The Structure of American Economy*, published in 1951, he explicitly rejected the view of production defined as a 'one-way avenue' that leads from the services of the primary factors of production (i.e. non-producible inputs): land, labor and capital to final goods (Leontief, 1951, p. 112). Unlike the theories of Walras and Cassel, in Leontief there are no given initial endowments of these factors (Kurz and Salvadori, 2000).

A point of convergence between Leontief's analysis and the classical framework is the method. William Petty defended political economy to be as objectivist as possible. This view became an importatnt feature of the Classical approach, which describes the process of production and accumulation in terms of observable magnitudes (Kurz, 2011):

> "The Method I take [is] (…) to express my self in Terms of *Number, Weight or Measure*; to use only Arguments of Sense, and to consider only such Causes, as have visible foundations in Nature; leaving those that depend upon the mutable Minds, Opinions, Appetites and Passions of particular Men, to the Consideration of others" (Petty, 1662, p. 244; emphasis in the original).

Leontief advocated a similar view and adopted a 'naturalistic' or 'material' perspective. He insisted that the investigation should focus on 'directly observable basic structural relationships' (Leontief, 1987, p. 860, *apud* Kurz and Salvadori, 2000), rejecting the use of subjective concepts, that are not directly observable as utility, preferences and demand functions, present in Walras's general equilibrium theory:

> "Input–output analysis is a practical extension of the classical theory of general interdependence which views the whole economy of a region, a country and even of the entire world as a single system and sets out to describe and to interpret its operation in terms of directly observable basic structural relationships" (Leontief, 1987, p. 860).

In his thesis, Leontief considered that the starting point of the marginalist approach, the *homo economicus* (rational individual characterized by endowments and preferences), was inappropriate because it gives "too much room to imagination and too little to facts" (Leontief, 1928, pp. 619-20, *apud* Kurz and Salvadori, 2000). Instead, economics should start from "the ground of what is objectively given" (Leontief, 1928, p. 583 *apud* Kurz, 2011). In his 1928 work, Leontief also alerts that economic concepts that do not refer to magnitudes that can, at least in principle, be observed and measured could be meaningless and misleading (Kurz, 2011). This idea is confirmed in latter publications of the author, where he stresses the importance to empirically verify the hypothesis adopted in the models:

> "In the presentation of a new model, attention nowadays is usually centered on a step-by-step derivation of its formal properties. (…) By the time it comes to interpretation of the substantive *conclusions*, the assumptions on which the model has been based are easily forgotten. But it is precisely the empirical validity of these *assumptions* on which the usefulness of the entire exercise depends" (Leontief, 1971, p. 2, emphasis in the original)

Another proximity to the classical thought is in the content of the theory. Despite formal similarities with the analyses of Walras, Kurz and Salvadori, (2000) argue that they do not belong to the same tradition in the theory of value and distribution. The authors point out that Leontief's argument does not refer to a "pure exchange economy, but to an economy in which both capital and consumption goods are produced and reproduced" (ibid, p.29). In addition, in Leontief's analysis, the parameters that determine relative prices are obtained from technological and institutional data, whereas Walras's model consists in a pure exchange economy where the 'effective demands' ultimately depends on the agent's utility maximizing disposition.

Concerning the distribution problem, Leontief argued that in conditions of free competition (that is, the absence of barriers to entry in and exit from the various spheres of production – an usual classical assumption) the surplus is distributed according to an uniform rate of return on the value of capital invested across all industries. (Kurz, 2011). Hence, in Leontief's model, the problem of distribution is not addressed in terms of relative scarcities of the factors of production as defined in the neoclassical theory. Walras's theory on the other hand starts from a given vector of capital goods and attempts to determine the rate of profit in terms of the demand and supply of capital (Kurz and Salvadori, 2000).

Leontief states, in his 1928 paper, that a physical scheme of production governs the exchange relationships, or relative values, between commodities in a capitalist economy. The corresponding price equations bring together his physical scheme and the rule of distribution. He also finds out that changes in relative prices will affect the distribution of income without affecting the circular flow of the economy in any way. Or as explained by Kurz (2011, p. 35) "the same physical input-output schema can support different price systems reflecting different distributions of income". Leontief relates this finding to the classical economists who have advocated a 'surplus theory' of value and distribution (Leontief, 1928, p. 619). Hence, the exchange ratios of goods reflect not only essentially technological factors, but also 'social causes' (Kurz, 2011).

These propositions show that the young Leontief had a deep understanding of the classical economists' approach to the problem of value and distribution (Kurz, 2011). According to Kurz and Salvadori (2006), Leontief had actually arrived at a view that is very similar to the one Piero Sraffa elaborated at around the same time.

Leontief's quantity input-output open model, according to which, $\Delta q = (I - A)^{-1}\Delta f$, is based on the assumption that changes in quantities ($\Delta q$) do not affect the technical coefficients ($A$) (i.e. the analysis assumes constant technical coefficients[6]). It means that changes in quantities do not change prices. Besides that, the closure of this model resides on the final demands ($f$). In this way we can say Leontief's open quantity input-output model is a demand-led model, therefore input-output analysis is compatible with a Keynesian adjustment in the long run (Kurz, 2011).

The demand led approach is an important feature that complements the classical character of the model, and also differentiates it from the neoclassical models. In neoclassical growth theory there is no independent role for aggregate demand, as it is based on supply-determined equilibrium processes. Therefore, aggregate demand merely adjusts passively to the aggregate supply, automatically reaching output levels dictated by aggregate supply conditions. Cornwall and Cornwall (2001) point out that the occurrence of long periods of high unemployment makes evident the inadequacy of an approach that assumes aggregate demand is always enough to match aggregate supply.

In the empirical exercise we will perform in the next chapters we will apply a structural decomposition methodology, which is largely based in the Leontief's quantities input-output open model. Therefore, it is compatible with demand-led explanations of growth (as opposed to growth accounting methods based on a Neoclassical theory of value added). We advocate that this method allows us to take into account the structural changes in the analysis of economic performance and evaluate the evidences of cumulative causation processes. Therefore, this work is inserted in a framework that blends elements from different traditions: that associated with Svennilson (1954) and Syrquim (1988) with its emphasis on structural change and transformation as an integral feature of economic development; the Classical economics,

[6] The constant technical coefficients regard the static analysis point of view. The empirical analysis performed in this work, that will be detailed in the next chapters, is a structural decomposition analysis. This growth accounting technique compares input-output matrices of different years, so it accounts for changes in all variables, including the technical coefficients.

regarding its theory of value and distribution; and the Keynesian economics, with its emphasis on aggregate demand as a key determinant of economic performance and outcomes.

## 1.2 Brazilian Economy and Consumption Patterns

The years between 2000 and 2016 were marked by significant changes in the dynamics of economic growth in Brazil. The decade of 2000, especially since 2003, witnessed a sustained economic growth after two decades of low dynamism of the Brazilian economy. However, this recent episode of growth differs essentially from the economic "miracle" of the 1970s. At that time, growth and diffusion of modern durable goods occurred in a context of exclusion of most of the population. The growth of the 2000s was marked by the expansion and diffusion of consumption patterns for larger portions of the population.

The 2000's resumption of economic growth in Brazil occurred in a context of reduction of external vulnerability. The better situation of the current account and the resumption of large capital inflows allowed the government to repay, in late 2005, all IMF loans; to reduce total external debt; and to accumulate large amounts of reserves, increasing the economic policy space. Consequently, the country also got rid of the conditionalities imposed by the Fund on the conduction of economic policy. The favorable external scenario also allowed the appreciation of the exchange rate[7] and the reduction of the interest rate, still maintaining a significant differential in relation to the central countries' rates (Serrano and Summa, 2011).

After 2003, the international scenario was of rapid expansion of international trade; rising international commodity prices and capital flows to emerging markets; China's growing demand of Brazilian exports; and reduction of interest rates in high-income economies (Serrano and Summa, 2011 and Medeiros, 2015). There is a relative consensus that the rise in the price of commodities and the increase in Chinese demand for Brazilian exports represented a positive shock to the country's economy. However, the performance in the 2000s was also due to the domestic policies practiced in the period. At the turn of the 1990s to the 2000s, in most Latin American countries, candidates critical of the neoliberal recipe were elected. In Brazil it was

[7] The nominal exchange rate presented a devaluation trend from 1999 to 2003 and an almost continuous appreciation trend since then until 2011. This trend was briefly interrupted by the strong nominal devaluation in the turbulent year of 2009, which was quickly reversed. After 2011 the nominal interest rate assumed a devaluation trend again.

not different, and this represented a change in the guidelines of economic policy (Carvalho and Rugitsky, 2015).

A few years after the election of Lula for president in 2002, the government changed its guidelines and adopted a more expansive strategy. Since 2006, it can be said that the government assumed responsibility for ensuring the growth of investment, consumption and formal employment (Serrano and Summa, 2011). From the measures taken in President Lula's second term, the contribution of the growth of the domestic markets has become more prominent, given the expansion of household consumption and investment, leaving exports to a less important role (Barbosa e Souza, 2010).

According to Bielschovsky (2014), Brazil had at that time three powerful fronts of expansion or "engines" of development, that could be explored. The first was the expansion of the mass consumption market through the incorporation of previously excluded low income families. The second was the Asian demand for natural resources, abundant in Brazil, that could stimulate the deepening of technical progress in the sectors associated with its mining and/or exports. The third engine was related to the increase in economic and social infrastructure through public investment and private investment induced by the State. According to the author:

> "Infrastructure investments are a driver of development because they move a gigantic amount of resources and employment and generate externalities to the private sector and to the whole economy, which is why they have a responsibility to encourage the expansion of private investment" (Bielschovsky, 2014, p.127).

This new national development projects that emerged during Lula's administrations were not part of a clear and defined development strategy. But had influence of social developmentalist ideas like the "engines" of development mentioned above. Some examples are the *Plano de Aceleração do Crescimento* (PAC) and the *Plano Brasil Maior* (Bielschowsky, 2014).

In order to strengthen these "engines", the government carried out, in the field the fiscal policy, the expansion of social transfers, an increase in minimum wage and higher expenditures on housing, infrastructure, health and education. An active credit policy was also implemented through the Brazilian Development Bank (BNDES), which financed a growing volume of private investment at subsidized interest rates, and public commercial banks (Caixa Econômica Federal and Banco do Brasil), which increased the credit supply for housing, agriculture and consumption. This combination of external conditions and domestic policies allowed the rapid

growth of domestic demand and, in particular, of private consumption, which after a while induced a more rapid and sustained expansion of private investment (Carvalho and Rugitsky, 2015; Serrano and Summa, 2011).

During this period, the macroeconomic regime, the behavior of relative prices, government policies aimed at poverty reduction[8] and the raising of the minimum wage[9], elevated the income of the bottom of the pyramid in relation to the average income. Consequently, the period experienced a decline in personal income concentration, especially in wage dispersion, and an increase in the wages share of income (Medeiros, 2015).

Regarding the structure of employment, an intense process of formalization marked the period, with formal employment increasing faster than informal jobs between 2002 and 2011. Most of the new jobs created in the period occurred in the salary ranges between one and one and a half minimum wage. The rise in base wages and the shift effects among industries explain the simultaneous increase in the wage share and the decline in the wage inequality (Medeiros, 2015).

According to Saramago, Freitas and Medeiros (2018), since 2004 the recovery of economic growth and the significant fall in the unemployment rate since 2005, as well as the combination of real increases in the minimum wage and the increase in the formalization of the workforce gave a strong boost to the bargaining power of the workers. The period from 2004 to 2015, comprehended a cycle of growth of real wages, mainly in the base of the labor market. In line with the growth of wages, productivity has grown since 2006, mainly in agriculture and services. In addition, the prices of workers' consumer goods grew less than those of the products produced by them, which along with the productivity growth enabled the vigorous increase in real wages to occur without a spike in the wages share of income. In other words, these conditions allowed the wages to grow without pressing the profits.

[8] The expansion of social transfers (pensions, retirement, *Bolsa Família* Program, unemployment benefits, transfers to the elderly, etc.) contributed significantly to the reduction of poverty in the 2000s. In particular, the expansion of the *Bolsa Família* Program and rural pension have had a major impact in the Northeast region, the historical nucleus of poverty in the country (Medeiros, 2015). It can be said that the per capita product growth itself helped in fighting poverty through the generation of employment and income and because of the rule of minimum wage readjustment, which takes into account GDP growth with two years of lag and the inflation rate of the previous year.

[9] The increase in the real minimum wage, which was more intense between 2006 and 2009, had a major impact on reducing poverty and income inequality through the benefits of social security and its influence on the basic salary of low-qualification workers. In addition, other wages (associated with higher qualification and schooling) increased proportionately less than the minimum in the period, contributing to the reduction of labor income inequality (Medeiros, 2015).

The increase in wages and the formalization process contributed to the expansion of consumption, not only through the expansion of income, but also because permitted a large diffusion of consumer credit in the period. These conditions allowed the inclusion of a significant part of the Brazilian population in the consumer market and a change in the consumption pattern of Brazilian families. Low-income population started consuming products and services that they did not have access before. This contributed to a great expansion of domestic consumption, which, played an important role in determining the growth cycle of the 2000's decade (Dória, 2013; Medeiros, 2015).

The appreciation of the exchange rate also played an important role in the expansion of consumption. It allowed the minimum wage to increase relatively to the minimal consumer basket and also to industrial prices, as it neutralized the price pressures of both agriculture and imported raw materials, and allowed the containment of prices controlled by the government, like public services fares, energy prices, etc. The price containment of strategic wage goods reduced the cost of living of families, which together with the increase of the minimum wage and the expansion of credit opened space for the expansion of the consumption of non-essential manufactured goods, allowing a strong shift in the consumption pattern at the base of the pyramid. The massification of durable consumer goods, including electronics, and the expansion of both, the low-medium class segments of the automotive market and consumption of food away from home, are expression of the change in lifestyle (Medeiros, 2015).

The main shift in the consumption structure was the increase in the relative share of transportation (collective and individual transportation) and health (medicine and health insurance). With regard to transportation, the increase in the minimum wage increased the purchasing power of the population in terms of urban transportation tariffs, and formalization increased the number of users of transportation vouchers. Thus, there was an increase in the number of passengers and, at the same time, reduced the portion of income committed to urban transportation. The changes in consumption patterns also led to the mass consumption of household appliances, computers and internet use, a service that expanded mainly in the lower levels of income distribution. On the other hand, as would be expected according to Engel's law, the share of food (even with increased food out of the home and the introduction of new food products), clothing and housing in households' expenditures decreased with the increase in average income, although the latter remained the main expenditure group (Dória, 2013; Medeiros, 2015).

The expansion and diversification of consumption led to the growth of sectors whose production demanded a less qualified workforce. This is the case of many service industries and construction, which grew significantly in the period. As these sectors employ many workers of low-qualification, the degree of formalization and the wages at the base of the pyramid have risen further, reinforcing the process of consumption expansion described above (Carvalho, 2018).

Rugitsky (2017) points out that the dynamics observed in the 2000s characterizes a process of circular and cumulative causation (using the concept of Myrdal (1957)) involving income distribution and productive structure. The author stresses that transformations in the income structure of the economy can have effects on the productive structure. This is because the distribution of income, in addition to its impact on effective demand, will modify the composition of demand if the consumption baskets of the families of different income groups differ significantly. Thus, a reduction of wage inequality, for example, changes the composition of aggregate demand, which tends to affect relative prices and, consequently, the productive structure itself. The sectors producing goods whose share of aggregate demand increased tend to grow faster than the economy as a whole. If, in addition, different sectors require different combinations of skills, the change in the productive structure will have an impact on the structure of employment regarding the relative participation of skilled and unskilled workers. Finally, this change in the structure of employment will affect the distribution of wages, increasing or decreasing wage inequality. If wage inequality is further reduced, a cumulative process will be triggered by restarting the cycle.

In the Brazilian case, the recent decline in wage inequality, as well as the increase in the share of wages in income, led to changes in the composition of aggregate demand, due to the diffusion of consumption habits previously restricted to the richer groups to those in the lower part of the distribution of income (Rugitsky, 2017). At least part of the compatibility of supply to this change in the demand composition occurred through changes in the productive structure, while part of the new demands was met by imports[10] (Medeiros, 2015).

The increase in the share of services in value added and the decline of the manufacturing industry seem, at least in part, to be attributable to this movement. The change in the productive

[10] Although investments in the manufacturing industry expanded, given the appreciation of the real, the imported coefficient increased in capital goods, intermediate goods and consumer goods (Medeiros, 2015).

structure, in turn, led to a transformation of the employment structure, with a growing share of low productivity jobs (especially in the service sector). This transformation finally deepened the decline of wage inequality, restarting the cycle (Rugitsky, 2017).

However, the growth rates of the 2000s were not sustained in the following years, marked by the deceleration of growth. Rugitsky (2017) argues that the very process of transformation of the productive structure arising from the combination of accelerating growth and decreasing inequality could create limits to the continuity of the expansionary cycle. The first limit pointed out by the author is a fiscal one: the fall in manufacturing share in value added can reduce tax revenues, given the high dependence of the Brazilian tax system on the taxation of goods and the difficulties of taxing services. What could eventually, because of the primary budget surplus rule adopted in Brazil, limit the government's capacity to increase public investment, which was a key variable in accelerating growth (Rugitsky, 2017).

This reduction in tax revenue due to a change in the productive structure[11] could lead to an increase in the government's deficit, creating also political difficulties to the conduction of fiscal policy. Eventually, bad political conditions could limit government's capacity to increase public investment, even when the State has capacity to finance its spending by expanding public debt. As public investment was a key variable in maintaining a high pace of economic growth, limitations to its increase can represent a restraint to the continuity of the expansionary cycle. Dweck and Teixeira (2018) argue that the inflections in the conduction of the fiscal policy during Dilma's administration (2011-2015) responded partially to changes in the fiscal and macroeconomic situation but were mainly a result of constraints imposed by the fiscal rules adopted and broader political limitations.

The second limit is the reliance on exchange rate appreciation to control inflation. Rugitsky (2017) suggests that the increase in the services' share in value added accelerated the inflation of services and this movement was only compatible with the inflation target, as the continuous currency appreciation controlled the inflation of manufacturing products. However, the exchange rate appreciation reinforces the change in the productive structure (increase of importance of services), since this change in relative prices favors the substitution of consumption of domestic tradeable goods by imported ones, especially manufactured goods.

[11] Rugitsky (2017) points out that this limit could not be very relevant in practice, inasmuch as the cumulative transformation is also related to the increase in labor market formalization, which pushes tax revenues up.

The author also indicates a third limit related to the external constraint due to the end of the commodities boom. He considers plausible that the change in the productive structure observed has increased the income elasticity of imports and decreased the income elasticity of exports, given the increasing concentration of commodity exports and the increasing dependence on imports to meet the change in demand composition. According to Thirlwall's (1979) formulation, the growth rate that is compatible with the balance of payments equilibrium is determined by these elasticities and the changes observed in Brazil could have compressed the "equilibrium" growth rate. Thus, despite the commodity boom had temporarily relaxed the external constraint on growth, the underlying change in the productive structure tended to alter the income elasticities of foreign trade, so that growth would be constrained by the balance of payments balance at a lower level. Once the commodity boom ended, such a restriction would come to light, as the current account deterioration has shown (Rugitsky, 2017).

Nevertheless, Serrano and Summa (2015) argue that the deceleration of the Brazilian economy since 2011 was a result of the contraction of internal demand rather than the reduction in exports[12]. They also defend that the deceleration was mainly result of the choices of economic policy of the government. Since 2010, the Central Bank started a cycle of increases in the nominal basic interest rate[13] and hardened macro-prudential measures, reducing the growth of credit supply. To some extent this has helped to halt the consumer boom, especially of durable goods (Serrano and Summa, 2015). After 2011, the anti-cyclical policies implemented in the context of the 2008 international crisis were discontinued, implying strong reduction in government spending and public investment (Medeiros, 2015). Therefore, according to the authors, the adoption of a contractionary macroeconomic policy was responsible for the reduction of product and private investment growth rates from that year.

In response to the scenario of loss of competitiveness of the national industry and the emergence of external imbalances, many economists[14] started to defend a change in the economic model that was been adopted in Brazil. It was proposed the replacement of the previous model, based on stimulus to domestic market, by a growth model inspired in the Asian industrial development, with more centrality to exports. Industrial representatives pressured the government for lower interest rates, devaluation of the Real, containment of public spending,

[12] See also Montanha (2019).
[13] The cycle of increases in the basic interest rate was reverted by the end of 2011, but from 2013 to 2015 the nominal basic interest rate had again an ascending trajectory.
[14] For exemple, Bresser-Pereira (2010a), Bresser-Pereira (2010b), Oreiro (2012) and Pessoa (2012).

tax relief, expansion of BNDES credit, contention of energy tariffs (Carvalho, 2018) and more protection against foreign competition.

By the end of 2010, the government decided to promote a fiscal adjustment, aiming to increase the primary surplus, and did not increase the minimum wage in real terms in 2011, thus meeting the demands of the industrial sector. The fiscal adjustment occurred with a reduction of government spending, mainly of public investment. The contractionary policies also led to a retraction in private investment (Serrano and Summa, 2015).

The government's argument for tightening fiscal policy was to make it possible to reduce interest rates, which, combined with a reduction in taxes, would promote private investment growth and export-led growth as the real exchange rate depreciated due to the reduction of interest. In this sense, fiscal adjustment was justified as a way to contain the inflation of services through the contraction of demand, since the appreciation of the exchange rate kept aggregate inflation under control (Serrano and Summa, 2015). In other words, the change would involve replacing an expansionary fiscal policy (with expansion of public consumption and investments) and a contractionary monetary policy (high interest rates) for a contractionary fiscal policy and a looser monetary policy (lower interest rates), which would facilitate the currency depreciation (Carvalho, 2018).

However, as the economy had already begun to decelerate in 2010, along with the world economy, the pro-cyclical policies implemented squeezed aggregate demand: there was a retraction of private investment and exports growth was not able to sustain the GDP growth at the same level of the previous years (Serrano and Summa, 2015). The contractionist policies were partially reverted after 2012 until 2014, allowing the economy to keep positive GDP growth rates until 2014, with decreasing unemployment.

The role of fiscal policy became one of the most important topics in Brazil during the elections in 2014 and right after. This debate led to a major change in economic policy and, since 2015, a set of austerity measures became constant in Brazil, especially through expenditure cuts. In the second administration of President Dilma, a mainstream economist became the new finance minister and he conducted a major fiscal consolidation, representing a drastic change in the economic policy. The government promoted the largest block in the budget authorization, since 2000, which led to a review of schedules of infrastructure projects and government programs and suspended any hiring for new public positions. Public investment

plummeted, reinforcing the vicious cycle, as investment is the most important element in aggregate demand to explain short-term economic fluctuations. Consequently, in 2016, the economy that was decelerating, but kept positive growth rates since 2010, entered into a deep recession (Dweck, Tonon, Krepsky, 2018).

In the next chapters we will go through the methodology and results of the empirical exercise performed in this work. We will analyze the period described above (from 2000 to 2016) trying to map the main structural changes found in consumption and output structures, and to understand the household consumption and output growth patterns adopting an input-output structural decomposition approach.

# Chapter 2 - Methodology

In this chapter, we will present the methodology used to develop the empirical exercise performed in this dissertation. It is largely based on input-output techniques. More specifically, the study applies a structural decomposition analysis (SDA), which is a structural accounting methodology compatible with demand-led explanations of growth. The following section explains some details on the database we used and the next one goes through the calculations of both structural decomposition equations: for output and household consumption.

## 2.1 Input-Output Database

The study uses data from the Brazilian input-output (IO) Matrices at constant 2010 prices and constant 2010 relative prices, constructed by GIC-UFRJ based on the methodology presented by Passoni and Freitas (2018), both at basic prices. These input-output matrices harmonize the official data of the Brazilian IO matrices offering a series compatible with the most updated manual of National Accounts, SNA 2008, for the period 2000-2016. These matrices offer a breakdown of 42 activities and 91 products. However, in the decompositions that will be descripted in the next sections we use the matrices with products already aggregated in the 42 activities by the multiplication of market share matrices. Except when otherwise stated, the matrices and vectors refer to IO tables at constant 2010 prices.

### 2.1.1 Deflation Method and Additivity Property

Nowadays, official Statistics Institutes publish constant prices SNA data using chained indices. More specifically, every year, SNA data is published at current year's prices and at previous year's prices. This procedure provides more accurate and updated information than the direct Laspeyres indices that were used formerly. However, matrices deflated with chained indices lose the additivity property. It happens because, while in the Laspeyres system there is

a fixed-base in the reference period, in the chained indices system the relative prices vector changes yearly (Balk and Reich, 2008; Passoni, 2019).

The additivity property, in national accounts means that the order of conducting deflation and aggregation operations is interchangeable, without affecting the result (Balk and Reich, 2008; Passoni, 2019). An example of the non-additivity problem in the national accounts is the demand side GDP decomposition: when you deflate each expenditure component of GDP (household consumption, gross fixed capital formation, government expenditures, exports…) by their own deflator you do not get the same result you would find by deflating the GDP (or all expenditure components) by the GDP implicit deflator (Passoni, 2019).

Passoni (2019) addresses this problem in the elaboration of the series of input-output tables we used in this work, by applying a deflation methodology that allows the maintenance of the additivity property. First, the author built constant relative prices matrices (that does not present the additivity property) deflating the current prices IO tables by cell-specific price indices, and then adjusted for relative prices to obtain additive series at constant prices. The next two sub-sections will give further details on the methodology of construction of both databases mentioned above.

### 2.1.2 Constant Relative Prices Input-Output Tables

The elements of each of the IO tables at constant 2010 relative prices (hereafter CRP IO tables) of a specific year $\tau$ ($R_{ij}^{2010,\tau}$) correspond to the ratio of each element of that IO table at current prices of year $\tau$, $R_{ij}^{\tau}$, and the accumulated cell specific deflator[15], $\Lambda_{ij}^{2010,\tau}$. Where R is one of the IO tables we want to deflate (Passoni, 2019).

[15] The accumulated cell specific deflator, $\Lambda_{R_{ij}}^{2010,\tau}$ was constructed by Passoni (2019) as follows:

First, cell specific price indices were calculated as a ratio between an element of a current prices matrix (of year t) and the correspondent element of that matrix at previous year's prices, where *p* represent price and *q* quantity:

$$\lambda_{ij}^{t-1,t} = \frac{(p^t q^t)_{ij}}{(p^{t-1} q^t)_{ij}}, t = 2001, \dots, 2016.$$

Then the cell specific price indices were chained up to the year of interest $\tau$ for a fixed-base period (2000's prices):

$$R_{ij}^{2010,\tau} = \frac{R_{ij}^{\tau}}{\Lambda_{R_{ij}}^{2010,\tau}} \quad (1)$$

The tables obtained by this procedure represent volume units. As each cell is divided by its cell-specific deflator, the series loose the additivity property over products and industries. The non-additivity results from changes in 'real' purchasing power of each industry or a change in the prices of each industry's products in relation to the gross output deflator. Therefore, the sum of deflated products in industry *j* by the cell-specific deflator will be different from the total of industry *j* deflated by the total deflator (Passoni, 2019).

### 2.1.3 Constant Prices Input-Output Tables

The IO tables at constant 2010's prices ($R_{ij}^{2010,\tau,\phi}$) are obtained by the multiplication of each element of the CRP IO tables by its relative prices ratio ($\phi_{ij}$) (Passoni, 2019).

$$R_{ij}^{2010,\tau,\phi} = \phi_{ij}^{2010,\tau} R_{ij}^{2010,\tau} \quad (2)$$

The relative prices ratio is constructed as division of the cell-specific price index by the chained gross output deflator ($p^{2010,\tau}$). This ratio captures the change in each industry 'real' purchase power relative to the general price changes of the economy. Therefore, the CP IO tables present the additivity property over time by products and industries (Passoni, 2019).

$$\phi_{ij}^{2010,\tau} = \frac{\Lambda_{R_{ij}}^{2010,\tau}}{p^{2010,\tau}} \quad (3)$$

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$$\Lambda_{R_{ij}}^{2000,\tau} = \prod_{t=2001}^{\tau} \lambda_{ij}^{t-1,t}$$

And finally, the base year is changed to 2010, which is the reference year of all the matrixes in the data set:

$$\Lambda_{R_{ij}}^{2010,\tau} = \frac{\Lambda_{R_{ij}}^{2000,\tau}}{\Lambda_{R_{ij}}^{2000,2010}}$$

Combining expressions (2) and (3), we can see that all data is deflated by a single deflator: the gross output deflator (Passoni, 2019).

$$R_{ij}^{2010,\tau,\phi} = \frac{\Lambda_{R_{ij}}^{2010,\tau}}{p^{2010,\tau}} \frac{R_{ij}^{\tau}}{\Lambda_{R_{ij}}^{2010,\tau}} = \frac{R_{ij}^{\tau}}{p^{2010,\tau}} \quad (4)$$

## 2.2 Structural Decomposition Analysis

In this section, we will explain the two structural decomposition analysis performed in this work: of the gross output and the household consumption growth rates, making explicit its endogenous and exogenous components. The empirical approach was adapted from the structural decomposition analysis developed in the input-output literature, based on the Leontief open input-output model. As noted in Chapter 1, Leontief's open quantity input-output model is a demand-led model, which makes our approach compatible with demand-led explanations of growth (as opposed to supply-side accounting methods based on a Neoclassical theory of value added).

The structural decomposition analysis is a method that allows us to disaggregate the total amount of change (variation) in one variable into contributions made by its components between two years. For example, it is possible to quantify the impact of changes in the aggregate demand components (technical coefficients and final demand) on the output growth, or decompose household consumption growth into the different factors that explain it. Therefore, when you have two or more sets of input-output data for an economy, the structural decomposition analysis can be used to discuss the process of structural change associated with input-output relations (Dietzenbacher and Los, 1998; Miller and Blair, 2009).

We adapted the methodology to capture the distinction between autonomous and induced variables. Government consumption, investment and exports are considered exogenous. With respect to investment expenditures, this version of the SDA overlooks the theoretical findings that take into account that, to some extent, business investment decisions are an endogenous process of adjusting productive capacity to meet demand. Therefore, the SDA proposed better represents the aggregate investment that may be considered autonomous such as housing, government and state-owned enterprises investment. Investment will be

partially endogenized in later developments of this work. On the other hand, we divided household consumption into autonomous and induced components. To facilitate analysis, non-profit institutions serving households (NPISHs) spending is aggregated with autonomous household consumption and change in inventories is aggregated with gross fixed capital formation under the investment category in all decompositions.

### 2.2.1 Endogenization of Household Consumption

In the standard interindustry analysis, household consumption is treated as an exogenous variable, so that the usual Leontief matrix multiplier analysis lacks the multiplier process via consumption function that is usually found in Keynesian models (Miyazawa, 1976). In order to split the household consumption into its autonomous and induced components in our model, we used as proxy a distinction between durable and nondurable consumption (including services). Following Freitas and Dweck (2013), we assumed that durable consumption is autonomous since it does not depend on current income but in the availability of credit and personal wealth. On the other hand, the consumption of nondurables depends largely on the purchasing power introduced in the economy by the current production decisions, especially by wages.[16]

The amount of credit applied to durable consumption depends on institutional and social factors. The main determinants are: the evolution of durable consumption patterns; the patterns of income distribution; the intensity of competition in the financial system; banking risk policies; taxes structure; the legal framework; the role of the public sector in the credit system; relations between the financial sector and the central bank; and the orientation of monetary and credit policy adopted by the monetary authority, among others. Household debt/income ratio also influences the expansion of consumer credit. However, such influence is quite weak, particularly when longer periods of analysis are considered and, consequently, the institutional and social factors mentioned are subject to significant changes. (Freitas and Dweck, 2013).

In order to separate the induced from autonomous consumption, we constructed a vector $v$ that contains the nondurable consumption share by industry[17]. The determination of these

[16] As will be explained in the following subsection, the endogenous household consumption was constructed as a wage-dependent variable.
[17] See Appendix A for a detailed explanation of the construction of vector *v*.

shares constitutes one of the innovations of this work (see Appendix A). In that effort we combined the classification of products according to the basic classes of goods of the System of National Accounts (BC-SNA), the Classification by Broad Economic Categories (CGCE-IBGE)[18] (CONCLA-IBGE, 2013) and weights based on products sales from the Annual Industrial Survey[19] (PIA-IBGE), all made available by the Brazilian Institute of Geography and Statistics - IBGE.

The method adopted to introduce induced consumption into the basic input-output model follows Miyazawa (1976). This method allows us to treat household consumption as an endogenous variable in the Leontief system by introducing the Keynesian consumption function on a disaggregated level (Miyazawa, 1976). We will initially calculate a matrix $A_c$, of coefficients relative to the induced consumption of households. The matrix $A_c$ is given by the multiplication of the diagonalised vector $\hat{v}$, by the vectors of propensity to consume of total wage, by industry, $c_w$, and share of wages in the gross output of each industry, $w'$.

Let:

$v$ be the vector that identifies the percentage of endogenous consumption in the final consumption of each industries production;

$c_w$ be the vector of final consumption of national production by industry ($f_i^C$) divided by the mass of wages of the economy ("average propensity to consume products of national origin"), $c_w = \begin{bmatrix} \frac{f_1^C}{W} \\ \vdots \\ \frac{f_{42}^C}{W} \end{bmatrix}$;

$w'$ be the line vector of wages per industry[20] divided by the output of each industry (share of wages in the gross output of each activity), $w' = \begin{bmatrix} \frac{w_1}{x_1} & \cdots & \frac{w_{42}}{x_{42}} \end{bmatrix}$.

[18] Abbreviation in Portuguese.
[19] We used sales data from the PIA Survey of 2010, because that is the latest reference year of national accounts data and the IO matrices utilized in this work are valued at 2010's prices.
[20] In order to obtain a vector of wages by industry, it was necessary to harmonize the industry sectors of the input-output matrices with the sectors presented in the Supply and Use Tables (SUT) published by the Brazilian National Institute of Geography and Statistics (IBGE). It was used salary data from the SUT in the 2010 National Accounts reference because it is in accordance with the SNA 2008 as also with Passoni and Freitas (2018) methodology.

Therefore, we have:

$$A_c = \hat{v}c_w w' = \begin{bmatrix} v_1 \frac{f_1^C}{W}\frac{w_1}{x_1} & \cdots & v_1 \frac{f_1^C}{W}\frac{w_{42}}{x_{42}} \\ \vdots & \ddots & \vdots \\ v_{42} \frac{f_{42}^C}{W}\frac{w_1}{x_1} & \cdots & v_{42} \frac{f_{42}^C}{W}\frac{w_{42}}{x_{42}} \end{bmatrix} \quad (5)$$

It follows that, the multiplication of $A_c$ by the production vector $x$ results in the vector $f^{C_{ind}}$ of total induced consumption by industry. Therefore, letting $f$ be the vector of final demand for domestic production by industry, we define $f^{aut}$ as the autonomous final demand vector of domestic production:

$$f^{C_{ind}} = \hat{v}c_w w' x \Leftrightarrow$$

$$f^{C_{ind}} = A_c x \quad (6)$$

$$f^{aut} = f - f^{C_{ind}} \quad (7)$$

Hence, from the IO matrices identity $x = Ax + f$ and equations (6) and (7), we can write:

$$x = Ax + f \Leftrightarrow$$

$$x = Ax + f^{C_{ind}} + f^{aut} \Leftrightarrow$$

$$x = Ax + A_c x + f^{aut} \Leftrightarrow$$

$$x = (A + A_c)x + f^{aut} \Leftrightarrow$$

$$x = (\bar{A})x + f^{aut} \Leftrightarrow$$

$$x = (I - \bar{A})^{-1} f^{aut} \Leftrightarrow$$

$$x = \bar{L} f^{aut} \quad (8)$$

The correspondence of activities at Passoni and Freitas (2018) disaggregation to SNA IBGE's one can be consulted in Appendix D.

Where $\bar{A}$ is the sum of the matrix of the domestic technical coefficients (A) with the matrix $A_c$:

$$\bar{A} = A + A_c \tag{9}$$

The matrix $\bar{L} = (I - \bar{A})^{-1}$ combines Leontief's propagation process with the Keynesian propagation process, reflecting the effect of endogenous changes in household consumption demand (Miyazawa, 1976). Thus, the model considers the household consumption of durable goods as an autonomous component of final demand and of nondurable goods and services as dependent on wages.

### 2.2.2 Decomposition of gross output variation

Since the paper Dietzenbacher and Los (1998), it has been agreed in the literature that the decomposition of the growth of any variable, resulting from the product of the two or more elements, can be done as follows[21]: Let: $a = bc$ then,

$$\Delta a = \frac{1}{2}\Delta b(c_1 + c_0) + \frac{1}{2}(b_0 + b_1)\Delta c, \tag{10}$$

where *a*, *b* and *c* are arbitrary matrices of compatible dimensions. Expression (11) shows de decomposition of the variation in $x$ as it is defined in equation (8)[22] following the method presented in expression (10).

$$\Delta x = \underbrace{\frac{1}{2}\Delta\bar{L}(f_1^{aut} + f_0^{aut})}_{\substack{Change\ in\ Technology \\ and\ Induced\ Consumption}} + \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{aut}}_{\substack{Change\ in\ Autonomous \\ Final\ Demand}} \tag{11}$$

It can be shown that [23]:

$$\Delta\bar{L} = \bar{L}_1(\Delta\bar{A})\bar{L}_0 \tag{12}$$

[21] For an explanation of the intuition behind the structural decomposition analysis methodology see Appendix B.
[22] Subscripts 0 and 1 indicate that the variable refers to the initial year (0) or the final year (1) of the period considered in the decomposition.
[23] For a demonstration of expression (12) see Miller and Blair (2009), chapter 13.

Replacing (12) in (11), we have:

$$\Delta x = \frac{1}{2}(\bar{L}_1(\Delta\bar{A})\bar{L}_0)(f_1^{aut} + f_0^{aut}) + \frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{aut} \tag{13}$$

Using relation (9) in (13) we get (14):

$$\Delta x = \underbrace{\frac{1}{2}(\bar{L}_1\Delta A\bar{L}_0)(f_1^{aut} + f_0^{aut})}_{Change\ in\ Technology} + \underbrace{\frac{1}{2}(\bar{L}_1\Delta A_c\bar{L}_0)(f_1^{aut} + f_0^{aut})}_{\text{Change in Induced Consumption Pattern}} + \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{aut}}_{Change\ in\ Autonomous\ Final\ Demand} \tag{14}$$

One might argue that changes in the production technology takes long periods to occur, and it would be inappropriate to use this terminology when referring to small periods of time. We chose to keep this terminology because it is largely used in the input-output literature, but it is important to notice that when we use the term "change in technology" we will be strictly analyzing changes in the technical coefficients, without further considerations about the timing of changes in technology in a broader sense.

We can write the vector of change in the autonomous final demand ($\Delta f^{aut}$) as a sum of vectors representing the change in each of its components (using the largest number of demand side components available in the database). Let $\Delta f^{C_{aut}}$, $\Delta f^{I}$, $\Delta f^{G}$ e $\Delta f^{X}$ be the change in autonomous consumption, investment, government spending and exports, we have:

$$\Delta f^{aut} = \Delta f^{C_{aut}} + \Delta f^{I} + \Delta f^{G} + \Delta f^{X} \tag{15}$$

Replacing equation (15) in (14) we have (16):

$$\Delta x = \underbrace{\frac{1}{2}(\bar{L}_1 \Delta A \bar{L}_0)(f_1^{aut} + f_0^{aut})}_{Change\ in\ Technology} + \underbrace{\frac{1}{2}(\bar{L}_1 \Delta A_c \bar{L}_0)(f_1^{aut} + f_0^{aut})}_{\substack{Chnage\ in\ Induced \\ Consumption\ Pattern}}$$
$$+ \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{C_{aut}}}_{\substack{Change\ in\ Autonomous \\ Household\ Consumption}} + \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{I}}_{Change\ in\ Investment} \quad (16)$$
$$+ \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{G}}_{\substack{Change\ in\ Government \\ Spending}} + \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^{X}}_{Change\ in\ Exports}$$

It is worth noting that in the case of induced consumption and technological change, the decomposition captures the contribution of the change in the propensities to consume and production technical coefficients, respectively. In the case of autonomous expenditures, the decomposition captures the contribution in relation to the growth rate of the aggregate itself.

#### 2.2.2.1 Disclosing the Trade Pattern in Output Components

It is also important to notice that, in equation (16), the output change is decomposed into components of the demand for domestic production. Therefore, these components include the effect of the change in the trade pattern. For example, a decrease in some national technical coefficient, might be due to a change in the production technology – the economic activities are demanding less of that specific product (as an input) to produce one unit of output –, but it could also be reflecting an increase in the imported coefficient of that productive input.

For this reason, it is important to analyze these effects separately. We will call 'trade pattern' the effect related to changes in the national content of the aggregates studied in this work, and we will call 'total effect' the one related to the total change in the aggregate (considering demand for domestic and imported products).

To measure the trade pattern, we will construct matrices $\mu$ of domestic content coefficient for each component. First, let: $A = \mu^A \otimes A_T$. Where: $\mu^A$ is the matrix of domestic content coefficients (demand for domestic inputs as a share of total inputs), $A_T$ is the matrix of total technical coefficients. Also $\otimes$ denotes the product of Hadamard operation (multiplication

element by element) and the subscript T indicates the variable refers to total demand of goods and services (domestic and imported). We have:

$$\Delta A = \underbrace{\frac{1}{2}\Delta\mu^{A} \otimes (A_{T1} + A_{T0})}_{\substack{Change\ in \\ Intermediate\ Demand \\ Trade\ Pattern}} + \underbrace{\frac{1}{2}(\mu_0^A + \mu_1^A) \otimes \Delta A_T}_{\substack{Change\ in \\ Technology}} \tag{17}$$

Now let: $A_c = \mu^{Ac} \otimes A_{cT}$ . Where $A_{cT}$ is a matrix constructed analogously to the matrix $A_c$, as follows: $A_{cT} = \hat{v}c_{wT}w'$. In this expression, $c_{wT}$ is the vector of total final consumption by industry (domestic and imported) divided by the total wages of the economy ("average propensity to consume"). We have:

$$\Delta A_c = \underbrace{\frac{1}{2}\Delta\mu^{Ac} \otimes (A_{cT1} + A_{cT0})}_{\substack{Change\ in \\ Induced\ Consumption \\ Trade\ Pattern}} + \underbrace{\frac{1}{2}(\mu_0^{Ac} + \mu_1^{Ac}) \otimes \Delta A_{cT}}_{\substack{Change\ in\ Induced \\ Consumption\ Pattern}} \tag{18}$$

Let $f_t$ be the total final demand (by domestic and imported output); $f = \hat{\mu}f_t$ is the final demand for domestic output; $\hat{\mu} = \hat{f}\hat{f}_T^{\ -1}$represents the share of domestic final demand in total final demand. Analogously, we have:$\hat{\mu}^{aut} = \hat{f}^{aut}\hat{f}_T^{aut\ -1}$. We can write:

$$\Delta f^{aut} = \underbrace{\frac{1}{2}\Delta\hat{\mu}^{aut}(f_{T1}^{aut} + f_{T0}^{aut})}_{\substack{Change\ in \\ Autonomous\ Final\ Demand \\ Trade\ Pattern}} + \underbrace{\frac{1}{2}(\hat{\mu}_1^{aut} + \hat{\mu}_0^{aut})\Delta f_T^{aut}}_{\substack{Change\ in \\ Autonomous\ Final\ Demand}} \tag{19}$$

Replacing (17), (18) and expressions analogous to (19) for each component of the final demand in (16), and rearranging, we have:

$$\begin{aligned}
\Delta x = & \underbrace{\frac{1}{2}\left(\bar{L}_1\left[\frac{1}{2}\Delta\mu^{A} \otimes (A_{T1} + A_{t0})\right]\bar{L}_0\right)(f_1^{aut} + f_0^{aut})}_{\substack{Change\ in\ Intermediate\ Demand \\ Trade\ Pattern}} \\
& + \underbrace{\frac{1}{2}\left(\bar{L}_1\left[\frac{1}{2}(\mu_0^A + \mu_1^A) \otimes \Delta A_t\right]\bar{L}_0\right)(f_1^{aut} + f_0^{aut})}_{Change\ in\ Technology} \\
& + \underbrace{\frac{1}{2}\left(\bar{L}_1\left[\frac{1}{2}\Delta\mu^{A_c} \otimes (A_{cT1} + A_{cT0})\right]\bar{L}_0\right)(f_1^{aut} + f_0^{aut})}_{\substack{Change\ in\ Induced\ Consumption \\ Trade\ Pattern}} \\
& + \underbrace{\frac{1}{2}\left(\bar{L}_1\left[\frac{1}{2}\left(\mu_0^{A_c} + \mu_1^{A_c}\right) \otimes \Delta A_{cT}\right]\bar{L}_0\right)(f_1^{aut} + f_0^{aut})}_{Change\ in\ Induced\ Consumption} +
\end{aligned} \tag{20}$$

$$\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)\Delta\hat{\mu}^{C_{aut}}\left(f_{\mathrm{T1}}^{C_{aut}}+f_{\mathrm{T0}}^{C_{aut}}\right)}_{\substack{Change\ in\ Autonomous\\ Household\ Finl\ Consumption\\ Trade\ Pattern}}+$$

$$\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)\left(\hat{\mu}_1^{C_{aut}}+\hat{\mu}_0^{C_{aut}}\right)\Delta f_T^{C_{aut}}}_{\substack{Change\ in\ Autonomous\\ Household\ Finl\ Consumption}}+\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)\Delta\hat{\mu}^{I}\ (f_{\mathrm{T1}}^{I}+f_{\mathrm{T0}}^{I})}_{\substack{Change\ in\ Investments\\ Trade\ Pattern}}+$$

$$\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)(\hat{\mu}_1^{I}+\hat{\mu}_0^{I})\Delta f_T^{I}}_{Change\ in\ Investments}+\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)\Delta\hat{\mu}^{G}\ (f_{\mathrm{T1}}^{G}+f_{\mathrm{T0}}^{G})}_{\substack{Change\ in\ Government\ Spending\\ Trade\ Pattern}}+$$

$$\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)(\hat{\mu}_1^{G}+\hat{\mu}_0^{G})\Delta f_T^{G}}_{Change\ in\ Government\ Spending}+\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)\Delta\hat{\mu}^{X}\ (f_{\mathrm{T1}}^{X}+f_{\mathrm{T0}}^{X})}_{\substack{Change\ in\ Exports\\ Trade\ Pattern}}+$$

$$\underbrace{\frac{1}{4}(\bar{L}_0+\bar{L}_1)(\hat{\mu}_1^{X}+\hat{\mu}_0^{X})\Delta f_T^{X}}_{Change\ in\ Exports}$$

### 2.2.3 Decomposition of consumption growth

We can write the total final consumption ($f^C$) as the sum of an induced ($f^{C_{ind}}$) and an autonomous ($f^{C_{aut}}$) part:

$$f^C = f^{C_{ind}} + f^{C_{aut}} \tag{21}$$

Using the relation (6) we can rewrite (21) as follows:

$$f^C = A_c x + f^{C_{aut}} \tag{22}$$

As shown in section 2.2.1, above, we can write $A_c = d_{cw}w'$ where $d_{cw} = \hat{v}\, c_w$. The vector $d_{cw}$ represents the propensities to consume non-durable goods and services of national origin (or 'induced' propensities to consume). Let us now decompose $w'$, which is a line vector with elements corresponding to the mass of wages of each industry divided by the output of the same industry. We can write $w'$ as the product of the line vector line $w'_l$, which represents the industries average wages (its elements are the ratio of the mass of wages to the number of jobs in each industry), by the diagonalized vector of the technical coefficients of work $\widehat{l_x}$, (matrix in which the elements of the main diagonal correspond to the inverse of productivity in each activity): $w' = w'_l\, \widehat{l_x}$.

Where $w'_l = \left[\frac{w_1}{l_1} \quad \cdots \quad \frac{w_{42}}{l_{42}}\right]$ and $\widehat{l_x} = \begin{bmatrix} \frac{l_1}{x_1} & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & \frac{l_{42}}{x_{42}} \end{bmatrix}$.

Therefore, we can write $A_c = d_{cw} w'_l \, \widehat{l_x}$. Substituting this expression into (22) we have:

$$f^C = d_{cw} w'_l \, \widehat{l_x} x + f^{C_{aut}} \tag{23}$$

We will start from the equation (23) and use the same methodology[24] applied for the decomposition of the output to write an expression for $\Delta f^C$. The resulting expression for the decomposition of the final consumption of the families will look like this:

$$\Delta f^C = \underbrace{\frac{1}{2}\Delta d_{cw}(w'_{l0}\,\widehat{l_{x0}}x_0 + w'_{l1}\,\widehat{l_{x1}}x_1)}_{Change\ in\ Induced\ Consumption\ Pattern} + \underbrace{\frac{1}{2}\left(d_{cw0}(\Delta w'_l)\widehat{l_{x1}}x_1 + d_{cw1}(\Delta w'_l)\widehat{l_{x0}}x_0\right)}_{Change\ in\ Average\ Wages}$$

$$+\underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}(\Delta\widehat{l_x})x_1 + d_{cw1}w'_{l1}(\Delta\widehat{l_x})x_0\right)}_{Change\ in\ the\ Inverse\ of\ Productivity} + \underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\,\widehat{l_{x0}} + d_{cw1}w'_{l1}\,\widehat{l_{x1}}\right)\Delta x}_{Change\ in\ Output} +$$

$$\underbrace{\Delta f^{C_{aut}}}_{Change\ in\ Autonomous\ Consumption} \tag{24}$$

#### 2.2.3.1 Disclosing the Trade Pattern in Consumption Components

As noted before, in equation (16), the output change is decomposed into components of the demand for domestic products and services. In the same way, the variation of the consumption, expressed by equation (24), also regards to consumption of domestic origin. Therefore, these components include the effect of the change in the trade pattern. In order to analyze this effect separately in the consumption decomposition we will use the same strategy applied to the output decomposition. Let:

$$d_{cw} = \hat{\mu}^d d_{cwT} \tag{25}$$

[24] For a detailed explanation for the decompositions of variables that result from the product of more than two others see Miller and Blair (2009, pp. 598-9).

Where $d_{cw}$ is the vector of propensities to consume non-durable goods of domestic origin out of wages; $d_{cwT}$ is the vector of propensities to consume non-durable goods of all origins (domestic and imported) out of wages; and $\hat{\mu}^d$is a diagonal matrix, that represents the share of domestic propensities to consume in total propensities to consume, as shown in equation (25). The matrix $\hat{\mu}^d$ will allow us to measure the change in trade pattern of endogenous consumption. From equation (25) we get:

$$\Delta d_{cw} = \underbrace{\frac{1}{2}\Delta\hat{\mu}^d(d_{cwT1} + d_{cwT0})}_{\substack{Change\ in \\ Endogenous\ Consumption \\ Trade\ Pattern}} + \underbrace{\frac{1}{2}(\hat{\mu}_1^d + \hat{\mu}_0^d)\Delta d_{cwT}}_{\substack{Change\ in\ Total \\ Propensities\ do\ consume \\ non\ durable\ goods}} \tag{26}$$

We can apply the same procedure to $C_{aut}$to obtain $\Delta C_{aut}$ as a function of $\hat{\mu}^{Caut}$ as follows: $f^{C_{aut}} = \hat{\mu}^{Caut} f_T^{C_{aut}}$. So, we can write:

$$\Delta f^{C_{aut}} = \underbrace{\frac{1}{2}\Delta\hat{\mu}^{C_{aut}}\left(f_{T1}^{C_{aut}} + f_{T0}^{C_{aut}}\right)}_{\substack{Change\ in \\ Autonomous\ Consumption \\ Trade\ Pattern}} + \underbrace{\frac{1}{2}(\hat{\mu}_1^{C_{aut}} + \hat{\mu}_0^{C_{aut}})\Delta f_T^{C_{aut}}}_{\substack{Change\ in\ Total \\ Autonomous\ Consumption}} \tag{27}$$

Replacing equations (26) and (27) in equation (24) we get:

$$\Delta f^C = \underbrace{\frac{1}{4}\Delta\widehat{\mu^d}(d_{cwT1} + d_{cwT0})\left(w'_{l0}\,\widehat{l_{x0}}x_0 + w'_{l1}\,\widehat{l_{x1}}x_1\right)}_{Change\ in\ Iduced\ Consumption\ Trade\ Pattern}$$

$$+\underbrace{\frac{1}{4}\left(\hat{\mu}_1^d + \hat{\mu}_0^d\right)\Delta d_{cwT}\left(w'_{l0}\,\widehat{l_{x0}}x_0 + w'_{l1}\,\widehat{l_{x1}}x_1\right)}_{Change\ in\ Total\ Iduced\ Consumption\ Pattern}$$

$$+\ \underbrace{\frac{1}{2}\left(d_{cw0}(\Delta w'_l)\widehat{l_{x1}}x_1 + d_{cw1}(\Delta w'_l)\widehat{l_{x0}}x_0\right)}_{Change\ in\ Average\ Wages} \tag{28}$$

$$+\underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\left(\Delta\widehat{l_x}\right)x_1 + d_{cw1}w'_{l1}\left(\Delta\widehat{l_x}\right)x_0\right)}_{Change\ in\ the\ Inverse\ of\ Productivity}$$

$$+\ \underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\,\widehat{l_{x0}} + d_{cw1}w'_{l1}\,\widehat{l_{x1}}\right)\Delta x}_{Change\ in\ Output}$$

$$+ \underbrace{\frac{1}{2}\Delta\hat{\mu}^{C_{aut}}\left(f_{T1}^{C_{aut}} + f_{T0}^{C_{aut}}\right)}_{\substack{Change\ in\ Autonomous\ Consumption \\ Trade\ Pattern}} + \underbrace{\frac{1}{2}(\hat{\mu}_1^{C_{aut}} + \hat{\mu}_0^{C_{aut}})\Delta f_T^{C_{aut}}}_{\substack{Change\ in\ Total \\ Autonomous\ Consumption}}$$

#### 2.2.3.2 Further Detail on the Change in Output Component in Consumption's Decomposition: Composition and Scale Effects

The term 'Change in Output' in the consumption decomposition (equation (28) above) measures the contribution of changes in sectorial output to household consumption growth. It captures, however, the combined effect of the change in output scale (total aggregate output growth) and the change in its sectorial composition. In other words, one part of output's contribution, is due to the total output growth, that stimulates consumption growth indirectly by dynamizing economic activity. Another part of output stimulating power over consumption can come from the change in its industrial composition.

For example, for a given rate of total aggregate output growth, if the growth is more concentrated in labor intensive industries it is expected to cause a higher expansion in consumption, because household's income will increase (due to expansion of employment or elevation of wages, depending on the existent labor supply for the specific industries). On the other hand, if this output growth was a result of a faster growth of the capital-intensive industries, the same rate of total output growth would cause a smaller impact on household's consumption. Disclosing these two effects will give us information to investigate the occurrence of cumulative causation processes, as suggested by Rugitsky (2017).

To make explicit the influence of the change in output's sectorial composition and of its scale we wrote the vector *x* as follows:

$$x = \underbrace{x(i'x)^{-1}}_{Composition}\ \underbrace{(i'x)}_{Scale} \tag{29}$$

Where *i* is a unitary or summation vector of dimension (1x42). The expression $i'x$ in equation (29), that is the pre-multiplication of the *x* vector (of output by industries) by the transposed summation vector, results in a scalar corresponding to the total output of that specific year, or in other words, the sum of all industries' output. Therefore, the change in that 'component' can

be interpreted as a change in the scale of output. In the same way, the expression $x(i'x)^{-1}$ in equation (29) results in a vector in which each element is an industrial output divided by the total output, or in other words, a vector of the shares of each industry in total output. Analogously, we may say that a change in this 'component' can be interpreted as a change in outputs' industrial composition.

Considering the vector *x* as a product of two factors (from equation (29)), the first term in the right side of equation (23) would become a product of five factors. Considering that, and following Miller and Blair (2009), we can write the 'Change in Output' component of the consumption decomposition (equation (24)) like this:

$$\underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\,\widehat{l_{x0}} + d_{cw1}w'_{l1}\,\widehat{l_{x1}}\right)\Delta x}_{Change\ in\ Output} \tag{30}$$

$$= \underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\,\widehat{l_{x0}}\Delta[x(i'x)^{-1}](i'x_0) + d_{cw1}w'_{l1}\,\widehat{l_{x1}}\Delta[x(i'x)^{-1}](i'x_1)\right)}_{\substack{Change\ in\ Output's \\ Composition}}$$

$$+ \underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\,\widehat{l_{x0}}x_0(i'x_0)^{-1} + d_{cw1}w'_{l1}\,\widehat{l_{x1}}x_1(i'x_1)^{-1}\right)\Delta(i'x)}_{\substack{Change\ in\ Output's \\ Scale}}$$

#### 2.2.3.3 Relative Prices Effects

All decompositions presented in this chapter were performed using the IO tables at 2010's constant prices. However, it is important to check if any of the structural change found is due to the effect of changes in the relative prices structure. For example, one could argue that an increase in the share of services in consumption could be the result of the services inflation being higher than the inflation of other industries in the period, and not a change in volume terms. To account for that and to guarantee that the conclusions obtained in the previous decompositions hold, we will perform a decomposition of the aggregate household consumption into its volume and relative price components.

The total sectoral household consumption vector, in constant prices, ($f^C$) is a combination of the sectoral relative price ($c^p$) and household consumption in volume ($f^{C^v}$). The vector $f^C$ is obtained in the CP IO tables (deflated by the gross output deflator, $p^{2010,\tau}$),

and the vector $f^{C^v}$ correspond to the household consumption in the CRP IO tables (deflated by the accumulated cell-specific deflator, $\Lambda_{f_i^C}^{2010,\tau}$). The vector $c^p$ represents the relative prices ratio for the household consumption, and its elements follow the logic of equation (3), as we can see in equation (31). Also, applying equation (2) to consumption, we note that vector $c^p$ can be constructed as the division of each element of $f^C$ ($f^C{}_i^{2010,\tau,\phi}$) by the correspondent element in $f^{C^v}$ ($f^C{}_i^{2010,\tau}$), as follows:

$$c_i^p = \phi_{f^{C^v}{}_i}^{2010,\tau} = \frac{\Lambda_{f^C{}_i}^{2010,\tau}}{p^{2010,\tau}} = \frac{f^C{}_i^{2010,\tau,\phi}}{f^C{}_i^{2010,\tau}} = \frac{f^C{}_i}{f^{C^v}{}_i} \tag{31}.$$

Therefore, we can write:

$$f^C = \hat{c}^p f^{C^v} \tag{32}.$$

Applying the same technique we used to get equation (11), based on Dietzenbacher and Los (1998) and Miller and Blair (2009), we can decompose the change in $f^C$ as follows:

$$\Delta f^C = \underbrace{\frac{1}{2}\left(\hat{c}_1^p + \hat{c}_0^p\right)\Delta f^{C^v}}_{\substack{change\ in \\ volume}} + \underbrace{\frac{1}{2}\Delta\hat{c}_1^p\left(f_1^{C^v} + f_0^{C^v}\right)}_{\substack{chnage\ in \\ relative\ prices}} \tag{33}.$$

# Chapter 3 - Empirical Results

In this chapter, we will analyze the results obtained from the decompositions proposed in Chapter 2. The analysis will aim to explain the growth of household consumption and output in Brazil, between 2000 and 2016, by looking at the contribution of different components of each of these two variables. We will also evaluate the presence of cumulative causation processes between consumption and productive structure in order to give more elements to understand the output and household consumption trajectories and clarify the sources of the structural change observed.

The choice of the period between 2000 and 2016 for the analysis was due to the historical importance of the period, the presence of significant changes in the dynamics of economic growth and consumption in Brazil and the availability of data. We chose to divide the 2000-2016 period into four main sub periods, according to the growth pattern observed. The first period comprises the years of 2000 to 2003, a **low growth** period. As we can see in Graph 1, until 2003 the output growth was weak, and household consumption contracted in real terms. The period between 2004 and 2008, characterized by acceleration of consumption and production growth, is the **growth acceleration** period. In the third sub period, between 2010 and 2014, we can see in Graph 1 a **deceleration of the growth** of both aggregates. The last period comprises the years of 2015 and 2016, when both aggregates had a strong slowdown, characterizing a **recession period**, with contraction of household consumption. This periodization is in accordance to the datation of economic cycles published by the *Comitê de Datação de Ciclos Econômicos (CODACE-FGV) (2017)*[25].

[25] The *Comitê de Datação de Ciclos Econômicos (CODACE-FGV)* – in English: "Economic Cycle Dating Committee" aims to establish reference chronologies for the Brazilian economic cycles. In their 2017 publication they classified the period of our study as follows:

| ***Quarterly Chronology of the Brazilian Business Cycle*** | |
|---|---|
| From 2º quarter of 1999 to 1º quarter of 2001 | Expansion |
| From 2º quarter of 2001 to 4º quarter of 2001 | Recession |
| From 1º quarter of 2002 to 4º quarter of 2002 | Expansion |
| From 1º quarter of 2003 to 2º quarter of 2003 | Recession |

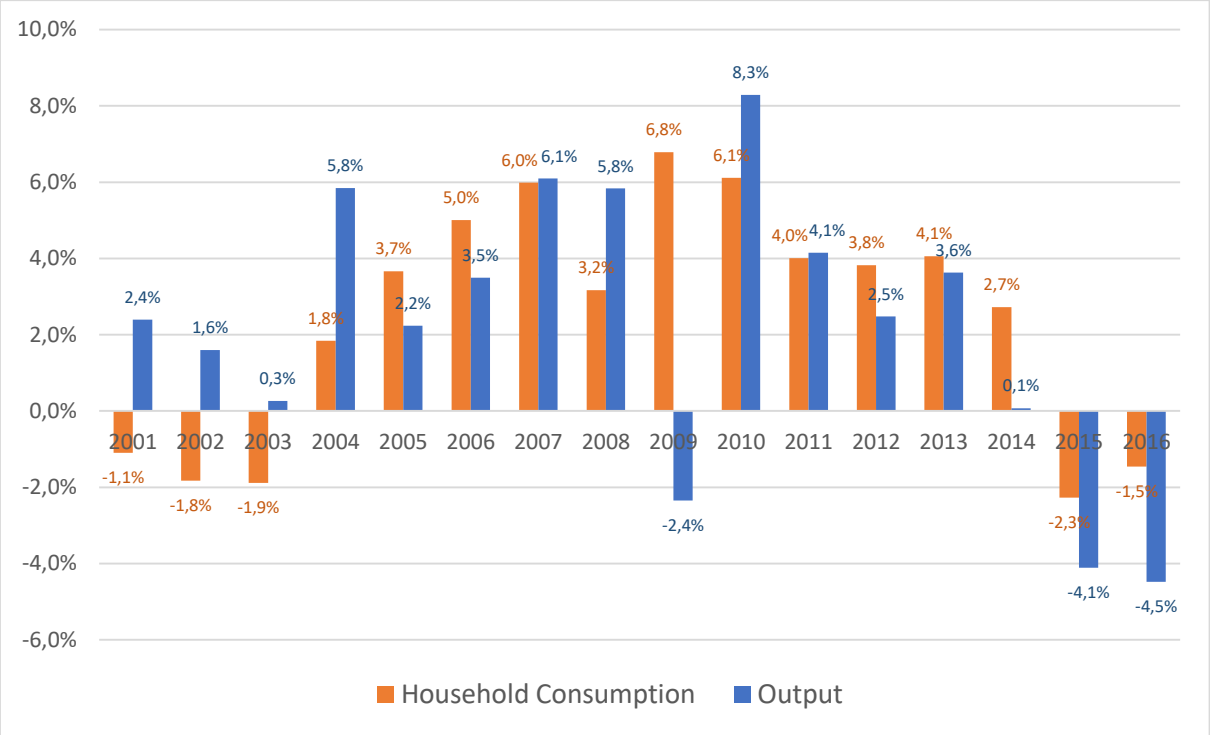
We excluded 2009 from this stage of the analysis because it is a crisis year, yet not as pronounced as the last period. Years with very atypical data, if defined as an extreme of the interval in a structural decomposition analysis, can cause distortions in the results, undermining the understanding of the growth dynamics of the period under study. For this reason, we analyzed separately the smaller sub period from 2008 to 2009.

We also preferred not to make the decomposition from 2003 to 2010 because the official data used in IO matrix at current prices for these two years are from different reference years of the Brazilian National Accounts. Although the database takes into account the harmonization of the data in the two different reference years, there are limitations to this procedure. Therefore, in order to produce the most accurate analysis, we preferred to keep 2010 out of this decomposition sub period.

| | |
|---|---|
| From 3º quarter of 2003 to 3º quarter of 2008 | Expansion |
| From 4º quarter of 2008 to 1º quarter of 2009 | Recession |
| From 2º quarter of 2009 to 1º quarter of 2014 | Expansion |
| From 2º quarter of 2014 to 4º quarter of 2016 | Recession |

*Source: CODACE-FGV (2017).*

*Graph 1 - Household Consumption and Gross Output Growth Rates at 2010's constant prices*[26]




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

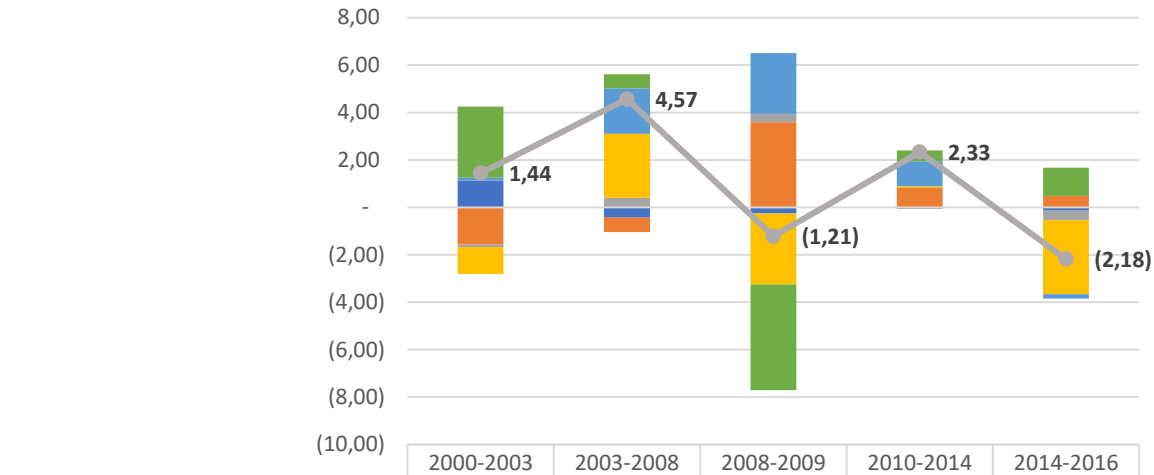
## 3.1 First stage decompositions: aggregate components

Graph 2 displays the results of the decomposition of gross outputs average growth rate into six components: change in technology[27] (technical coefficients), change in the endogenous consumption pattern (propensities to consume), change in autonomous consumption, change in investment, change in government spending and change in exports. The bars represent the contribution of each component to growth, and the line, the total output variation. Graph 3 is analogous to Graph 2 but representing the decomposition of the average growth of final consumption of households. The change in consumption is disaggregated in five components: change in autonomous consumption, change in endogenous consumption pattern, change in average wages, change in the inverse of labor productivity and change in output. Graph 2 and Graph 3 represent respectively the results relative to equations (16) and (24), the output and

[26] Both variables in Graph 1 are at basic prices and consider all origins of products (domestic and imported). Household consumption includes NPISHs' spending.
[27] As stated in Section 2.2.2, when we refer to "change in technology" we will be strictly analyzing changes in the technical coefficients.

household consumption decompositions regarding goods and services of domestic origin. Therefore, the components presented in the graphs include the effect of the change in the trade pattern.

*Graph 2 - Decomposition of Output's Yearly Average Growth - p.p.*




| | 2000-2003 | 2003-2008 | 2008-2009 | 2010-2014 | 2014-2016 |
|---|---|---|---|---|---|
| Exports | 3,00 | 0,60 | (4,46) | 0,47 | 1,19 |
| Government Spending | 0,12 | 1,91 | 2,57 | 1,06 | (0,19) |
| Investment | (1,13) | 2,71 | (2,99) | 0,07 | (3,12) |
| Autonomous Households' Consumption | (0,11) | 0,40 | 0,35 | (0,05) | (0,40) |
| Endogenous Consumption Pattern | (1,57) | (0,61) | 3,58 | 0,82 | 0,48 |
| Technology | 1,13 | (0,44) | (0,26) | (0,03) | (0,14) |
| Average Output Growth | 1,44 | 4,57 | (1,21) | 2,33 | (2,18) |

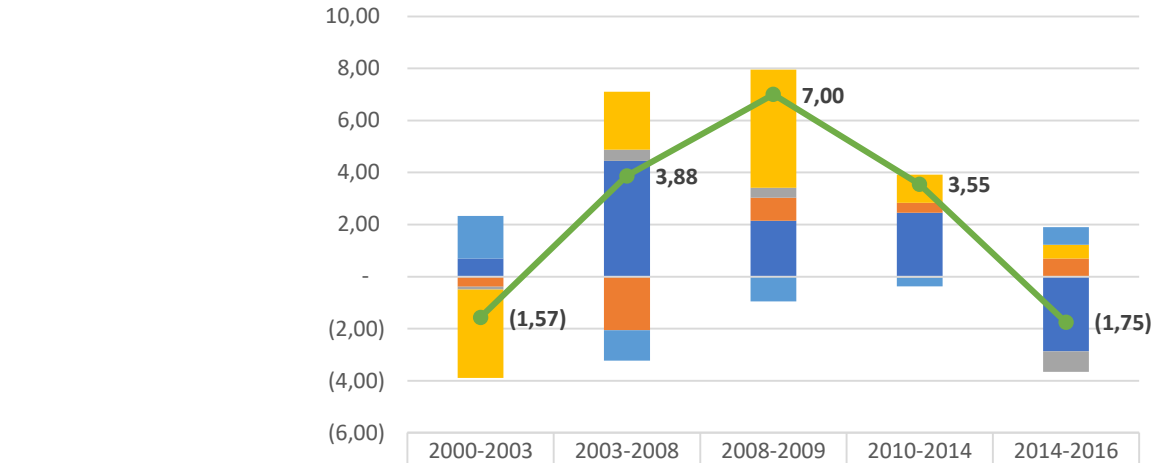
*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Analyzing Graph 2, we can see that in the **low growth period (2000-2003)** exports had an important role in explaining change in gross output. As far as the average growth rate of output was of modest 1,44% per year, we can say that the growth regime of the period characterizes as an "export-led stagnation"[28] regime. The contribution of exports was followed by the change in technology, these two components compensated the negative contribution of investment and endogenous household consumption. In the same period, from Graph 3, we see that the component that explains most of the contraction of consumption is the one related to average wages. The inverse of productivity was responsible for the more important positive contribution in the period. This means productivity decreased[29], in other words, the necessity

[28] This expression was used by Medeiros and Serrano (2001) to describe the 1980's growth pattern in Brazil, we believe it also fits in the 2000-2003 period.
[29] It is important to notice that productivity change in the short run might be a result of labor hoarding or any other procyclical aspect of productivity.

of workers to produce a certain amount of output increased, and an increase in occupations had positive effects on economic growth.

*Graph 3 - Decomposition of Household Consumption Yearly Average Growth - p.p.*




| | 2000-2003 | 2003-2008 | 2008-2009 | 2010-2014 | 2014-2016 |
|---|---|---|---|---|---|
| Inverse of Productivity | 1,64 | (1,17) | (0,95) | (0,33) | 0,68 |
| Average Wages | (3,40) | 2,22 | 4,53 | 1,09 | 0,54 |
| Autonomous Consumption | (0,11) | 0,43 | 0,39 | (0,04) | (0,79) |
| Endogenous Consumption Pattern | (0,39) | (2,06) | 0,89 | 0,39 | 0,69 |
| Output | 0,69 | 4,45 | 2,14 | 2,45 | (2,87) |
| Average Consumption Variation | (1,57) | 3,88 | 7,00 | 3,55 | (1,75) |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

As discussed in Chapter 1, there is a relative consensus that the rise in the price of commodities and the increase in Chinese demand for Brazilian exports represented a positive shock to the country's economy. However, the performance in the 2000s was also due to the domestic policies practiced in the period. A few years after the election of Lula for president in 2002, the government adopted a more expansive strategy. Since 2006, it can be said that the government assumed responsibility for ensuring the growth of investment, consumption and formal employment (Serrano and Summa, 2011). As a result, the domestic market began to grow faster, given the expansion of household consumption and investment, and exports growth lost importance in explaining economic dynamism (Barbosa and Souza, 2010).

During this period, the government increased the minimum wage, expanded social transfers and expenditures on social housing, infrastructure, health and education. The government also implemented an active credit policy through the Brazilian Development Bank (BNDES), which financed private investment at subsidized interest rates, and the public commercial banks, which increased the credit supply for housing, agriculture and consumption

(Carvalho and Rugitsky, 2015). According to Serrano and Summa (2011), this combination of good external conditions and domestic policies allowed the rapid growth of private consumption, which after a while induced a more rapid and sustained expansion of private investment.

We can see this movement in Graph 2: in the **accelerating growth period (2003-2008)** the components considered autonomous in our model had positive impacts on gross output growth, with special importance of investment and government spending. On the other hand, the endogenous components (technology and consumption pattern) had negative contributions. In other words, in this period, the average technical coefficients and average propensities to consume out of wages got lower. In the case of technical coefficients (technology), it means domestic industries are using fewer inputs from domestic suppliers to make a certain amount of output. It indicates a decrease in the density of domestic production chains.

In the case of consumption pattern, in Graph 2 and Graph 3, in both periods analyzed in the decade of 2000 the contribution of household induced consumption was negative. This is a counterintuitive result, given that, as discussed in Chapter 1, during the 2000s, especially after 2005, there was a significant reduction in poverty, extreme poverty and inequality. One would expect a positive contribution of induced consumption, since the lower income strata of the population have higher propensities to consume. However, as Charles, Dallery and Marie (2015) point out: "*[i]t is known that the propensity to consume varies with the economic cycle: as incomes increase, the savings rate also rises, which reduces the propensity to consume and thus the multiplier*". In addition, in the empirical model, the propensities to consume consider only wages as income, and wages presented higher growth rates in the period, in comparison to the performanceof household consumption of non-durable goods and services.

This result does not change the fact that the inclusion of a significant part of the Brazilian population in the consumer market and a change in the consumption pattern of Brazilian families contributed to a great expansion of domestic consumption. Furthermore, the consumption of households whose main income was somehow linked to the minimum wage played an important role in determining the growth cycle of the 2000's decade (Dória, 2013; Medeiros, 2015). The combination of the macroeconomic regime, the price structure, the government policies aimed at poverty reduction and the raising of the minimum wage elevated the income of the bottom of the pyramid in relation to the mean income. This allowed the

decline in the concentration of personal income and within wages, as well as the increase in the share of wages in income.

Observing Graph 3, we can see that the components that more importantly contributed to growth of consumption in the accelerating growth period were the gross output growth and wages growth. That indicates a strong endogenous behavior of consumption and corroborates the above explanations of why propensities to consume got lower.

In the **International Crisis years (2008-2009)**, as we can see in Graph 2, investments and exports contributions to output growth dropped. Change in the technical coefficients (technology) also had a negative impact. The fall in exports reflects the sudden deceleration in international trade, and the fall in investment was probably related the high uncertainty scenario after the crisis, and because many companies were recuperating of financial losses and decided not to invest. Also, the outflow of international capital in a movement of selling positions in "risky markets" to cover losses in the central economies may have led national firms less prone to invest in that period. During the period, the change in consumption (mainly endogenous) and government spending prevented a stronger reduction in economic activity, demonstrating the important role played by the government anti-cyclical fiscal policy. Observing Graph 3, we can see that the consumption growth in the period was mainly endogenous and responded to higher average wages and propensities to consume. Autonomous consumption also had a positive contribution, as it had in the preceding period, responding to government measures to stimulate consumption of durables.

Although the country recovered from the 2009's crisis very fast, presenting high growth rates as early as 2010, the following years presented slightly lower growth rates, accompanying a broad slowdown movement of the world's economy. As discussed in Chapter 1, the slowdown of the Brazilian economy since 2011 was a result of the contraction of domestic demand, rather than the drop in exports. Since 2010, the Central Bank promoted a cycle of increases in the nominal interest rate and tightened macroprudential measures, reducing the growth of credit supply. This measures applied at the beginning of the decade helped to interrupt the consumer boom, especially of durable goods. After 2011, the anti-cyclical policies implemented in the context of the 2008 international crisis were discontinued, and the government reduced public spending and investment. The contractionary policies also led to a reduction in private

investment contributing to the contraction of the product and private investment growth rates (Serrano and Summa, 2015).

Graph 2 shows us that in the **decelerating period (2010-2014)** endogenous consumption started to contribute significantly to output growth, this means that the propensities to consume increased. Autonomous consumption and investment had negligible contributions to output growth. Among the autonomous expenditures, only government spending and exports had relevant positive contributions. Government spending was the most important component to explain output growth in this period, as we can see in Graph 2, its contribution is of smaller magnitude in the decelerating period than in the previous ones, showing the high stimulating capacity of this demand category. From Graph 3, we see that the consumption in the period was mainly endogenous, with positive contributions derived from propensities to consume, average wages and gross output growth. Autonomous consumption, which had a positive contribution in the former periods, had almost no impact in the final consumption growth.

In 2015, there was a major change in economic policy and, since that year, a set of austerity measures was adopted in Brazil, especially through expenditure cuts. The government promoted the largest block in the budget authorization, since 2000, which led to a review of schedules of infrastructure projects and government programs and suspended any hiring for new public positions. Public investment was drastically reduced, reinforcing the vicious cycle. Consequently, the economy that was decelerating, but kept positive growth rates from 2010 to 2014, entered into a deep recession (Dweck, Tonon, Krepsky, 2018). According to CODACE-FGV (2017), the 2014-2016 recession was the longest and the one that presented the higher accumulated loss in GDP since 1980, year when the Committee started the dating of the Brazilian economic cycles.

In the **recession period (2014-2016)** it is evident, in Graph 2, a major contraction of investment contribution to output growth. The other two domestic autonomous components – autonomous consumption and government spending – also had negative contributions. These results reflect the drastic austerity measures adopted by the government since 2015 with severe cuts in public investment and government spending causing huge impacts on unemployment and public finances (Dweck, Tonon and Krepsky, 2018).

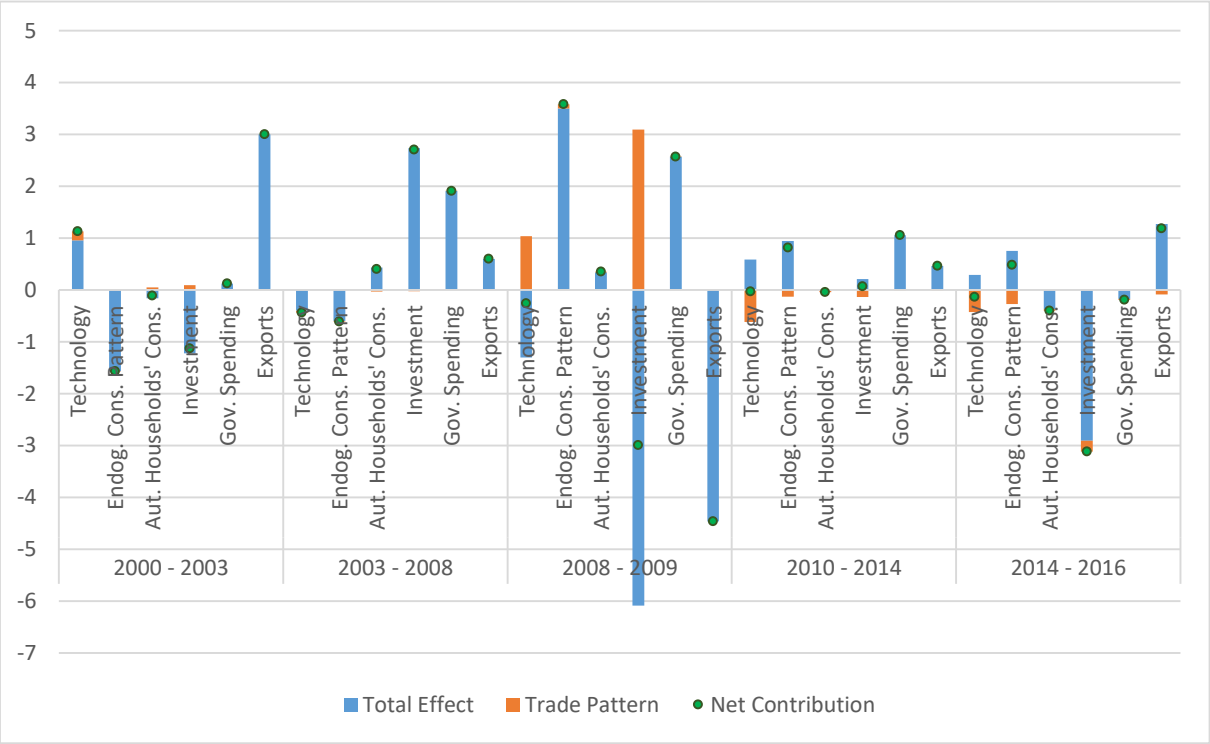
Consumption, in the period, as we can see in Graph 3, kept its endogenous character, with the contraction observed mainly explained by the fall in output. Autonomous spending also had a negative impact, and the components that had positive contributions to growth did not represent a positive scenario: the growth in propensities to consume reflects that consumption is compromising a bigger share of wages even when consumption is decreasing. The wage bill shrunk even more than consumption. In the same way, the positive impact of average wages is due to a fall in occupations even higher than to one of the wage bill. Finally, the positive impact of inverse of productivity shows us that the fall in production was even stronger than the fall in occupations. In other words, these three components, which are ratios, had positive variations because of stronger decreases in the denominators, and not because of increases in the numerators.

## 3.2 Second stage decompositions: disclosing the trade pattern

Graph 4 and Graph 5 represent the results regarding equations (20) and (28) respectively. They allow us to see the contribution of changes in the trade pattern of the components to the growth of output and household consumption. The sum of the 'trade pattern' and the 'total effect' bars for each component and period gives us the result presented in Graph 2 and Graph 3. In these two graphs, when the trade pattern has a positive value it represents an increase in the national content of the respective category of demand, and when it is negative, it means that the imported content increased.

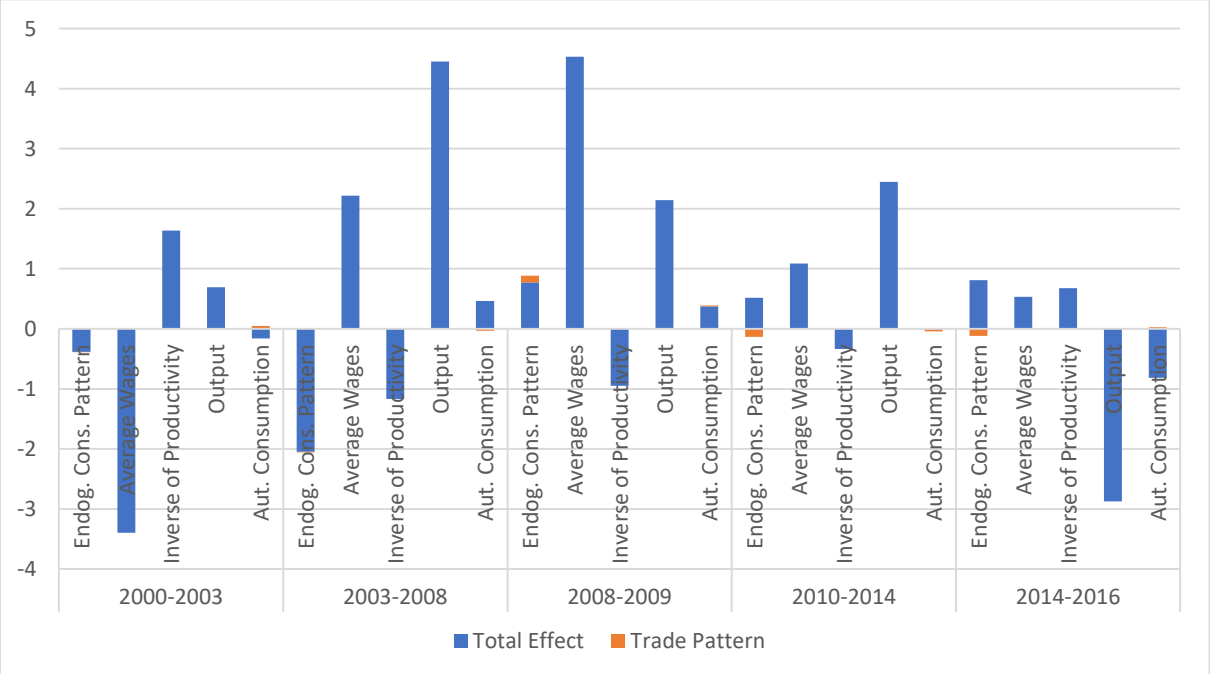
Analyzing Graph 4, we can see that in the first two periods, **low growth period (2000-2003)** and **accelerating growth period (2003-2008)**, the change in trade pattern had very little importance in explaining output growth. Therefore, it does not change the conclusions obtained above. It is only notable a positive effect in the technical coefficients (technology) in the low growth period, indicating the firms did some imports substitution. During the **International Crisis years (2008-2009)**, on the other hand, the change in trade pattern played an important role counterbalancing part of the negative contributions of investment and technology to output growth. Despite the strong contraction of investments, there was an increase in its domestic content. Technology presented a similar movement: while the change in the total technical coefficients did not favor output growth, a substitution of imports avoided an even deeper deceleration of the economy.

*Graph 4 - Trade Pattern and Total Effect Contribution to Output Yearly Average Growth by Component and Period - p.p.*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Graph 5 - Trade Pattern and Total Effect Contribution to Household Consumption Yearly Average Growth by Component and Period - p.p.*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

In the next two periods, **the decelerating** (2010-2014) and **recession period** (2014-2016), the change in trade pattern contributed negatively to output growth in all components of demand, in special in the endogenous ones (technology and induced consumption). In the case of technology (technical coefficients), the decrease in the domestic content was so strong that it compensated entirely the positive effect of the technological change in the period. This effect can be associated with the increased international competition.

Analyzing now Graph 5, we can see that the change in trade pattern did not have a relevant impact in household consumption in any of the periods under study. It reveals that the new households' demand created by the income distribution did not leak towards foreign products. It rather was met in the domestic market. In other words, there was no major increase in the leakage of households' demand to imports in the period. The increase in the penetration of imports was relatively more important only in intermediate consumption[30].

## 3.3 Structural change and cumulative causation

This section will cover some aspects regarding structural change and it is divided in five sub-sections. In the first we analyze the impact of the changes in the relative prices structure on household consumption growth. In the following two sub-sections we will comment on the change in industrial structure and contribution to growth by industry for household consumption and output respectively. In the fourth subsection we will account for the impact of changes in the trade pattern on household consumption and output by industry. In the last sub-section we will present the results concerning our attempts to identify the occurrence of cumulative causation processes between the structures of consumption and production.

For better visualization and interpretation, the sectorial results (that are originally obtained in a disclosure of 42 industries), except when otherwise mentioned, are presented in an aggregated level of analysis containing 12 industries. The 42 industries were regrouped according to the classification proposed by the Manufacturing Industries and Competitiveness Research Group– GIC-UFRJ (Passoni, 2019).

[30] See Passoni (2016).

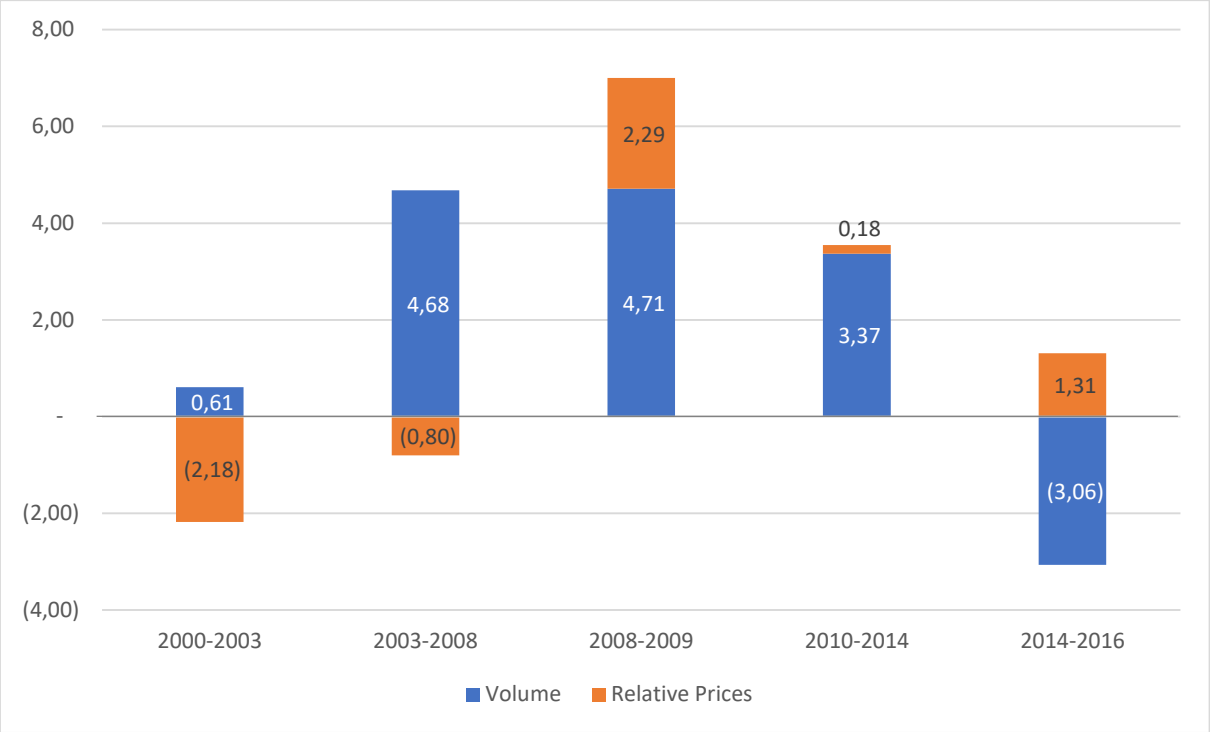
The main difference from this classification to the National Accounts regular 12 industries classification is that in GIC-UFRJ aggregation extractive and manufacturing industries are split into four industry groups: a) *Industrial commodities; b) Traditional manufacturing; c) Agricultural commodities*; and d) *Innovative manufacturing*.

*Industrial Commodities* (a) comprehends natural resource intensive activities related to mineral extractive industry, metallurgy, and basic chemistry; *Traditional manufacturing* (b) comprises production of low technological content goods, industries with few requirements of productive scale; production of wage goods, inputs, industrial parts and complements, and manufactured consumer goods; *Agricultural commodities* (c) includes industries intensive in natural resources and energy, and are generally associated with agribusiness and homogeneous products of high tonnage; and *Innovative manufacturing* (d) comprehends more sophisticated activities in terms of technology and organization of the production process. These industries are the main contributors to the technology diffusion process in the economy, including high-tech and durable consumer goods (automobiles, electronics) industries (Passoni, 2019).

### 3.3.1 Relative Prices Effects on Household Consumption

As mentioned in Chapter 2, we used the IO tables at 2010's constant prices to calculate the structural decompositions presented in this work. Therefore, before analyzing sectorial structural change, in the next section, it is important to verify if there are relevant changes in the relative prices structure. For example, an increase in the contribution of services for consumption growth could be the result of the services inflation being higher than the inflation of other industries in the period, and not a change in volume terms. To account for that and to guarantee that the analysis is accurate, we performed a decomposition of the aggregate household consumption into its volume and relative price components, as described in Section 2.2.3.3.

*Graph 6 - Relative Prices Effect on Household Consumption Yearly Average Growth - p.p.*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

The relative price structure had important influence on consumption results in the period 2000-2003, as shown in Graph 6. In this period, the magnitude of the change in relative prices contribution was larger than the change in volume. As they had opposite signs, the positive contribution of volume of consumption was overcompensated by the negative relative prices effect. Therefore, we can say that the negative consumption contribution observed in Graph 1 (and all results relative to household consumption) reflects, in fact, a major negative relative prices effect. As we can see in Table 1[31] below, which presents the results of this decomposition disaggregated in 11 industries, this effect occurred mainly in services. The period 2000-2003 was a period of strong devaluation of Real. This can explain in part the fact that the inflation of

[31] Aiming to facilitate visualization, the following graphs and tables concerning output sectorial analysis show the results in a breakdown of 12 industries, and those relative to sectorial household consumption present results for 11 industries, although all results were obtained in the 42 industries breakdown. In the graphs and tables concerning sectorial household consumption, we aggregated the industries "11 Private education, health care, and other personal services" and "12 Government Services (education, health care, defense, social security and public administration)" in one single industry. The government services represent a considerably lower share of household consumption than the other industries. That is because most of the government services are offered for free to the families by the government, so it is not registered as a households' expense in the National Accounts, but rather as a government's expense. The IO tables do not have information on effective household consumption (that considers all goods and services consumed by households, even if they do not pay for them). Also "07 Construction" is an industry with values close to zero in household consumption structure. That happens because construction is considered household investment in the National Accounts. We provide the correspondence between the aggregation levels in Appendix D and the complete results of the decompositions, in Appendix E.

services was lower compared to tradeable goods inflation, because exchange rate is an important relative price and affects more directly the tradeable goods prices.

*Graph 7 - Exchange rate of Real to US dollar (average of purchase and sale values) - monthly*


*Source: Brazilian Central Bank. Author's elaboration.*

After 2003, until the end of the decade, the Brazilian currency appreciated, with an exception in the last quarter of 2008, during the international crisis year, as can be seen in Graph 7. Medeiros (2015) points out that the appreciation of the exchange rate, which the author considers the most important change in relative prices in the 2000s, played an important role in the expansion of consumption. It allowed the minimum wage to increase relatively to the minimal consumer basket and to industrial prices. It neutralized the price pressures of both agriculture and imported raw materials and it allowed the containment of administered prices. The price containment of strategic wage goods reduced the cost of living of families, what together with the increase of the minimum wage and the expansion of credit opened space for the expansion of the consumption of non-essential industrial goods, allowing a large shift of the consumption pattern at the base of the pyramid. The massification of durable consumer goods, including electronics, and the expansion of both, the low-medium class segments of the automotive market and consumption of food away from home, are expressions of the change in lifestyle.

Although exchange rate affects more directly the imported goods prices, there is also an effect in domestic products prices, especially in an open economy, either through imported

input prices or through competition between imports and domestic production for final demand. As we can see in Table 1, the consumption of innovative manufacturing, that includes electronics, automotive products and other durable consumer goods, presented growth in volume, and a negative contribution of relative prices (meaning lower inflation relative to other sectors) between 2003 and 2014, except during the international crisis year.

According to Graph 6, in the 2003-2008 (accelerating growth) and 2010-2014 (decelerating growth) periods the contribution of relative prices changes was minor, not affecting the sign of the aggregated results. In this period, the results obtained for consumption were mainly due to volume changes. In the periods 2008-2009 (international financial crisis) and 2014-2016 (recession) the contribution of relative prices changes was a little larger relative to volume contributions, but also did not change the sign of overall results. In addition, the tendencies observed for household consumption in the whole period under analysis (2000-2016) does not change when we take the relative prices effect off. In other words, the results obtained in constant prices reflects the behavior of the consumption measured in volume terms.

*Table 1 - Volume and Relative Prices Contribution to Household Consumption Yearly Average Growth by Period - p.p.*

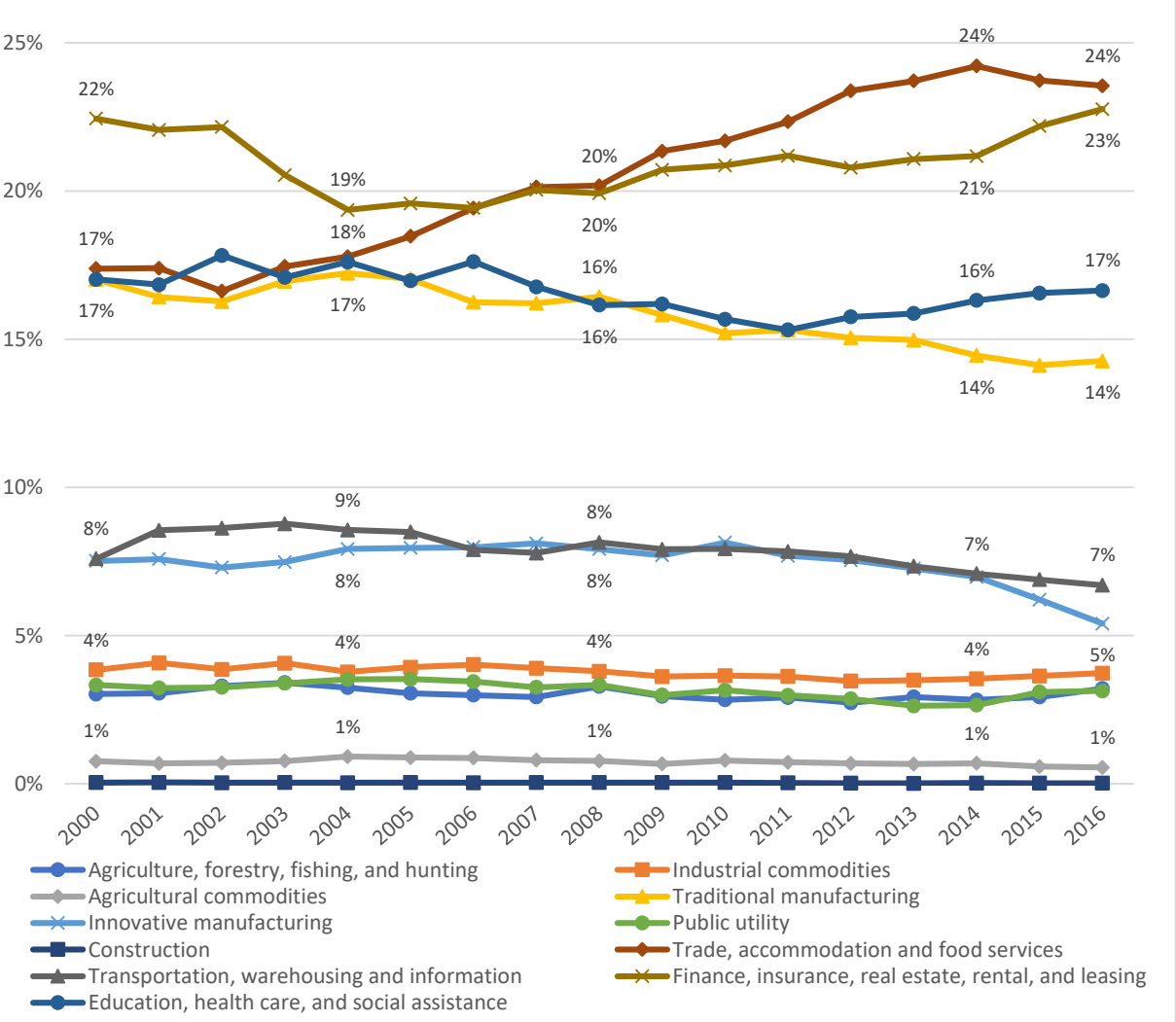
| Industries | 2000-2003 | | 2003-2008 | | 2008-2009 | | 2010-2014 | | 2014-2016 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Volume** | **Relative Prices** | **Volume** | **Relative Prices** | **Volume** | **Relative Prices** | **Volume** | **Relative Prices** | **Volume** | **Relative Prices** |
| Agriculture, forestry, fishing, and hunting | 0,07 | 0,01 | 0,11 | 0,00 | 0,13 | -0,25 | 0,13 | -0,03 | -0,03 | 0,16 |
| Industrial commodities | -0,06 | 0,07 | 0,14 | -0,04 | 0,10 | -0,03 | 0,25 | -0,15 | -0,06 | 0,09 |
| Agricultural commodities | -0,01 | 0,00 | 0,03 | 0,00 | -0,01 | -0,04 | 0,02 | -0,01 | -0,06 | -0,02 |
| Traditional manufacturing | -0,42 | 0,13 | 0,47 | 0,07 | 0,14 | 0,36 | 0,16 | 0,18 | -0,42 | 0,08 |
| Innovative manufacturing | -0,04 | -0,09 | 0,51 | -0,12 | 0,23 | 0,10 | 0,31 | -0,33 | -0,66 | -0,23 |
| Public utility | -0,03 | 0,00 | 0,14 | -0,02 | -0,02 | -0,12 | 0,10 | -0,13 | 0,02 | 0,16 |
| Construction | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,01 | 0,01 | -0,01 | 0,00 | 0,00 |
| Trade, accommodation and food services | -0,16 | -0,08 | 1,17 | 0,12 | 1,10 | 1,56 | 0,92 | 0,54 | -1,31 | 0,56 |
| Transportation, warehousing and information | 0,32 | -0,05 | 0,18 | 0,02 | 0,22 | 0,11 | 0,43 | -0,38 | -0,20 | -0,11 |
| Finance, insurance, real estate, rental, and leasing | 0,72 | -1,69 | 1,42 | -0,76 | 2,00 | 0,24 | 0,67 | 0,15 | -0,11 | 0,52 |
| Education, health care, and other personal services | 0,23 | -0,48 | 0,53 | -0,07 | 0,81 | 0,36 | 0,37 | 0,36 | -0,23 | 0,10 |
| **Total Consumption Variation** | **0,61** | **-2,18** | **4,68** | **-0,80** | **4,71** | **2,29** | **3,37** | **0,18** | **-3,06** | **1,31** |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

### 3.3.2 Household Consumption Structural Change

In this section, we will analyze the contribution to consumption growth by industries. This is another way to look at the results of the household consumption decomposition. But, before analyzing those results it is interesting to know how the consumption structure changed in the period under study.

*Graph 8 - Composition of Household Consumption of Domestic Origin - Industries Shares*



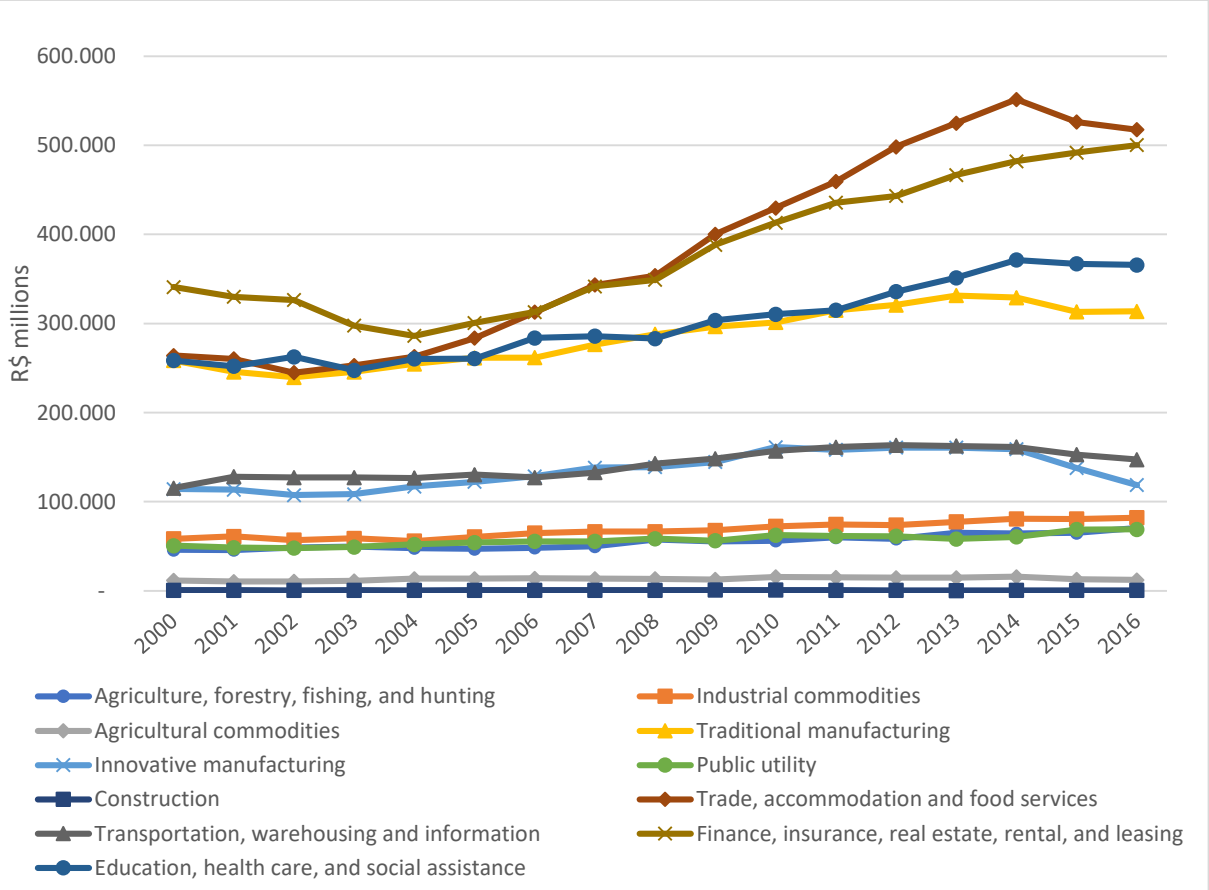

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Graph 8 displays the composition of the total household consumption (domestic origin, at basic 2010's constant prices) for the period 2000-2016. Each line shows the evolution of the share of a group of industries in household consumption of domestic origin. It is notable the increase of the share of *Trade, accommodations and food services*. This group of industries presented a clear tendency of increasing its share in household consumption from 2002 to 2014.

Since 2006, it became the largest category in household consumption, leaving *Finance, insurance, real state, rental and leasing*, that used to represent the largest part of household consumption, in the second place.

From Table 1 we can see that in the period 2003-2008 the change in relative prices represented an important negative contribution to *Finance, insurance, real state, rental and leasing* consumption growth (the reduction in relative prices was especially strong in the real state and rental sector). Also, in the period 2010-2014 *Trade, accommodations and food services* experimented a higher inflation in relation to other sectors. This helps to explain the tendencies observed in Graph 8 for these two industries.

*Graph 9 - Household Consumption of Domestic Origin Levels at Constant 2010's Prices by Industry*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Between 2004 and 2014, *Educational services, health care, and social assistance* and *Traditional manufacturing* presented a tendency of decreasing their participation in household consumption. As we can see in Graph 9, household consumption levels of the four mentioned

groups of industries increased from 2004 to 2014. Therefore, the negative tendency of the participation of *Educational services, health care, and social assistance* and *Traditional manufacturing* is due to the faster growth of other industries, mainly *Trade, accommodations and food services* and *Finance, insurance, real state, rental and leasing*.

From 2014 to 2016, the dynamic was different. The consumption of *Trade, accommodations and food services*, *Traditional manufacturing*, *Innovative manufacturing* and *Transportation, warehousing and information* actually reduced in volume terms in the period, as shows Table 1 (and Graph 9 indicates). In the period, *Educational services, health care, and social assistance* consumption kept relatively stable levels, and *Finance, insurance, real state, rental and leasing* kept its growth tendency. This way, these two industries increased their share in household consumption from 2014 to 2016, while the other mentioned industries had their shares reduced (see Graph 8).

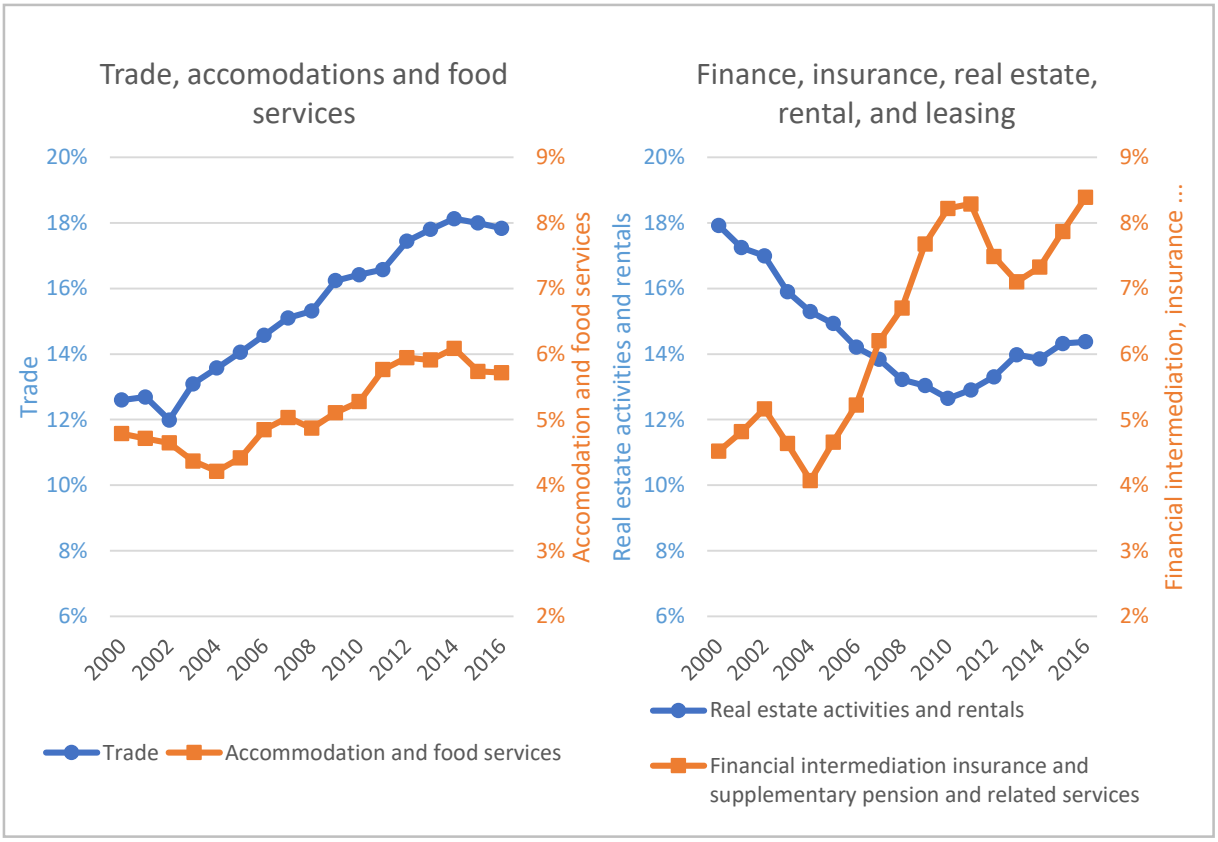
As we have noted, *Trade, accommodations and food services* and *Finance, insurance, real state, rental and leasing* are the sectors that represent the largest shares of household consumption, and also their participation in consumption presented the greater variations in percentage points in the period analyzed. For this reason, we will give further detail on these series. Graph 10 presents the share of household consumption in the most disaggregated level (42 industries) for these industries groups.

In the case of *Trade, accommodations and food services* both components presented similar behavior, both increased their share in household consumption from 2004 to 2014 and lost participation between 2014 and 2016. It is also notable that *Trade* has a bigger share in household consumption than *Accommodations and food services*, and the relation between their shares remains relatively stable in the period (one is approximately three times the other). The consumption in these two categories is positively related to the level of economic activity and, especially *Accommodations and food services*, to the increase in formal occupations.

On the other hand, the industries belonging to the *Finance, insurance, real state, rental and leasing* group presented very different trends. *Real estate activities and rentals* presented a negative trend from 2000 to 2010, it increased its share until 2013 and remained stable after that. *Financial intermediation insurance and supplementary pension and related services*, by its turn, presented a strong positive trend between 2004 and 2010, increasing its share in consumption in 4 percentage points in this period. From 2011 to 2013 the finance related

products decreased their participation, and after 2013 the series returns to an ascendant trajectory. Differently from the previous case, the components of *Finance, insurance, real state, rental and leasing* did not keep a stable relation between them. We can say that, in general terms, the financial services share increased its importance relatively to real state and rental services share.

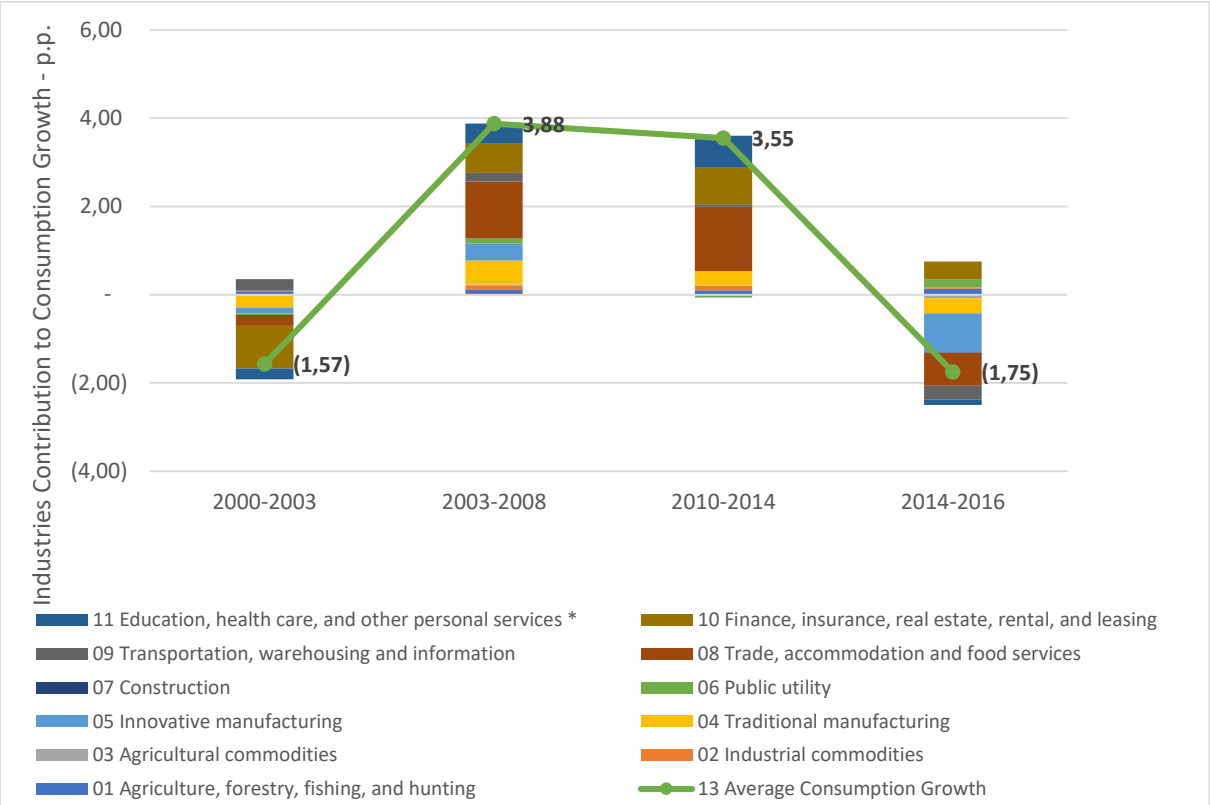
*Graph 10 - Disaggregation of selected industries share in household consumption – Domestic Origin – at 2010's Constant Prices.*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Graph 11 displays the sectorial composition of the consumption variation (the sectorial results for the household consumption decomposition). In the **low growth period**, consumption fell in almost all activities, except for *Agriculture, forestry, fishing and hunting* and *Transportation warehousing and information*. The major negative contribution to consumption is related to *Finance, insurance, real estate, rental, and leasing*. This negative contribution is mainly explained by the contraction of *Real estate activities and rentals* consumption in volume terms. Also, as shows Graph 10, this group of services lost participation in the consumption structure, while the financial services kept its share relatively stable from 2000 to 2003.

*Graph 11 - Industries Contribution to Consumption Yearly Average Growth by Period*



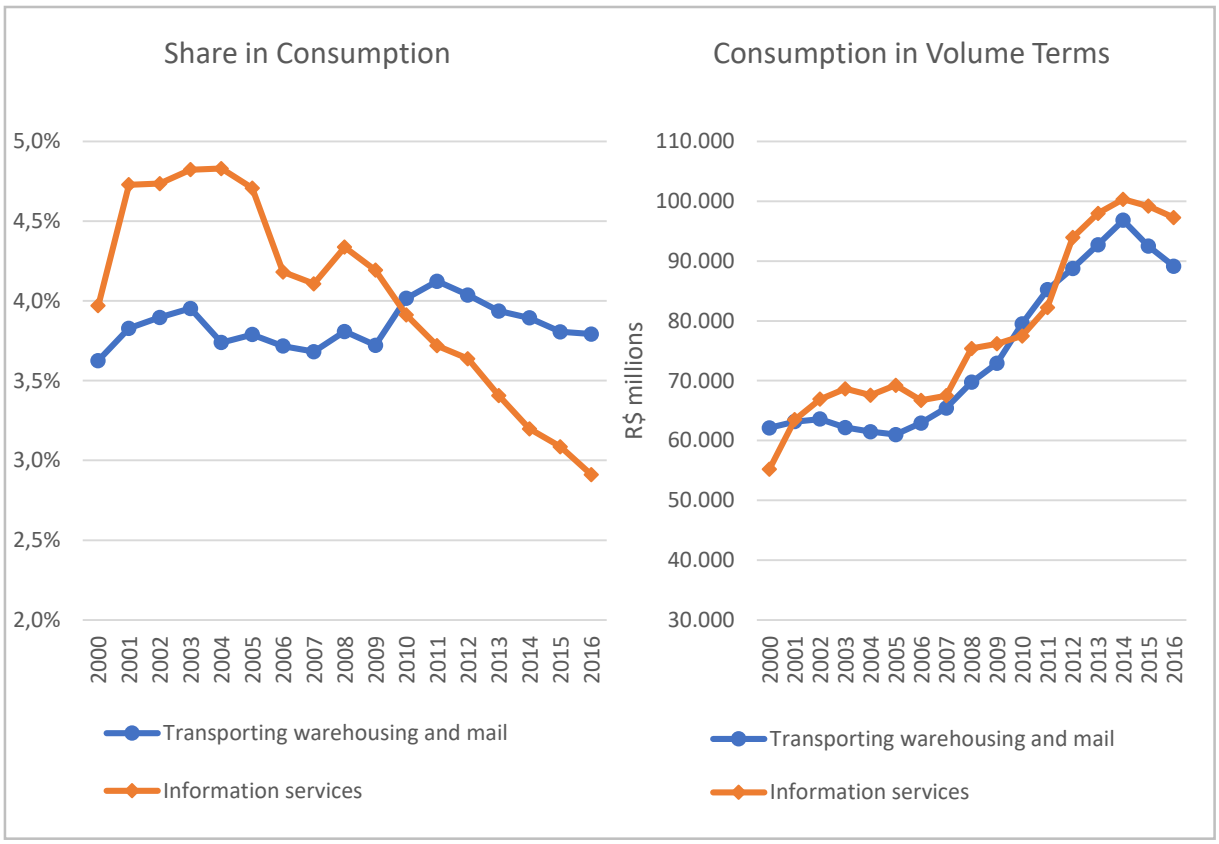

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

In the **next two subperiods (2003-2008 and 2010-2014)**, when Brazil saw higher rates of consumption growth, the major contributions came from *Trade, accommodations and food services*, *Financial services* and *Educational services, health care, and social assistance*. Especially in the accelerating growth period, *traditional* and *innovative manufacturing* and *Transportation, warehousing and information* also had important positive contributions to consumption growth, as shows Graph 11. This reflects the change in consumption patterns and the incorporation of previously excluded people to the consumer market. With regard to transportation, the increase in the minimum wage increased the purchasing power of the population in terms of urban transportation tariffs, and formalization increased the number of users of transportation vouchers. Thus, there was an increase in the number of passengers and, at the same time, reduced the share of income committed to urban transportation (Medeiros, 2015).

Graph 12 presents more disaggregated series for *Transportation, warehousing and information* share in household consumption and series of its consumption values in volume terms (series deflated by cell-specific deflators). It is notable both *Transporting, warehousing and mail* and *Information services* grew in volume terms from 2004 to 2014, and its

consumption fell after this year. We can also note that after 2010 the consumption of *Information services* lost participation in domestic consumption, and until 2014, it is due to a reduction in the sector relative prices, and not a reduction in volume (you can also check that in Table 1).

*Graph 12 – Transportation, Warehousing and Information Share in Household Consumption and Consumption Levels at 2010's Constant Relative Prices – Domestic Origin*

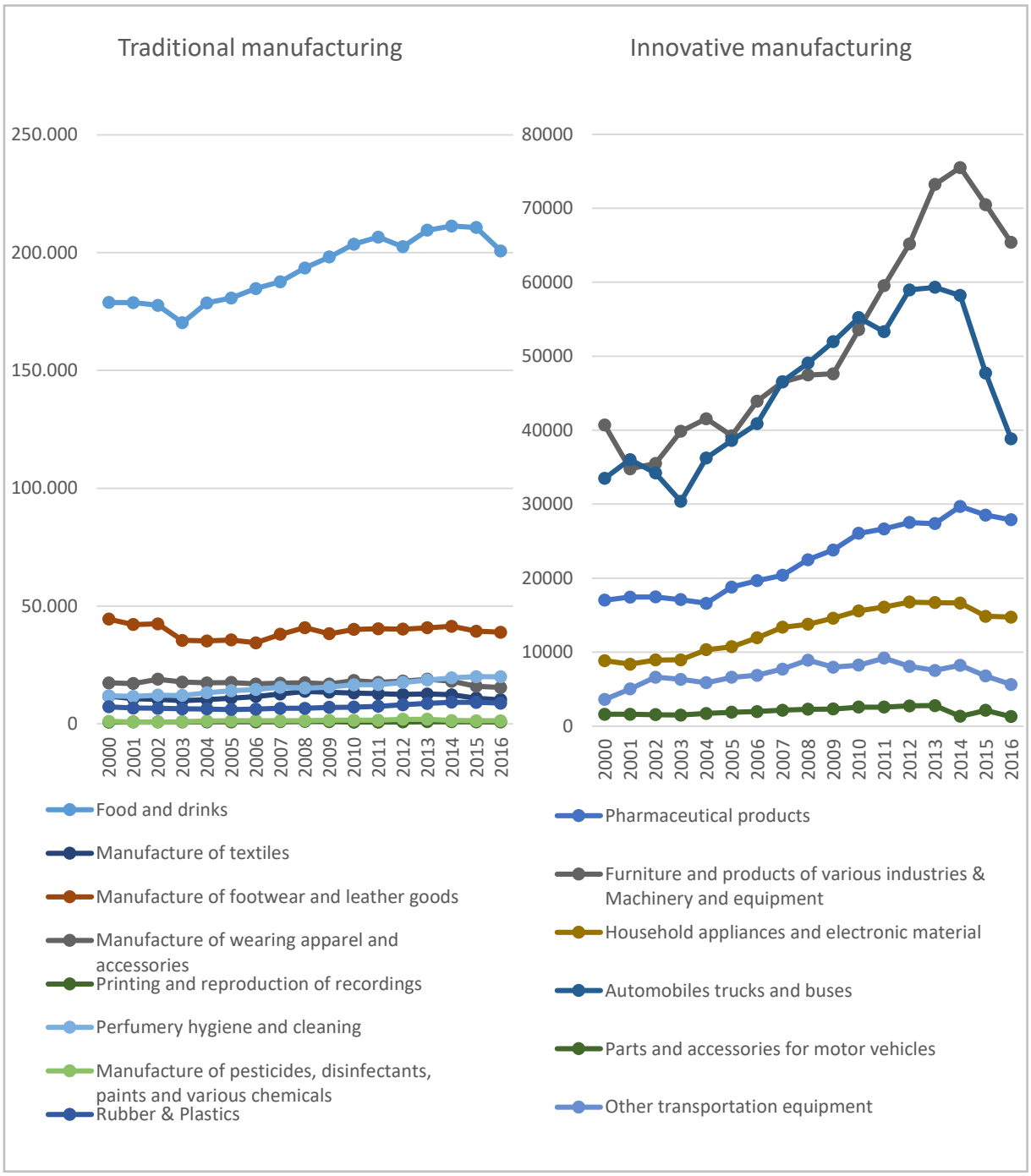



*Source: own calculation based on Passoni and Freitas (2018) IO database.*

The changes in consumer patterns also led to the mass consumption of household appliances, computers and internet use, a service that expanded mainly in the lower levels of income distribution and of health care services (medicines and health insurance) (Medeiros, 2015). Graph 13 illustrates the expansion of manufactured products consumption between 2003 and 2014 (and its vertiginous reduction after that year).

The intense process of formalization of labor and the increase in wages in the 2000's years contributed to the expansion of consumption not only through the expansion of income, but also because they were the basis for the large diffusion of consumer credit (Medeiros, 2015). We can see this expansion reflected in the positive contribution of the financial services in Graph 11.

*Graph 13 – Traditional and Innovative Manufacturing Consumption Levels at 2010's Constant Relative Prices (volume) – Domestic Origin - R$ millions*



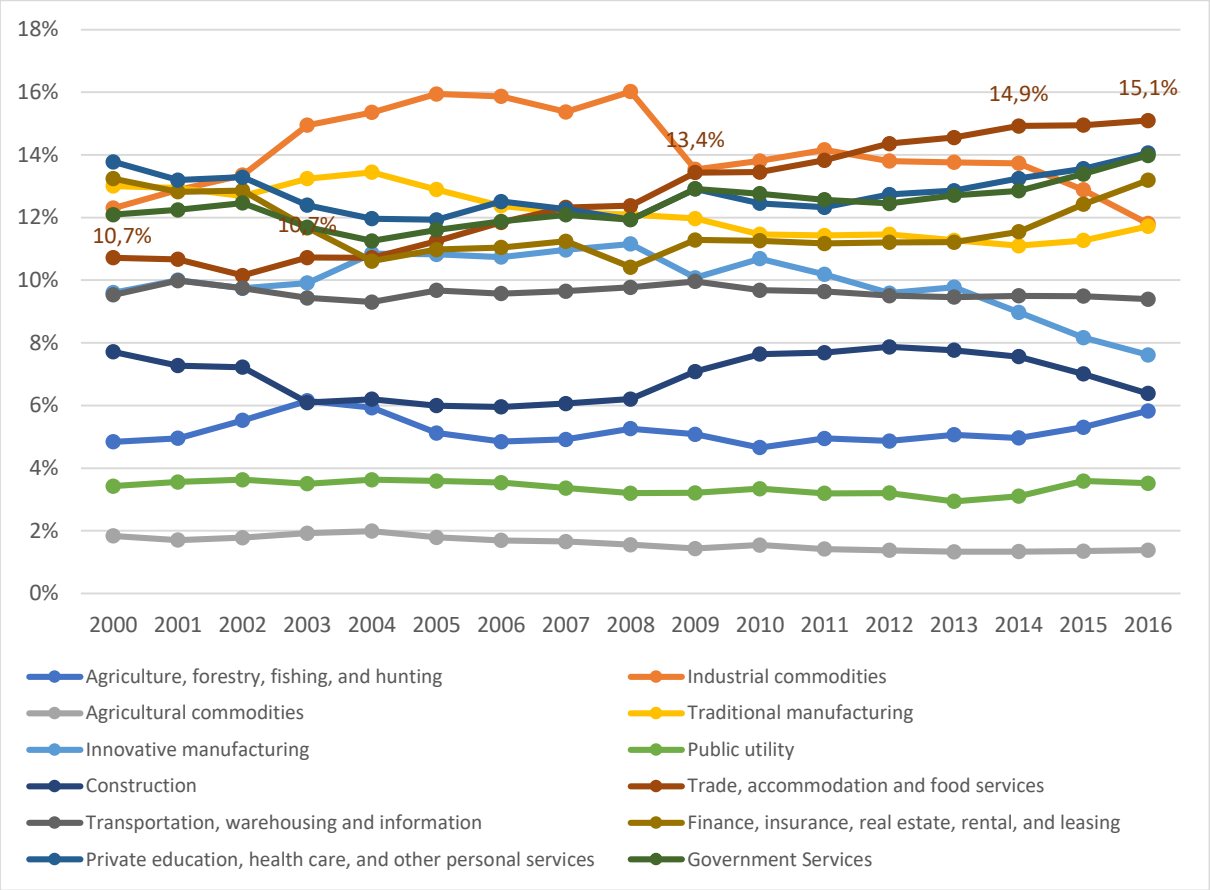

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

In the recession period consumption contracted. The main negative contributions came from *manufactured products, trade, accommodations and food services, and transportation warehousing and information services*. The negative contributions of these last two industries reflects directly the major increase in unemployment, which can be associated to a reduction of

demand for food away from home and transportation (in particular because formal occupations generally provide transportation vouchers).

### 3.3.3 Output Structural Change

*Graph 14 - Composition of Output of Domestic Production - Industries Shares*

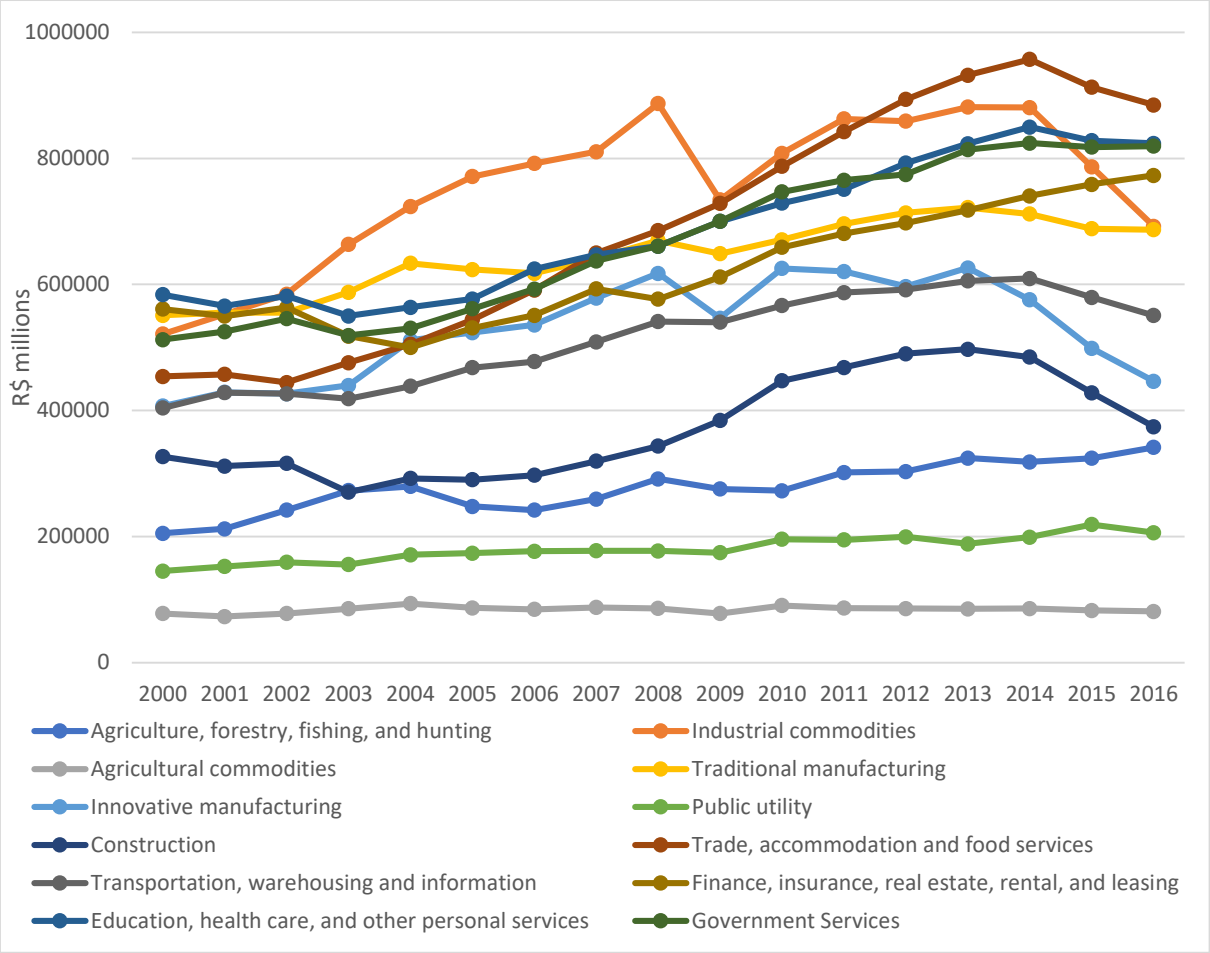



*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Graph 14 and Graph 15 show respectively the industries shares in output and industries output levels at constant prices of 2010. In Graph 14, one of the most evident features is the increase in the share of *Trade, accommodation and food services*. This increase was especially fast between 2004 and 2009. It is also notable the decrease in the share of *Traditional manufacturing*, that was also faster between 2004 and 2010. In both cases, the tendency persisted until 2014, with less intensity. *Innovative manufacturing* presented some increase in its share in the 2000's, and after 2010 changed its trajectory, losing importance in the productive structure. Another notable change in structure regards to *Industrial commodities* share. It

grewfast in the beginning of the 2000's becoming the largest industry in terms of output share. In 2009, its output share drops and keeps stable until 2014.

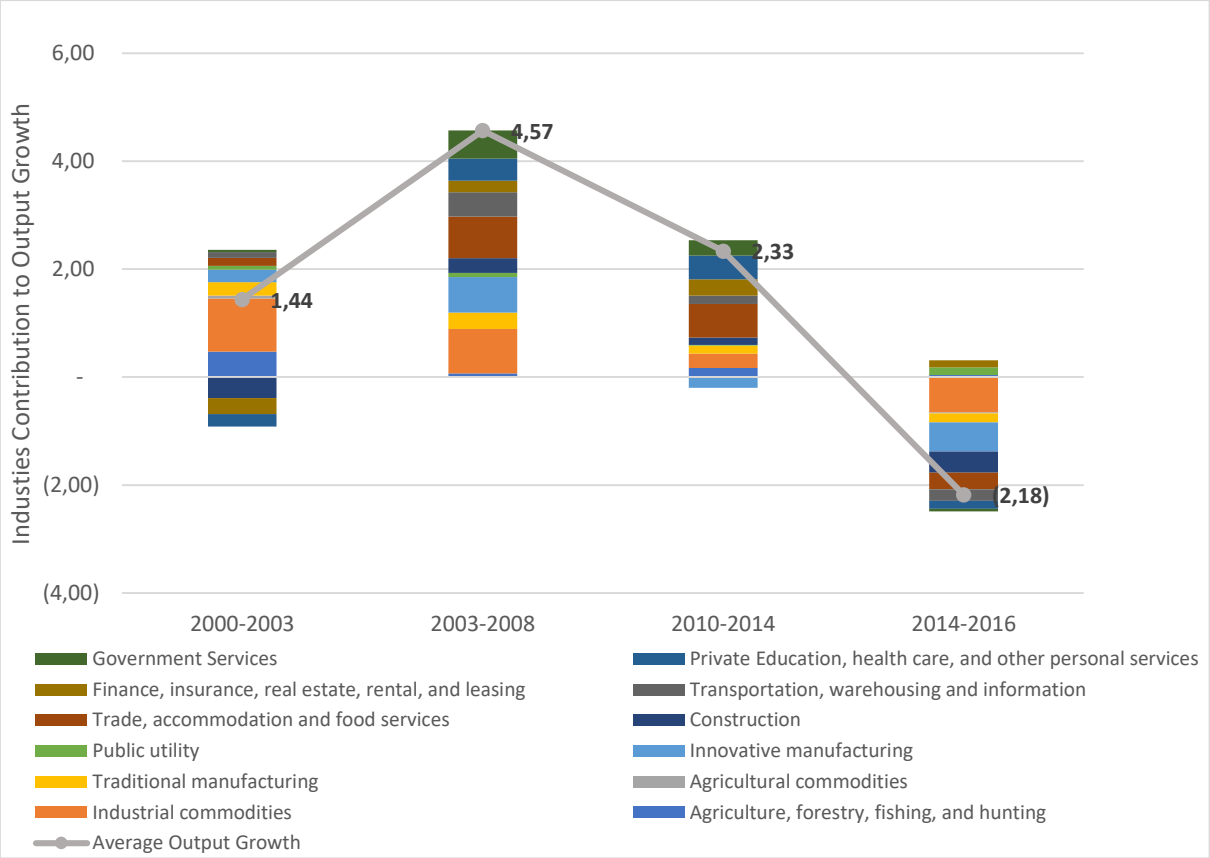
*Graph 15 - Output Levels at Constant 2010's Prices by Industry - Domestic Origin*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Analyzing Graph 15, we can see different patterns of growth. From 2000 to 2003 most industries output levels were relatively stable. From 2004 to 2008, most industries presented a fast growth. In 2009, we can see the effects of the international financial crisis that affected mainly *Industrial commodities* and *Innovative manufacturing*. While most other industries kept their output trajectories relatively unaltered until 2014, these two industries presented a recovery of their output levels in 2010, but until 2014 presented lower growth rates than the others (note the lower inclination of the curves). Finally, from 2014 to 2016 many industries present an inflection in their output trajectory. *Industrial commodities*, *Construction*, *Innovative manufacturing*, *transportation, warehousing and information*, and *Trade, accommodation and food services* presented the strongest slowdowns.

*Graph 16 - Industries Contribution to Yearly Average Output Growth by Period - p.p.*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

In Graph 16, we can see the contribution of each industry to output growth in the four main sub-periods studied. In the **low growth period**, the major contributions to growth came from *Industrial commodities*, *Agriculture*, *Traditional* and *Innovative manufacturing*. The *Industrial commodities* industry is essentially composed of natural resources, extractive mineral, metallurgy and basic chemistry industries, and its production is largely associated to exports. *Construction*, *finance, insurance, real estate, rental and leasing*, and *Private educational and health care services* had negative contribution to growth. In the period, services had, in general, minor or negative contributions to growth, reflecting the weak performance of the domestic market, characteristic of the "export led stagnation" of the period.

In the **growth acceleration period** all industries had positive contributions to growth (Graph 16). *Industrial commodities* remained as the major contribution, although it was smaller than in the previous period and lost participation in the total growth. Other industries more oriented to domestic markets increased notably their contribution to growth. This is the case of *Trade accommodation and food services*, *Innovative manufacturing*, *Transportation*,

*warehousing and information*, *Government services* and *Private educational and health care services*. The increase in the contribution to growth of these industries reflects the structural change in the productive structure that came along with the process of expansion and diversification of consumption in Brazil in the period.

The expansion and diversification of consumption in the period – associated to the increase of the income in the lower layers of the distribution – led to the growth of sectors whose production demanded a less qualified workforce. This is the case of many service industries and *Construction*, which grew significantly in the period. As these sectors employ many low qualification workers, the degree of formalization and the wages at the base of the pyramid have risen further, reinforcing the process (Carvalho, 2018).

In the **deceleration period (2010-2014)**, the sectorial composition of growth contrasts with the low growth one (2000-2003). In this period, the industries related to exports, as is the case of *Agriculture, forestry, fishing and hunting* and *Industrial commodities*, had relatively smaller contributions to growth, while others oriented to internal markets – mainly services – were responsible for the most important contributions. *Trade, accommodation and food services*, *educational and health services* and *financial services* are the most dynamic in the period. This reflects not only the deceleration in international markets but also some resilience of domestic market in sustaining some dynamism.

In the **recession period,** almost all industries had negative contributions to growth. *Industrial commodities, Innovative manufacturing* and *Construction* followed by *Trade, accommodation and food services, Transportation, warehousing and information* and *Public*[32] *and private educational and health services*. It is notable that *Government services* had negative contribution in this period, evidencing how deep was the fiscal consolidation and how inappropriate it was. As most other industries were also in contraction, this pro-cyclical policy contributed to deepen the recession. Graph 11 also suggests that *Government services* and *Construction* have strong positive correlation, indicating that government spending and government investment have strong capacity to boost economic growth.

[32] In the disclosure level of Graph 16 (and all other graphs concerning output information in this chapter), *Public health* and *Public education* are aggregated with *Public administration, defense and social security* under the industry '*Government services'*. For the most disaggregated results see Appendix E.

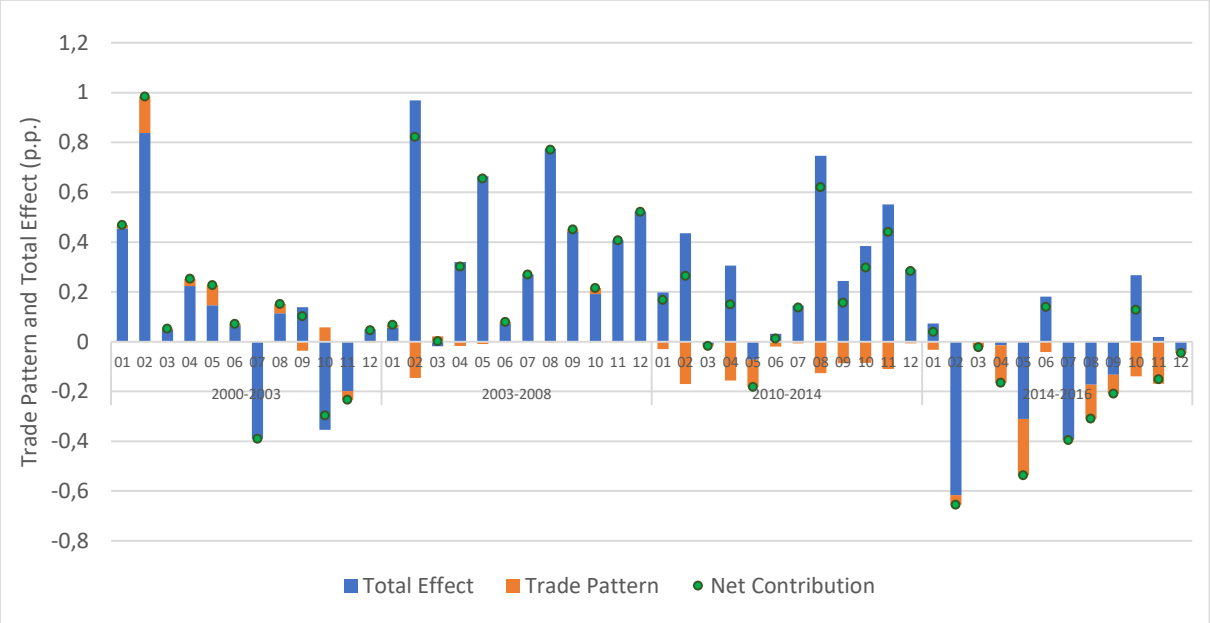
Rugitsky (2017) stresses that the dynamics observed in the 2000s characterizes a circular and cumulative causation process involving income distribution and productive structure. The decline in wage inequality, as well as the increase in the share of wages in income, led to changes in the composition of aggregate demand, due to the diffusion of consumption habits previously restricted to the richer groups to those in the lower part of the distribution of income. At least part of the compatibility of supply to this change in the composition of demand occurred through changes in the productive structure, while part of the new demands was met by imports (Medeiros, 2015). In order to evaluate this effect, in the next sub-section, we will explore the changes in the trade pattern in the period under study. This analysis will evaluate how the imported content has changed in output and in consumption in the context of the structural changes observed.

### 3.3.4 Trade Pattern Effect by Industry

Graph 17 and Graph 18[33] represent the results regarding equations (20) and (28) respectively, but this time, evidencing the sectorial contribution to output and household consumption growth. The sum of the trade pattern and the total effect bars for each industry and period[34] gives us the result presented in Graph 16 and Graph 11.

[33] Find the correspondence between industries codes, presented in Graph 17 and Graph 18, and their names in Table 6 in Appendix D.
[34] In Graph 17 this net result is represented by green dots.

*Graph 17 - Contribution to Output Yearly Average Growth by Industry and Period*

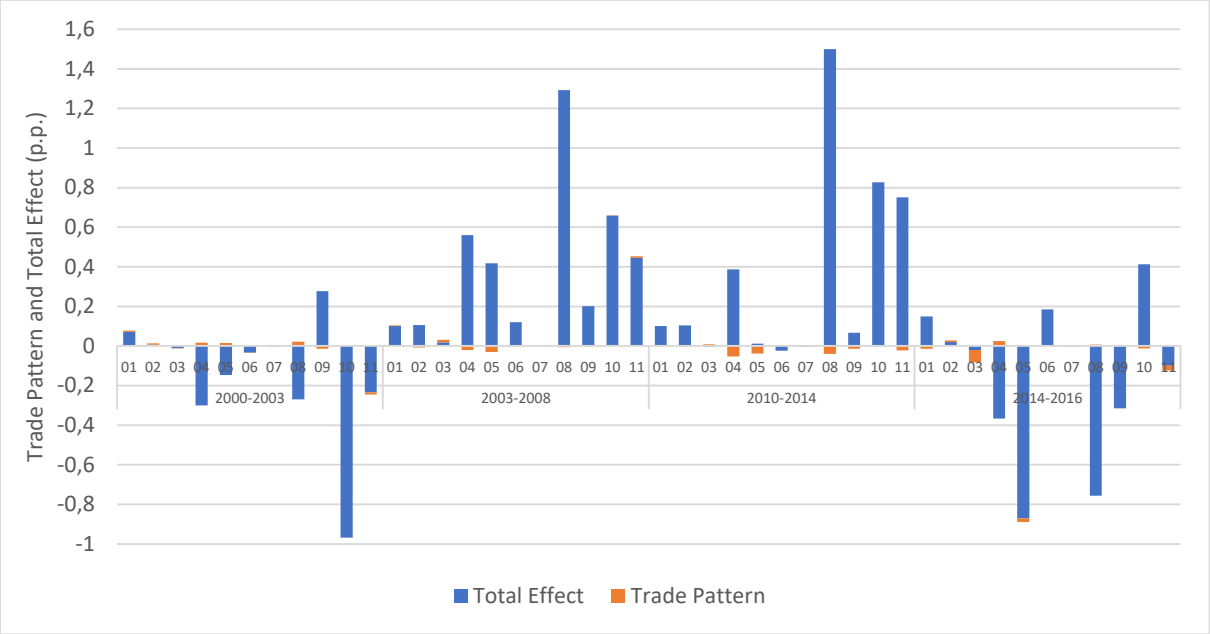



*Source: own calculation based on Passoni and Freitas (2018) IO database.*

From Graph 17 we can see that in the **low growth period (2000-2003)** the change in trade pattern was generally in the direction of an increase of national content especially in the manufacturing sectors. We have noted, when analyzing Graph 16, that in the **growth acceleration period (2003-2008)** the *Industrial commodities (industry number 02 in the graph)* contribution was smaller than in the previous period. We can also see this movement by looking at the green dots in Graph 17. The reduction in the contribution to output growth of the *Industrial commodities*, in the **growth acceleration period** in comparison with the previous period, is due to a change in the trade pattern: it represented a strong positive contribution in the first period (2000-2003) and a strong negative contribution in the following one (2003-2008), that partially compensated the increase in the total effect contribution of the industry. The other industries were not severely affected by the change in trade pattern in the period.

In the **deceleration (2010-2014)**, as well as in the **recession period (2014-2016)**, the change in trade pattern represented negative contributions to output growth in all industries, but especially in the manufacturing and services sectors. It shows that the penetration of imports affected almost all economic activities in a generalized way.

*Graph 18 - Contribution to Households' Consumption Yearly Average Growth by Industry and Period*



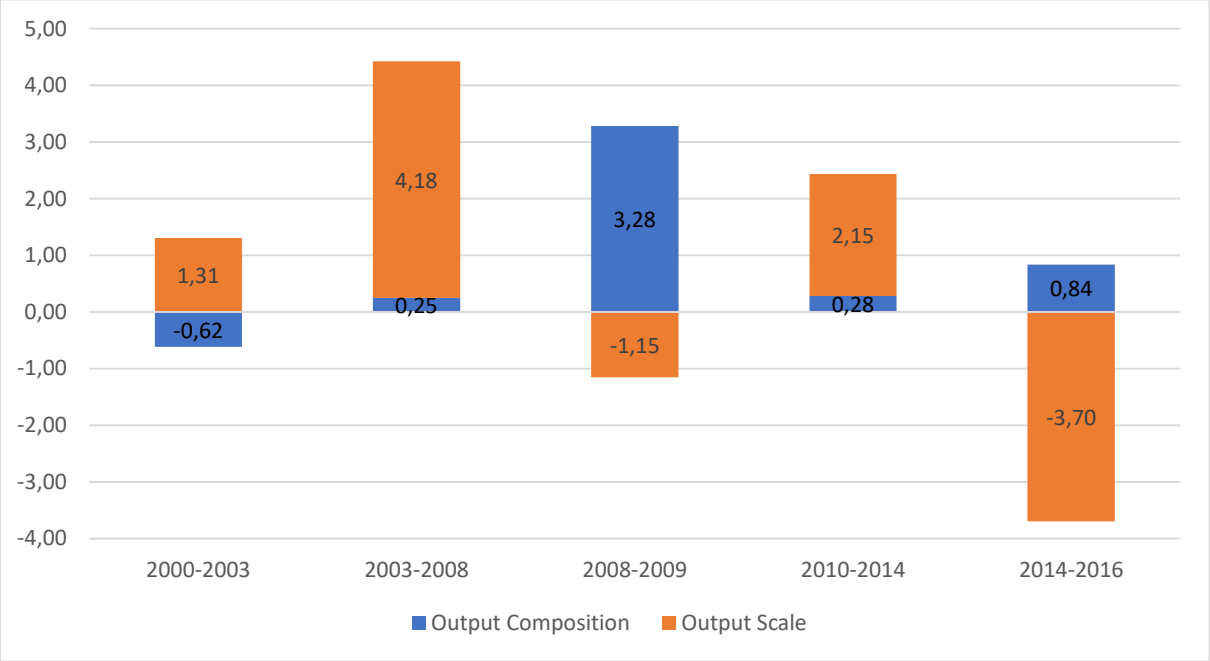

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

Graph 18 presents the results of the household consumption decomposition by industries and trade pattern. We can see that the contributions of trade pattern are small compared to the total contribution of each industry. This sectorial result corroborates the conclusions obtained from Graph 5 (household consumption SDA by component): the change in trade pattern did not have a relevant impact in household consumption in any of periods under study, indicating that there was no major increase in the leakage of households' demand to imports in the period. It shows that the new household's demand created with the improving of income distribution was mainly met by domestic production, and the proportion of imports in total household consumption did not change significantly.

### 3.3.5 Cumulative Causation

Graph 19 provides us a disclosure of the contribution of output to consumption growth (dark blue bars in Graph 3), making explicit the influence of the change in output's sectorial composition and of its scale (total aggregate output growth). With this information, we can investigate the occurrence of cumulative causation processes in each period.

*Graph 19 - Disaggregation of Output's contribution to Households' Consumption Growth in its scale and composition effects – Yearly Averages - p.p.*




*Source: own calculation based on Passoni and Freitas (2018) IO database.*

A positive composition effect indicates that the change in the sectorial output shares helped boost total household consumption. It suggests that sectors with higher wage share increased their share in output, favoring an increase in consumption. That process will reinforce the cumulative causation process if the increase in consumption is concentrated in the same industries that initiated it.

The composition effect was positive in all periods, except for the first one. This result suggests that in the low growth period the cumulative causation process as described above did not happen. On the contrary, the positive contribution of output to consumption growth came from its scale effect, which overcompensated the negative contribution of the change in sectorial composition. In the periods with positive consumption growth rates (from 2003 to 2014), except in the international crisis year, we had positive contributions for both effects. It is compatible with the hypothesis of a cumulative causation process from productive structure to consumption. However, the scale effect was more important than the composition one. In the recession period (2014-2016) we also had a positive contribution of output composition, as it was a period of negative growth rates, this suggests that the retraction was less intense in industries with higher wage share. This effect partially compensated the strong negative effect produced by output scale in the period.

In short, the results did not deny the hypothesis of occurrence of a cumulative process between productive and consumption structures in the periods 2003-2008 and 2010-2014. In addition, the structural change avoided an even greater contraction of consumption in the recession period (2014-2016). It is important to note that, although the magnitude of the composition effect contribution might look small compared to the scale effect, its importance should not be diminished. Because of the nature of the variables it is expected that the composition effect contribution had a smaller magnitude. Nevertheless, this variable is important to capture the changes in the sectorial composition of the economy.

It is still necessary to analyze the jobs and income structures and make a sectorial analysis to reinforce the evidences of the occurrence of cumulative causation processes. In the effort to capture the influence of output growth over jobs and income structures, we classified the 42 industries according to the wage share in sectorial output. We classified industries according to three categories of wage share: *Low*, *Medium and High*[35].

The industries classified as *High wage share* are listed in Table 2 below. After doing this classification, we could calculate the fourth term of equation (24) that measures the change in output contribution to consumption growth regarding each of the three categories separately.

*Table 2 - Industries Classified as High Wage Share*

| |
|---|
| Manufacture of footwear and leather goods |
| Manufacture of wearing apparel and accessories |
| Manufacture of wood products |
| Printing and reproduction of recordings |
| Trade |
| Transporting warehousing and mail |
| Accommodation and food services |
| Financial intermediation insurance and supplementary pension and related services |
| Business and family services and maintenance services |
| Public administration, defense and social security |
| Public education |
| Private education |
| Public health |
| Private health |

*Source: own elaboration based on Passoni and Freitas (2018) IO database.*

[35] See Appendix C for details on the calculations and how each industry was classified.

The results of this exercise are presented in Table 3. They provide us a better insight to understand if the link from production to consumption structures goes by the wage share channel and if the structural changes favor a cumulative causation process or not. More specifically, we have a measure of the contribution of the output growth of high wage share sectors to the growth of consumption of high wage share sectors. If this measure is more relevant than the contribution from other combinations of wage share ranges we can say that a cumulative causation process, as suggested by Rugitsky (2017), might have occurred in that period.

*Table 3 - Output contribution to household consumption (yearly average) by wage share and its proportion by period*

| Period | | **Output** (R$millions) | | | | **Output** (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Consumption** | **Low** | **Medium** | **High** | **Total** | **Low** | **Medium** | **High** | **Total** |
| 2000-2003 | Low | 2.130 | 1.725 | 255 | 4.111 | 21% | 17% | 2% | 40% |
| | Medium | 742 | 597 | 85 | 1.425 | 7% | 6% | 1% | 14% |
| | High | 2.506 | 2.026 | 297 | 4.829 | 24% | 20% | 3% | 47% |
| 2003-2008 | Low | 2.130 | 4.374 | 19.412 | 25.916 | 3% | 6% | 28% | 37% |
| | Medium | 803 | 1.649 | 7.316 | 9.768 | 1% | 2% | 11% | 14% |
| | High | 2.789 | 5.753 | 25.447 | 33.989 | 4% | 8% | 37% | 49% |
| 2008-2009 | Low | -5.137 | -3.274 | 21.447 | 13.035 | -14% | -9% | 57% | 35% |
| | Medium | -1.952 | -1.245 | 8.159 | 4.961 | -5% | -3% | 22% | 13% |
| | High | -7.773 | -4.936 | 32.264 | 19.555 | -21% | -13% | 86% | 52% |
| 2010-2014 | Low | 657 | 722 | 15.638 | 17.016 | 1% | 1% | 31% | 33% |
| | Medium | 233 | 258 | 5.541 | 6.032 | 0% | 1% | 11% | 12% |
| | High | 1.084 | 1.189 | 25.820 | 28.093 | 2% | 2% | 50% | 55% |
| 2014-2016 | Low | -3.864 | -10.587 | -7.472 | -21.923 | 6% | 16% | 12% | 34% |
| | Medium | -1.216 | -3.355 | -2.365 | -6.936 | 2% | 5% | 4% | 11% |
| | High | -6.330 | -17.401 | -12.273 | -36.004 | 10% | 27% | 19% | 56% |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

In Table 3, with the main contribution of each period highlighted, we can see that in the period 2000-2003, most part of the output contribution to consumption growth came from Low and Medium wage share industries (sum of the columns), not favoring cumulative causation. It corroborates what we observed in Graph 19: in the period of low growth, Brazil did not experience a cumulative causation process between consumption and output structures.

On the other hand, in the three periods comprehended between 2003 and 2014, the output contribution to consumption growth came mainly from *High wage share* industries, and it was more concentrated in the consumption of products of *High wage share* sectors as well.

This result evidences stimulus in both ways of cumulative causation. The first one, and clearer, is from output to consumption: as output contribution to consumption growth was highly concentrated in *High wage share* output to *High wage share* consumption. Secondly, from Consumption to output: as the increase in the consumption in *High wage share* sectors represent an increase in the demand for these industries, reinforcing the cycle.

In the crisis years (2014-2016) we do not see the same configuration. The main contribution to consumption growth came from *Medium wage share* sectors and it affected mainly *High wage share* consumption, what does not fit in the cumulative causation scheme. However, the contribution from *High wage share* output to *High wage share* consumption is not irrelevant. Therefore, we could say that, in this period, cumulative causation may have happened, but with less strength.

# Final Remarks

This dissertation analyzed the period from 2000 to 2016, trying to identify the sources of structural change observed for household consumption and output growth in Brazil. We tried to capture the effects of expansion and diversification of consumption to the structural change in the Brazilian Economy. Our main hypothesis was that there was a cumulative causation process, since the changes in consumption patterns led to the growth of sectors whose production demanded a less qualified workforce. This is the case of many service industries and construction, which grew significantly in the period. As we have shown, in fact, as these sectors employ many less qualified workers, the degree of formalization and the wages at the base of the pyramid have risen further, reinforcing the process.

In order to address these issues, we proposed a structural decomposition analysis to capture how changes in patterns of growth and consumption co-determine the productive structure, identifying cumulative causation processes between consumption and productive structures. Since this period was marked by different growth patterns, we divided the period into four sub periods: a **low growth period (from 2000 to 2003)**, with weak performance of output and contraction of consumption; a **growth acceleration period (between 2004 and 2008)**, characterized by acceleration of consumption and output growth; a third sub period **(from 2010 to 2014)**, marked by the **deceleration of the growth** of both aggregates; and a **recession period (years of 2015 and 2016)** when both aggregates had a strong slowdown, with contraction of household consumption.

The empirical exercise performed in this work suggested that a change in income and consumption structure led a change in production structure, which by its turn reinforced the change in income by transforming the job structure. The increase in the share of services in value added and the decline of the manufacturing industry seem, at least in part, to be related to this movement. Analyzing the consumption decomposition, we found that, in the periods of economic expansion **(2003-2008 and 2010-2014)**, structural change in output and consumption reinforced each other, what is compatible with the hypothesis of a cumulative causation process. This process was not perceived in the **low growth period (2000-2003)**. In **the recession period**

**(2014-2016)** the cumulative causation configuration was not so clear, it might have happened, but with less strength. It this period the sectorial change (composition effect) in the output's contribution to consumption growth was positive, indicating the presence of a cumulative causation process, however, the contraction of output was so strong that it over compensated its effect.

From this decomposition, we could also see that the components that more importantly explained consumption variation were the gross output growth and average wages growth. That indicates a strong endogenous behavior of consumption. We could also see that the change in trade pattern did not have relevant impact in household consumption in any of the periods under study, showing that the new households' demand created by the income distribution did not leak towards foreign products. Rather, the domestic market was able to meet the augmented demand. The penetration of imports occurred more significantly only on intermediate consumption, in special, in the 2010s.

The output decomposition performed in this work allowed us to observe that investment and government spending had high relevance in the determination of the economic fluctuations. On the other hand, exports did not have such a decisive role. Despite representing a positive shock, in the **low growth period (2000-2003)**, exports contribution was not enough to promote a better performance of output. In the two following periods of economic expansion **(2004-2008 and 2010-2014)**, exports contribution kept a similar level, and still the growth pattern of output changed notably, following the behavior of investment and government spending. This is also valid in the **recession period (2014-2016)**, when despite the positive contribution of exports, the output growth (or "degrowth") was driven by the contranction in investment and government spending. In this sense, it becomes clear that the fiscal policy is an important instrument to revert the recession situation and to promote a new resumption of economic growth. That is a matter that awakens concern as far as since 2017 it is prohibited, in Brazil, any real growth of federal public expenditure, for at least 10 years.

In further developments of this research we look forward to endogenize private investment in the decomposition model and to improve the evaluation of cumulative causation from consumption to output. In special, we intend to tackle the income distribution and jobs market links in a more direct approach.

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# Appendix

## A. Vector v: Nondurable Consumption Share Vector Methodology

IBGE's Classification by Broad Economic Categories for statistical purposes (CGCE – IBGE) has correspondence with the Classification by Broad Economic Categories in Terms of the Standard International Trade Classification - BEC[36] (Rev. 4 - 2003), of the Statistics Division of the United Nations – UN, and with the Basic Classes of goods of the System of National Accounts (BC-SNA). The objective of the CGCE - IBGE is the synthetic representation of the major economic categories, both in Industrial Statistics and in National Accounts. This classification has a hierarchical structure that, although originally oriented by the BEC, has its codes established from groupings of the categories contained in the List of Industrial Products (PRODLIST-*Indústria*), which describes industrial products manufactured in Brazil (IBGE, 2013).

The Basic Classes of goods of the System of National Accounts (BC-SNA) provides three possible classifications for goods: *1 - Capital goods (BK); 2 - Intermediate goods (BI)* and *3 - Consumer goods (BC)*. CGCE - IBGE classification provides a breakdown of the *Consumer goods* category into: *Durable consumer goods (BCD)* – which includes goods with an expected service life of more than one year and with relatively high values such as refrigerators and washing machines together with other goods with service life of three years

[36] The following broad economic categories (BEC) were not associated with the basic classes of the System of National Accounts: 321 - Fuels (motor spirit), 51 - Passenger cars and 7 - Not specified goods. The first two – 321 and 51 – because they are widely used for both industry and domestic consumption; and the last one – 7- Not specified goods – because it includes a wide range of goods such as military equipment, postal packages, special transactions and unclassified goods which, by type, may result in a mixture of goods classes of the National Accounts System. Although the BEC does not directly associate these three categories with the basic classes of the National Accounts system, it indicates that users may make their own associations of these product categories with the basic commodity classes of the National Accounts System. (UN, 2003, p.7).

or more. And *Non-durable consumer goods (BCND)* – which covers goods with expected service life of one year or less (UN, 2003, p.9).

In the construction of the vector $v$, of proportions of induced consumption per industry, we considered the PRODLIST present in the PIA 2010 as a reference. The elements of this PRODLIST were classified according to the Basic Classes of the National Accounts System and according to the CGCE-IBGE (CONCLA-IBGE, 2013).

The PRODLIST's elements classified as *Capital Goods (BK)* or *Intermediate Goods (BI)* in both classifications (BC-SNA and CGCE-IBGE) were excluded from the analysis, since we considered that they were not household consumption goods, and therefore, shouldn't be accounted in the assessment of the weight of non-durable goods in final consumption. The other elements of the PRODLIST were classified as *Durable good* or *Non-durable good* according to the CGCE-IBGE classification, as can be seen in Table 4 below.

In some cases, CGCE-IBGE provides a double classification for an element of the PRODLIST. This occurs when a good can be used by households in the form of final consumption and also can be used in the productive activity. This is the case for hair dryers and other hair care devices and automotive gasoline. In these cases, the classification for consumer goods was considered. Non-specified goods (BNEA), by their nature, were considered durable goods, and the not-classified elements of the PRODLIST, that do not have a CGCE-IBGE classification for being services, were considered non-durable. Public services were treated as exogenous, likewise durables, since their consumption does not depend on wages (is not endogenous).

*Table 4 - Combinations of classifications found in the database*

| BC-SNA | CGCE-IBGE | Model's Category |
|---|---|---|
| Capital Good | BCD/BK | Durable good |
| Capital Good | BK | Not a household consumption item |
| Intermediate Good | BCD/BI | Durable good |
| Intermediate Good | BCND | Non durable good |
| Intermediate Good | BCND/BI | Non durable good |
| Intermediate Good | BI | Not a household consumption item |
| Consumption Good | BCD | Durable good |
| Consumption Good | BCD/BK | Durable good |
| Consumption Good | BCND | Non durable good |
| Consumption Good | BCND/BI | Non durable good |

| | | |
|---|---|---|
| Consumption Good | BCND/BK | Non durable good |
| Consumption Good | BK | Durable good |
| Not Specified | BNEA | Durable good |
| Capital/Intermediate Good | BK/BI | Not a household consumption item |
| Capital/Consumption Good | BCD/BK | Durable good |
| Intermediate/Consumption Good | BCND | Non durable good |
| | BCND | Non durable good |
| | Sem Classificação | Without Classification |

*Source: CONCLA-IBGE, 2013; PIA, 2010. Author's elaboration.*

Finally, using correspondence tables made available by IBGE, we made a correspondence among the elements of the PRODLIST, the industries comprising the SNA and the industries at the level of aggregation used in the decompositions of this work (42 industries). Each element of vector $v$ is given by the proportion of the sales value of the elements of the PRODLIST classified as *Non-durable goods* in the total sales value of the elements of the PRODLIST of that industry (excluding elements of the PRODLIST which are not household consumer goods). The industries that do not comprise any PIA's 2010 PRODLIST element had their corresponding value in vector $v$ defined as 1 (100% non-durable consumption), since they are service activities.

## B. The Intuition Behind the Structural Decomposition Analysis Methodology

Starting from equation (8), the variation of x can be written as follows:

$$\Delta x = x_1 - x_0 = \bar{L}_1 f_1^{aut} - \bar{L}_0 f_0^{aut} \quad (34)$$

The objective is to decompose the total change of the gross output into changes in its components, in this case: changes in $\bar{L}$ ($\Delta\bar{L} = \bar{L}_1 - \bar{L}_0$) and in $f^{aut}$($\Delta f^{aut} = f_1^{aut} - f_0^{aut}$). Following this structure, there are four ways of rearranging equation (34). One of them is to use exclusively year 1 values for $\bar{L}$ and exclusively year zero values for $f^*$ – replacing $\bar{L}_0$ by ($\bar{L}_1 - \Delta\bar{L}$) and $f_1^{aut}$ by ($f_0^{aut} - \Delta f^{aut}$) – we get:

$$\Delta x = \Delta\bar{L} f_0^{aut} + \bar{L}_1 \Delta f^{aut} \quad (35)$$

In equation (35) the output change ($\Delta x$) is decomposed into two parts, one attributable to technological change (the first term on the right side) and the other one attributable to the change in autonomous final demand (second term on the right side). In this equation, $\Delta\bar{L}$ is weighted by the autonomous final demand of year zero and $\Delta f^{aut}$ is weighted by the technology of year 1 (Miller and Blair, 2009).

To understand the intuition behind each term in equation (35), note that $\Delta\bar{L} f_0^{aut} = \bar{L}_1 f_0^{aut} - \bar{L}_0 f_0^{aut}$. The first term in the right side of this equation ($\bar{L}_1 f_0^{aut}$) quantifies the output needed to meet the autonomous final demand of year zero with the technology of year 1 and the second term ($\bar{L}_0 f_0^{aut}$), the output needed to meet year zero's autonomous final demand with year zero's technology. Therefore, the difference between them is a reasonable measure of the effect of the technology change in the period. Analogous interpretation can be made for the term $\bar{L}_1 \Delta f^{aut}$ of equation (35), which expresses the impact of the change on the autonomous components of demand (Miller and Blair, 2009).

We could alternatively have rearranged expression (34) using only values of year zero for $\bar{L}$ and only values of year 1 for $f^{aut}$ obtaining the following expression: $\Delta x = \Delta\bar{L} f_1^{aut} + \bar{L}_0 \Delta f^{aut}$ (36). Two other results could still be obtained using $\bar{L}$ e $f^{aut}$, both from year 1, or both from year zero, but these formulations produce an interaction term between $\bar{L}$ and $f^{aut}$ that has no economic interpretation, making these formulations less useful for analysis purposes (Miller and Blair, 2009).

Although formulations (35) and (36) are mathematically correct, they produce distinct values for the effect of the technology and final demand changes. Since the paper Dietzenbacher and Los (1998), it has been agreed in the literature that using an average between the two results is often an acceptable approach. This formulation is expressed in equation (11) in section 1.2.2, that we also reproduce here:

$$\Delta x = \underbrace{\frac{1}{2}\Delta\bar{L}(f_1^* + f_0^*)}_{\substack{Change\ in\ Technology \\ and\ Induced\ Consumption}} + \underbrace{\frac{1}{2}(\bar{L}_0 + \bar{L}_1)\Delta f^*}_{\substack{Change\ in\ Autonomous \\ Final\ Demand}} \tag{11}$$

It is worth mentioning that the decomposition of the growth of any variable, resulting from the product of the other two, can be done as shown above. This result will be used in other stages of the decompositions performed in this work.

## C. Output Contribution to Consumption Growth by Wage Share

*Wage share classification*

In order to incorporate a *proxy* of the jobs and income structures to our analysis and to allow us to identify cumulative causation processes, we classified the 42 industries according to wage share in sectorial output. First we calculated the rate between mass of wages and output for each industry and year. Then we calculated the average rate of all years for each industry. Finally, we classified the industries according to the average rate: industries in the first tercile were classified as *Low wage share*, industries in the second tercile as *Medium wage share* and the ones in the third as *High wage share*. We present the result of this classification in Table 5 below.

*Calculating output contribution to consumption growth by wage share*

The first three columns of Table 3 correspond to a disaggregation of change in output's contribution to household consumption growth by wage share. That corresponds to the result obtained from the fourth term of the right side of equation (24):

$$\underbrace{\frac{1}{2}\left(d_{cw0}w'_{l0}\,\widehat{l_{x0}} + d_{cw1}w'_{l1}\,\widehat{l_{x1}}\right)\Delta x}_{Change\ in\ Output}$$

However, to obtain the values of the first column of Table 3, we considered only the values in $\Delta x$ referent to *Low wage share* industries, and the other values in the vector were replaced for zeros. In the second column, only the values in $\Delta x$ referent to *Medium wage share* industries were taken into account, and finally, to calculate the third column, we considered only the values of $\Delta x$ of *High wage share* industries. By doing that we could measure the contribution from each group of industries separately.

*Table 5 - Wage intensity classification*

| Industries | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | Mean | Tercile | Wage Intensity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agriculture, forestry, livestock and fisheries | 0,14 | 0,13 | 0,12 | 0,11 | 0,11 | 0,13 | 0,13 | 0,12 | 0,11 | 0,11 | 0,12 | 0,10 | 0,10 | 0,10 | 0,09 | 0,09 | 0,09 | 0,11 | 2nd | Medium |
| Extraction of oil and gas, including support activities | 0,05 | 0,05 | 0,05 | 0,06 | 0,06 | 0,05 | 0,05 | 0,06 | 0,06 | 0,08 | 0,07 | 0,07 | 0,06 | 0,07 | 0,08 | 0,09 | 0,13 | 0,07 | 1st | Low |
| Extraction of iron ore, including processing and agglomeration | 0,08 | 0,08 | 0,07 | 0,06 | 0,05 | 0,04 | 0,05 | 0,05 | 0,05 | 0,08 | 0,05 | 0,05 | 0,06 | 0,06 | 0,07 | 0,07 | 0,07 | 0,06 | 1st | Low |
| Other mining and quarrying | 0,15 | 0,14 | 0,14 | 0,12 | 0,10 | 0,13 | 0,12 | 0,12 | 0,12 | 0,13 | 0,14 | 0,15 | 0,15 | 0,15 | 0,16 | 0,14 | 0,15 | 0,14 | 2nd | Medium |
| Food and drinks | 0,07 | 0,06 | 0,06 | 0,06 | 0,06 | 0,06 | 0,07 | 0,07 | 0,07 | 0,08 | 0,08 | 0,09 | 0,09 | 0,09 | 0,09 | 0,09 | 0,09 | 0,07 | 1st | Low |
| Manufacture of tobacco products | 0,07 | 0,08 | 0,06 | 0,06 | 0,06 | 0,06 | 0,06 | 0,07 | 0,07 | 0,08 | 0,06 | 0,07 | 0,07 | 0,07 | 0,08 | 0,07 | 0,08 | 0,07 | 1st | Low |
| Manufacture of textiles | 0,12 | 0,13 | 0,12 | 0,12 | 0,11 | 0,13 | 0,13 | 0,14 | 0,14 | 0,15 | 0,16 | 0,16 | 0,16 | 0,17 | 0,17 | 0,18 | 0,17 | 0,15 | 2nd | Medium |
| Manufacture of footwear and leather goods | 0,15 | 0,16 | 0,17 | 0,18 | 0,18 | 0,19 | 0,19 | 0,19 | 0,20 | 0,22 | 0,20 | 0,20 | 0,21 | 0,23 | 0,23 | 0,23 | 0,23 | 0,20 | 3rd | High |
| Manufacture of wearing apparel and accessories | 0,16 | 0,16 | 0,15 | 0,16 | 0,16 | 0,18 | 0,19 | 0,19 | 0,19 | 0,22 | 0,21 | 0,21 | 0,21 | 0,21 | 0,19 | 0,20 | 0,20 | 0,19 | 3rd | High |
| Manufacture of wood products | 0,18 | 0,17 | 0,16 | 0,15 | 0,14 | 0,16 | 0,16 | 0,17 | 0,18 | 0,20 | 0,18 | 0,19 | 0,18 | 0,19 | 0,18 | 0,18 | 0,19 | 0,17 | 3rd | High |
| Manufacture of pulp, paper and paper products | 0,10 | 0,10 | 0,10 | 0,09 | 0,09 | 0,10 | 0,11 | 0,11 | 0,11 | 0,12 | 0,11 | 0,11 | 0,12 | 0,11 | 0,12 | 0,11 | 0,11 | 0,11 | 2nd | Medium |
| Printing and reproduction of recordings | 0,18 | 0,17 | 0,16 | 0,16 | 0,16 | 0,15 | 0,15 | 0,16 | 0,17 | 0,18 | 0,19 | 0,19 | 0,20 | 0,20 | 0,20 | 0,24 | 0,22 | 0,18 | 3rd | High |
| Oil refining and coking plants | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,02 | 0,01 | 1st | Low |
| Manufacture of biofuels | 0,06 | 0,05 | 0,04 | 0,05 | 0,06 | 0,07 | 0,06 | 0,07 | 0,08 | 0,09 | 0,08 | 0,09 | 0,09 | 0,10 | 0,12 | 0,11 | 0,11 | 0,08 | 1st | Low |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | 0,05 | 0,05 | 0,04 | 0,04 | 0,04 | 0,04 | 0,04 | 0,04 | 0,04 | 0,05 | 0,06 | 0,06 | 0,05 | 0,05 | 0,06 | 0,06 | 0,06 | 0,05 | 1st | Low |
| Pharmaceutical products | 0,13 | 0,12 | 0,12 | 0,12 | 0,11 | 0,12 | 0,11 | 0,12 | 0,11 | 0,11 | 0,12 | 0,13 | 0,13 | 0,13 | 0,14 | 0,15 | 0,15 | 0,12 | 2nd | Medium |
| Perfumery hygiene and cleaning | 0,11 | 0,08 | 0,09 | 0,10 | 0,11 | 0,09 | 0,09 | 0,10 | 0,10 | 0,10 | 0,11 | 0,12 | 0,11 | 0,10 | 0,10 | 0,11 | 0,10 | 0,10 | 1st | Low |
| Manufacture of pesticides, disinfectants, paints and various chemicals | 0,09 | 0,08 | 0,07 | 0,08 | 0,07 | 0,08 | 0,08 | 0,08 | 0,08 | 0,09 | 0,09 | 0,10 | 0,10 | 0,10 | 0,10 | 0,10 | 0,09 | 0,09 | 1st | Low |
| Rubber & Plastics | 0,13 | 0,12 | 0,12 | 0,11 | 0,11 | 0,12 | 0,12 | 0,13 | 0,13 | 0,14 | 0,14 | 0,15 | 0,15 | 0,15 | 0,16 | 0,16 | 0,15 | 0,14 | 2nd | Medium |
| Cement and other non-metallic mineral products | 0,15 | 0,14 | 0,14 | 0,13 | 0,13 | 0,14 | 0,14 | 0,15 | 0,14 | 0,14 | 0,15 | 0,15 | 0,16 | 0,16 | 0,17 | 0,18 | 0,19 | 0,15 | 2nd | Medium |
| Manufacture of steel and its derivatives | 0,08 | 0,09 | 0,07 | 0,06 | 0,06 | 0,05 | 0,06 | 0,06 | 0,06 | 0,08 | 0,07 | 0,08 | 0,09 | 0,09 | 0,09 | 0,09 | 0,10 | 0,08 | 1st | Low |
| Metallurgy of nonferrous metals | 0,08 | 0,08 | 0,07 | 0,07 | 0,06 | 0,08 | 0,07 | 0,08 | 0,08 | 0,10 | 0,09 | 0,10 | 0,10 | 0,10 | 0,09 | 0,08 | 0,09 | 0,08 | 1st | Low |
| Metal products - exclusive machinery and equipment | 0,17 | 0,15 | 0,15 | 0,14 | 0,14 | 0,14 | 0,15 | 0,15 | 0,15 | 0,17 | 0,17 | 0,18 | 0,18 | 0,19 | 0,19 | 0,20 | 0,20 | 0,17 | 2nd | Medium |
| Furniture and products of various industries & Machinery and equipment | 0,12 | 0,11 | 0,12 | 0,11 | 0,11 | 0,12 | 0,12 | 0,12 | 0,12 | 0,15 | 0,13 | 0,14 | 0,15 | 0,15 | 0,15 | 0,16 | 0,16 | 0,13 | 2nd | Medium |
| Household appliances and electronic material | 0,16 | 0,14 | 0,13 | 0,13 | 0,12 | 0,12 | 0,12 | 0,12 | 0,13 | 0,14 | 0,14 | 0,14 | 0,14 | 0,15 | 0,15 | 0,16 | 0,15 | 0,14 | 2nd | Medium |
| Automobiles trucks and buses | 0,11 | 0,10 | 0,10 | 0,08 | 0,07 | 0,07 | 0,07 | 0,08 | 0,07 | 0,08 | 0,07 | 0,08 | 0,08 | 0,08 | 0,09 | 0,11 | 0,12 | 0,09 | 1st | Low |
| Parts and accessories for motor vehicles | 0,15 | 0,14 | 0,14 | 0,13 | 0,12 | 0,13 | 0,14 | 0,14 | 0,14 | 0,15 | 0,15 | 0,16 | 0,18 | 0,18 | 0,19 | 0,21 | 0,20 | 0,16 | 2nd | Medium |
| Other transportation equipment | 0,10 | 0,08 | 0,09 | 0,11 | 0,11 | 0,12 | 0,13 | 0,13 | 0,12 | 0,13 | 0,14 | 0,14 | 0,15 | 0,17 | 0,16 | 0,16 | 0,17 | 0,13 | 2nd | Medium |
| Electricity generation and distribution gas water sewage and urban cleaning | 0,10 | 0,09 | 0,08 | 0,07 | 0,07 | 0,07 | 0,08 | 0,08 | 0,08 | 0,09 | 0,08 | 0,08 | 0,08 | 0,09 | 0,09 | 0,08 | 0,08 | 0,08 | 1st | Low |
| Construction | 0,10 | 0,10 | 0,10 | 0,11 | 0,11 | 0,11 | 0,11 | 0,12 | 0,13 | 0,15 | 0,15 | 0,16 | 0,16 | 0,17 | 0,17 | 0,16 | 0,16 | 0,13 | 2nd | Medium |
| Trade | 0,24 | 0,24 | 0,26 | 0,23 | 0,22 | 0,22 | 0,23 | 0,23 | 0,22 | 0,22 | 0,23 | 0,24 | 0,24 | 0,24 | 0,24 | 0,25 | 0,26 | 0,24 | 3rd | High |
| Transporting warehousing and mail | 0,19 | 0,17 | 0,17 | 0,16 | 0,17 | 0,17 | 0,17 | 0,17 | 0,18 | 0,18 | 0,18 | 0,19 | 0,20 | 0,20 | 0,20 | 0,21 | 0,21 | 0,18 | 3rd | High |
| Accommodation and food services | 0,15 | 0,17 | 0,17 | 0,18 | 0,17 | 0,17 | 0,16 | 0,16 | 0,17 | 0,17 | 0,18 | 0,17 | 0,18 | 0,18 | 0,18 | 0,19 | 0,20 | 0,17 | 3rd | High |
| Information services | 0,14 | 0,14 | 0,12 | 0,13 | 0,13 | 0,13 | 0,14 | 0,14 | 0,14 | 0,15 | 0,15 | 0,16 | 0,16 | 0,16 | 0,17 | 0,18 | 0,19 | 0,15 | 2nd | Medium |
| Financial intermediation insurance and supplementary pension and related services | 0,28 | 0,26 | 0,23 | 0,22 | 0,24 | 0,22 | 0,22 | 0,21 | 0,22 | 0,21 | 0,19 | 0,19 | 0,20 | 0,20 | 0,19 | 0,19 | 0,19 | 0,21 | 3rd | High |
| Real estate activities and rentals | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 0,01 | 1st | Low |
| Business and family services and maintenance services | 0,25 | 0,27 | 0,26 | 0,27 | 0,28 | 0,27 | 0,28 | 0,29 | 0,29 | 0,30 | 0,30 | 0,31 | 0,30 | 0,31 | 0,31 | 0,32 | 0,32 | 0,29 | 3rd | High |
| Public administration, defense and social security | 0,43 | 0,43 | 0,43 | 0,43 | 0,43 | 0,44 | 0,44 | 0,44 | 0,44 | 0,45 | 0,45 | 0,44 | 0,44 | 0,45 | 0,43 | 0,44 | 0,43 | 0,44 | 3rd | High |
| Public education | 0,68 | 0,69 | 0,67 | 0,66 | 0,65 | 0,67 | 0,70 | 0,66 | 0,68 | 0,67 | 0,65 | 0,66 | 0,66 | 0,65 | 0,67 | 0,66 | 0,67 | 0,67 | 3rd | High |
| Private education | 0,46 | 0,46 | 0,43 | 0,43 | 0,44 | 0,44 | 0,47 | 0,45 | 0,47 | 0,48 | 0,48 | 0,49 | 0,50 | 0,49 | 0,52 | 0,51 | 0,51 | 0,47 | 3rd | High |
| Public health | 0,49 | 0,51 | 0,50 | 0,49 | 0,48 | 0,50 | 0,52 | 0,53 | 0,54 | 0,53 | 0,51 | 0,51 | 0,52 | 0,51 | 0,51 | 0,52 | 0,52 | 0,51 | 3rd | High |
| Private health | 0,18 | 0,18 | 0,19 | 0,20 | 0,20 | 0,21 | 0,23 | 0,23 | 0,24 | 0,24 | 0,26 | 0,28 | 0,28 | 0,26 | 0,25 | 0,26 | 0,25 | 0,23 | 3rd | High |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

# D. Correspondence Tables

*Table 6 - GIC 12 Industries Codes*

| Code | Industry |
|---|---|
| 01 | Agriculture, forestry, fishing, and hunting |
| 02 | Industrial commodities |
| 04 | Traditional manufacturing |
| 03 | Agricultural commodities |
| 05 | Innovative manufacturing |
| 06 | Public utility |
| 07 | Construction |
| 08 | Trade, accommodation and food services |
| 09 | Transportation, warehousing and information |
| 10 | Finance, insurance, real estate, rental, and leasing |
| 11 | Education, health care, and other personal services |
| 12 | Government Services: education, health care, defense, social security and public administration |

*Source: own elaboration based on Passoni and Freitas (2018) IO database.*

*Table 7 - GIC 42 to GIC 12 Industries Correspondence*

| 42 Industries GIC Classification | GIC12 | 12 Industries GIC Classification |
|---|---|---|
| Agriculture, forestry, livestock and fisheries | GIC_A 01 | Agriculture, forestry, fishing, and hunting |
| Extraction of oil and gas, including support activities | GIC_A 02 | Industrial commodities |
| Extraction of iron ore, including processing and agglomeration | GIC_A 02 | Industrial commodities |
| Other mining and quarrying | GIC_A 02 | Industrial commodities |
| Food and drinks | GIC_A 04 | Traditional manufacturing |
| Manufacture of tobacco products | GIC_A 03 | Agricultural commodities |
| Manufacture of textiles | GIC_A 04 | Traditional manufacturing |
| Manufacture of footwear and leather goods | GIC_A 04 | Traditional manufacturing |
| Manufacture of wearing apparel and accessories | GIC_A 04 | Traditional manufacturing |
| Manufacture of wood products | GIC_A 03 | Agricultural commodities |
| Manufacture of pulp, paper and paper products | GIC_A 03 | Agricultural commodities |
| Printing and reproduction of recordings | GIC_A 04 | Traditional manufacturing |
| Oil refining and coking plants | GIC_A 02 | Industrial commodities |
| Manufacture of biofuels | GIC_A 02 | Industrial commodities |

| 42 Industries GIC Classification | GIC12 | 12 Industries GIC Classification |
|---|---|---|
| Manufacture of other organic and inorganic chemicals, resins and elastomers | GIC_A 02 | Industrial commodities |
| Pharmaceutical products | GIC_A 05 | Innovative manufacturing |
| Perfumery hygiene and cleaning | GIC_A 04 | Traditional manufacturing |
| Manufacture of pesticides, disinfectants, paints and various chemicals | GIC_A 04 | Traditional manufacturing |
| Rubber & Plastics | GIC_A 04 | Traditional manufacturing |
| Cement and other non-metallic mineral products | GIC_A 02 | Industrial commodities |
| Manufacture of steel and its derivatives | GIC_A 02 | Industrial commodities |
| Metallurgy of nonferrous metals | GIC_A 02 | Industrial commodities |
| Metal products - exclusive machinery and equipment | GIC_A 02 | Industrial commodities |
| Furniture and products of various industries & Machinery and equipment | GIC_A 05 | Innovative manufacturing |
| Household appliances and electronic material | GIC_A 05 | Innovative manufacturing |
| Automobiles trucks and buses | GIC_A 05 | Innovative manufacturing |
| Parts and accessories for motor vehicles | GIC_A 05 | Innovative manufacturing |
| Other transportation equipment | GIC_A 05 | Innovative manufacturing |
| Electricity generation and distribution gas water sewage and urban cleaning | GIC_A 06 | Public utility |
| Construction | GIC_A 07 | Construction |
| Trade | GIC_A 08 | Trade, accommodation and food services |
| Transporting warehousing and mail | GIC_A 09 | Transportation, warehousing and information |
| Accommodation and food services | GIC_A 08 | Trade, accommodation and food services |
| Information services | GIC_A 09 | Transportation, warehousing and information |
| Financial intermediation insurance and supplementary pension and related services | GIC_A 10 | Finance, insurance, real estate, rental, and leasing |
| Real estate activities and rentals | GIC_A 10 | Finance, insurance, real estate, rental, and leasing |
| Business and family services and maintenance services | GIC_A 11 | Education, health care, and other personal services |
| Public administration, defense and social security | GIC_A 12 | Government Services: education, health care, defense, social security and public administration |
| Public education | GIC_A 12 | Government Services: education, health care, defense, social security and public administration |
| Private education | GIC_A 11 | Education, health care, and other personal services |
| Public health | GIC_A 12 | Government Services: education, health care, defense, social security and public administration |
| Private health | GIC_A 11 | Education, health care, and other personal services |

*Source: own elaboration based on Passoni and Freitas (2018) IO database.*

# E. Complete Tables of Results

*Table 8 - Contribution to Average Output Growth by Component Disclosing Trade Pattern – 12 Industries - p.p.*

| Industry | Average Output Growth | Technology | Endogenous Household Consumption | Autonomous Household Consumption | Investment | Government Spending | Exports |
|---|---|---|---|---|---|---|---|
| **Period 2000-2003** | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,47** | 0,13 | -0,04 | -0,00 | 0,10 | 0,01 | 0,28 |
| Industrial commodities | **0,98** | 0,60 | -0,12 | -0,01 | -0,12 | 0,01 | 0,62 |
| Agricultural commodities | **0,05** | 0,01 | -0,02 | -0,00 | -0,03 | 0,00 | 0,10 |
| Traditional manufacturing | **0,25** | 0,17 | -0,30 | -0,01 | -0,18 | 0,01 | 0,55 |
| Innovative manufacturing | **0,23** | 0,14 | -0,07 | -0,02 | -0,08 | 0,00 | 0,25 |
| Public utility | **0,07** | 0,07 | -0,06 | -0,00 | -0,03 | 0,00 | 0,09 |
| Construction | **-0,39** | 0,01 | -0,01 | -0,00 | -0,41 | 0,00 | 0,01 |
| Trade, accommodation and food services | **0,15** | 0,19 | -0,22 | -0,01 | -0,08 | 0,01 | 0,27 |
| Transportation, warehousing and information | **0,10** | -0,06 | -0,03 | -0,01 | -0,08 | 0,01 | 0,27 |
| Finance, insurance, real estate, rental, and leasing | **-0,30** | 0,02 | -0,50 | -0,01 | -0,10 | 0,02 | 0,27 |
| Private educational services, health care, and other personal services | **-0,23** | -0,14 | -0,19 | -0,03 | -0,10 | -0,03 | 0,26 |
| Government Services: education, health care, defense, social security and public administration | **0,05** | -0,01 | -0,01 | -0,00 | -0,01 | 0,06 | 0,02 |
| **2000-2003 Total** | **1,44** | 1,13 | -1,57 | -0,11 | -1,13 | 0,12 | 3,00 |
| **Period 2003-2008** | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,07** | -0,08 | -0,05 | 0,01 | 0,07 | 0,08 | 0,04 |
| Industrial commodities | **0,82** | 0,11 | -0,10 | 0,04 | 0,36 | 0,15 | 0,26 |
| Agricultural commodities | **0,00** | -0,02 | -0,01 | 0,00 | 0,03 | 0,02 | -0,02 |
| Traditional manufacturing | **0,30** | -0,15 | -0,12 | 0,03 | 0,32 | 0,21 | 0,01 |
| Innovative manufacturing | **0,65** | -0,07 | -0,03 | 0,12 | 0,53 | 0,07 | 0,04 |
| Public utility | **0,08** | -0,06 | -0,03 | 0,01 | 0,07 | 0,07 | 0,02 |
| Construction | **0,27** | 0,02 | -0,00 | 0,00 | 0,23 | 0,01 | 0,00 |
| Trade, accommodation and food services | **0,77** | 0,06 | 0,07 | 0,04 | 0,34 | 0,21 | 0,05 |
| Transportation, warehousing and information | **0,45** | 0,02 | -0,10 | 0,03 | 0,26 | 0,16 | 0,07 |
| Finance, insurance, real estate, rental, and leasing | **0,22** | -0,21 | -0,12 | 0,03 | 0,22 | 0,24 | 0,05 |
| Private educational services, health care, and other personal services | **0,41** | -0,06 | -0,12 | 0,07 | 0,25 | 0,19 | 0,07 |
| Government Services: education, health care, defense, social security and public administration | **0,52** | 0,00 | -0,01 | 0,00 | 0,02 | 0,50 | 0,01 |
| **2003-2008 Total** | **4,57** | -0,44 | -0,61 | 0,40 | 2,71 | 1,91 | 0,60 |
| **Period 2008-2009** | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **-0,26** | -0,02 | 0,07 | 0,01 | -0,31 | 0,10 | -0,11 |
| Industrial commodities | **-2,47** | -0,76 | 0,21 | 0,04 | -0,84 | 0,19 | -1,31 |
| Agricultural commodities | **-0,13** | -0,03 | 0,01 | 0,00 | -0,05 | 0,02 | -0,09 |
| Traditional manufacturing | **-0,34** | 0,02 | 0,36 | 0,03 | -0,49 | 0,27 | -0,54 |
| Innovative manufacturing | **-1,15** | 0,13 | 0,12 | 0,08 | -0,79 | 0,07 | -0,76 |
| Public utility | **-0,05** | 0,02 | 0,02 | 0,01 | -0,09 | 0,08 | -0,08 |
| Construction | **0,65** | 0,01 | 0,02 | 0,00 | 0,63 | 0,02 | -0,02 |
| Trade, accommodation and food services | **0,70** | 0,19 | 0,96 | 0,04 | -0,36 | 0,31 | -0,44 |
| Transportation, warehousing and information | **-0,01** | 0,08 | 0,35 | 0,03 | -0,26 | 0,22 | -0,44 |
| Finance, insurance, real estate, rental, and leasing | **0,57** | -0,14 | 0,89 | 0,03 | -0,22 | 0,31 | -0,31 |
| Private educational services, health care, and other personal services | **0,64** | 0,24 | 0,55 | 0,09 | -0,21 | 0,30 | -0,34 |
| Government Services: education, health care, defense, social security and public administration | **0,64** | -0,01 | 0,03 | 0,00 | -0,02 | 0,66 | -0,03 |
| **2008-2009 Total** | **-1,21** | -0,26 | 3,58 | 0,35 | -2,99 | 2,57 | -4,46 |

*Table 8 – continuation…*

| Industry | Average Output Growth | Technology | Endogenous Household Consumption | Autonomous Household Consumption | Investment | Government Spending | Exports |
|---|---|---|---|---|---|---|---|
| **Period 2010-2014** | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,17** | -0,01 | 0,03 | -0,00 | -0,01 | 0,04 | 0,11 |
| Industrial commodities | **0,26** | 0,04 | 0,06 | -0,01 | 0,02 | 0,08 | 0,08 |
| Agricultural commodities | **-0,02** | -0,03 | 0,00 | -0,00 | -0,00 | 0,01 | 0,01 |
| Traditional manufacturing | **0,15** | -0,01 | 0,05 | -0,00 | -0,06 | 0,11 | 0,06 |
| Innovative manufacturing | **-0,18** | -0,08 | -0,00 | -0,01 | -0,11 | 0,03 | -0,00 |
| Public utility | **0,01** | -0,01 | -0,02 | -0,00 | 0,00 | 0,03 | 0,01 |
| Construction | **0,14** | -0,01 | -0,00 | -0,00 | 0,14 | 0,01 | 0,01 |
| Trade, accommodation and food services | **0,62** | 0,05 | 0,34 | -0,00 | 0,02 | 0,15 | 0,06 |
| Transportation, warehousing and information | **0,16** | -0,02 | 0,00 | -0,00 | 0,04 | 0,09 | 0,04 |
| Finance, insurance, real estate, rental, and leasing | **0,30** | -0,03 | 0,16 | -0,00 | 0,01 | 0,12 | 0,04 |
| Private educational services, health care, and other personal services | **0,44** | 0,08 | 0,19 | -0,01 | 0,02 | 0,12 | 0,05 |
| Government Services: education, health care, defense, social security and public administration | **0,28** | 0,00 | 0,00 | 0,00 | 0,00 | 0,27 | 0,00 |
| **2010-2014 Total** | **2,33** | -0,03 | 0,82 | -0,05 | 0,07 | 1,06 | 0,47 |
| | | | | | | | |
| **Period 2014-2016** | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,04** | -0,02 | 0,04 | -0,01 | -0,14 | -0,01 | 0,18 |
| Industrial commodities | **-0,65** | -0,21 | 0,04 | -0,04 | -0,52 | -0,01 | 0,08 |
| Agricultural commodities | **-0,02** | -0,02 | -0,02 | -0,00 | -0,04 | -0,00 | 0,06 |
| Traditional manufacturing | **-0,16** | -0,00 | -0,02 | -0,03 | -0,29 | -0,02 | 0,20 |
| Innovative manufacturing | **-0,54** | -0,06 | -0,02 | -0,14 | -0,42 | -0,01 | 0,12 |
| Public utility | **0,14** | 0,09 | 0,11 | -0,01 | -0,08 | -0,01 | 0,04 |
| Construction | **-0,40** | -0,01 | 0,00 | -0,00 | -0,38 | -0,00 | 0,00 |
| Trade, accommodation and food services | **-0,31** | 0,09 | -0,01 | -0,05 | -0,46 | -0,02 | 0,15 |
| Transportation, warehousing and information | **-0,21** | -0,03 | 0,00 | -0,03 | -0,23 | -0,01 | 0,09 |
| Finance, insurance, real estate, rental, and leasing | **0,13** | 0,08 | 0,24 | -0,03 | -0,26 | -0,02 | 0,13 |
| Private educational services, health care, and other personal services | **-0,15** | -0,03 | 0,10 | -0,05 | -0,28 | -0,03 | 0,13 |
| Government Services: education, health care, defense, social security and public administration | **-0,05** | 0,01 | 0,00 | -0,00 | -0,02 | -0,05 | 0,01 |
| **2014-2016 Total** | **-2,18** | -0,14 | 0,48 | -0,40 | -3,12 | -0,19 | 1,19 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 9 - Contribution to Average Households' Consumption Growth by Component Disclosing Trade Pattern Effect – 11 Industries - p.p.*

| Industry | Average Consumption Growth | Endogenous Consumption | Average Wages | Output | Autonomous Consumption |
|---|---|---|---|---|---|
| **Period 2000-2003** | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,08** | 0,12 | -0,12 | 0,02 | 0,00 |
| Industrial commodities | **0,01** | 0,06 | -0,14 | 0,03 | -0,00 |
| Agricultural commodities | **-0,01** | -0,00 | -0,03 | 0,01 | -0,00 |
| Traditional manufacturing | **-0,28** | -0,09 | -0,62 | 0,13 | -0,00 |
| Innovative manufacturing | **-0,13** | -0,05 | -0,11 | 0,02 | -0,05 |
| Public utility | **-0,03** | 0,01 | -0,12 | 0,03 | -0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **-0,25** | -0,05 | -0,64 | 0,13 | 0,00 |
| Transportation, warehousing and information | **0,26** | 0,36 | -0,30 | 0,06 | -0,00 |
| Finance, insurance, real estate, rental, and leasing | **-0,97** | -0,72 | -0,79 | 0,16 | 0,00 |
| Education, health care, and other personal services | **-0,24** | -0,02 | -0,52 | 0,11 | -0,06 |
| **2000-2003 Total** | **-1,57** | -0,39 | -3,40 | 0,69 | -0,11 |
| | | | | | |
| **Period 2003-2008** | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,10** | -0,10 | 0,08 | 0,16 | 0,00 |
| Industrial commodities | **0,10** | -0,14 | 0,09 | 0,19 | 0,00 |
| Agricultural commodities | **0,03** | -0,02 | 0,02 | 0,04 | 0,00 |
| Traditional manufacturing | **0,54** | -0,46 | 0,40 | 0,81 | 0,00 |
| Innovative manufacturing | **0,39** | -0,09 | 0,07 | 0,14 | 0,31 |
| Public utility | **0,12** | -0,08 | 0,08 | 0,16 | 0,00 |
| Construction | **0,00** | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **1,29** | 0,17 | 0,45 | 0,91 | 0,00 |
| Transportation, warehousing and information | **0,20** | -0,31 | 0,20 | 0,41 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,66** | -0,55 | 0,49 | 0,98 | 0,00 |
| Education, health care, and other personal services | **0,45** | -0,48 | 0,33 | 0,66 | 0,12 |
| **2003-2008 Total** | **3,88** | -2,06 | 2,22 | 4,45 | 0,43 |
| | | | | | |
| **Period 2008-2009** | | | | | |
| Agriculture, forestry, fishing, and hunting | **-0,12** | -0,32 | 0,15 | 0,07 | 0,00 |
| Industrial commodities | **0,08** | -0,15 | 0,18 | 0,09 | -0,00 |
| Agricultural commodities | **-0,05** | -0,09 | 0,04 | 0,02 | -0,00 |
| Traditional manufacturing | **0,50** | -0,51 | 0,79 | 0,38 | -0,00 |
| Innovative manufacturing | **0,33** | -0,04 | 0,14 | 0,07 | 0,20 |
| Public utility | **-0,13** | -0,33 | 0,16 | 0,07 | -0,00 |
| Construction | **0,01** | 0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **2,66** | 1,37 | 1,02 | 0,48 | 0,00 |
| Transportation, warehousing and information | **0,32** | -0,18 | 0,39 | 0,19 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **2,24** | 0,98 | 1,00 | 0,47 | 0,00 |
| Education, health care, and other personal services | **1,17** | 0,16 | 0,65 | 0,31 | 0,19 |
| **2008-2009 Total** | **7,00** | 0,89 | 4,53 | 2,14 | 0,39 |

*Table 9 – continuation…*

| Industry | Average Consumption Growth | Endogenous Consumption | Average Wages | Output | Autonomous Consumption |
|---|---|---|---|---|---|
| **Period 2010-2014** | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,10** | 0,00 | 0,03 | 0,08 | 0,00 |
| Industrial commodities | **0,10** | -0,02 | 0,04 | 0,10 | -0,00 |
| Agricultural commodities | **0,00** | -0,02 | 0,01 | 0,02 | -0,00 |
| Traditional manufacturing | **0,33** | -0,18 | 0,18 | 0,39 | -0,00 |
| Innovative manufacturing | **-0,03** | -0,09 | 0,03 | 0,07 | -0,03 |
| Public utility | **-0,02** | -0,12 | 0,03 | 0,08 | -0,00 |
| Construction | **-0,00** | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **1,46** | 0,66 | 0,27 | 0,61 | 0,00 |
| Transportation, warehousing and information | **0,05** | -0,21 | 0,09 | 0,20 | -0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,83** | 0,10 | 0,25 | 0,56 | 0,00 |
| Education, health care, and other personal services | **0,73** | 0,28 | 0,16 | 0,35 | -0,01 |
| **2010-2014 Total** | **3,55** | 0,39 | 1,09 | 2,45 | -0,04 |
| | | | | | |
| **Period 2014-2016** | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,14** | 0,19 | 0,02 | -0,09 | 0,00 |
| Industrial commodities | **0,03** | 0,09 | 0,02 | -0,11 | -0,00 |
| Agricultural commodities | **-0,08** | -0,07 | 0,00 | -0,02 | 0,00 |
| Traditional manufacturing | **-0,34** | -0,09 | 0,08 | -0,44 | 0,00 |
| Innovative manufacturing | **-0,89** | -0,16 | 0,01 | -0,07 | -0,69 |
| Public utility | **0,18** | 0,24 | 0,02 | -0,09 | 0,00 |
| Construction | **-0,00** | -0,00 | 0,00 | -0,00 | 0,00 |
| Trade, accommodation and food services | **-0,75** | -0,33 | 0,14 | -0,73 | -0,00 |
| Transportation, warehousing and information | **-0,31** | -0,19 | 0,04 | -0,21 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,40** | 0,79 | 0,13 | -0,68 | -0,00 |
| Education, health care, and other personal services | **-0,12** | 0,22 | 0,08 | -0,43 | -0,10 |
| **2014-2016 Total** | **-1,75** | 0,69 | 0,54 | -2,87 | -0,79 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 10 - Disclosure of Output's Contribution to Consumption Growth by Period -11 Industries - p.p.*

| Industry | 2000-2003 | | 2003-2008 | | 2008-2009 | | 2010-2014 | | 2014-2016 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale |
| Agriculture, forestry, fishing, and hunting | -0,02 | 0,05 | 0,01 | 0,15 | 0,11 | -0,04 | 0,01 | 0,07 | 0,03 | -0,12 |
| Industrial commodities | -0,03 | 0,06 | 0,01 | 0,18 | 0,13 | -0,05 | 0,01 | 0,08 | 0,03 | -0,14 |
| Agricultural commodities | -0,01 | 0,01 | 0,00 | 0,04 | 0,03 | -0,01 | 0,00 | 0,02 | 0,01 | -0,02 |
| Traditional manufacturing | -0,11 | 0,24 | 0,05 | 0,76 | 0,58 | -0,20 | 0,05 | 0,35 | 0,13 | -0,57 |
| Innovative manufacturing | -0,02 | 0,04 | 0,01 | 0,13 | 0,10 | -0,04 | 0,01 | 0,06 | 0,02 | -0,09 |
| Public utility | -0,02 | 0,05 | 0,01 | 0,15 | 0,11 | -0,04 | 0,01 | 0,07 | 0,03 | -0,12 |
| Construction | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 |
| Trade, accommodation and food services | -0,12 | 0,25 | 0,05 | 0,86 | 0,74 | -0,26 | 0,07 | 0,54 | 0,21 | -0,95 |
| Transportation, warehousing and information | -0,06 | 0,12 | 0,02 | 0,38 | 0,29 | -0,10 | 0,02 | 0,18 | 0,06 | -0,27 |
| Finance, insurance, real estate, rental, and leasing | -0,14 | 0,31 | 0,06 | 0,92 | 0,73 | -0,26 | 0,06 | 0,49 | 0,20 | -0,87 |
| Educational services, health care, and other personal services (includes government services) | -0,09 | 0,19 | 0,04 | 0,60 | 0,46 | -0,16 | 0,04 | 0,30 | 0,12 | -0,53 |
| Total Output Contribution | -0,62 | 1,31 | 0,25 | 4,18 | 3,28 | -1,15 | 0,28 | 2,15 | 0,84 | -3,70 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 11 - Contribution to Average Output Growth by Component Disclosing Trade Pattern – 12 Industries - p.p.*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2000-2003** | | | | | | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,47** | 0,12 | 0,01 | -0,04 | 0,01 | -0,00 | 0,00 | 0,09 | 0,00 | 0,01 | -0,00 | 0,28 | -0,00 |
| Industrial commodities | **0,98** | 0,49 | 0,10 | -0,12 | 0,00 | -0,01 | 0,00 | -0,15 | 0,03 | 0,01 | -0,00 | 0,62 | -0,00 |
| Agricultural commodities | **0,05** | 0,01 | -0,00 | -0,02 | -0,00 | -0,00 | 0,00 | -0,04 | 0,01 | 0,00 | -0,00 | 0,10 | -0,00 |
| Traditional manufacturing | **0,25** | 0,16 | 0,02 | -0,30 | 0,01 | -0,02 | 0,00 | -0,18 | 0,00 | 0,01 | -0,00 | 0,55 | -0,00 |
| Innovative manufacturing | **0,23** | 0,09 | 0,05 | -0,06 | -0,01 | -0,04 | 0,02 | -0,10 | 0,03 | 0,00 | -0,00 | 0,25 | -0,00 |
| Public utility | **0,07** | 0,07 | 0,00 | -0,06 | 0,00 | -0,00 | 0,00 | -0,04 | 0,00 | 0,00 | -0,00 | 0,09 | -0,00 |
| Construction | **-0,39** | 0,01 | 0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,41 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 |
| Trade, accommodation and food services | **0,15** | 0,17 | 0,02 | -0,23 | 0,01 | -0,01 | 0,00 | -0,09 | 0,01 | 0,01 | -0,00 | 0,27 | -0,00 |
| Transportation, warehousing and information | **0,10** | -0,03 | -0,03 | -0,02 | -0,01 | -0,01 | 0,00 | -0,08 | -0,01 | 0,01 | -0,00 | 0,27 | -0,00 |
| Finance, insurance, real estate, rental, and leasing | **-0,30** | -0,02 | 0,05 | -0,50 | -0,00 | -0,02 | 0,00 | -0,11 | 0,01 | 0,02 | -0,00 | 0,27 | -0,00 |
| Private educational services, health care, and other personal services | **-0,23** | -0,10 | -0,04 | -0,18 | -0,01 | -0,03 | 0,00 | -0,11 | 0,01 | -0,03 | -0,00 | 0,26 | -0,00 |
| Government Services: education, health care, defense, social security and public administration | **0,05** | -0,01 | -0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,01 | 0,00 | 0,06 | -0,00 | 0,02 | -0,00 |
| **2000-2003 Total** | **1,44** | 0,96 | 0,17 | -1,57 | -0,00 | -0,16 | 0,05 | -1,22 | 0,09 | 0,13 | -0,00 | 3,00 | -0,00 |
| **Period 2003-2008** | | | | | | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,07** | -0,09 | 0,01 | -0,05 | 0,00 | 0,01 | -0,00 | 0,07 | 0,00 | 0,08 | 0,00 | 0,04 | 0,00 |
| Industrial commodities | **0,82** | 0,24 | -0,13 | -0,10 | -0,01 | 0,05 | -0,00 | 0,37 | -0,01 | 0,15 | 0,00 | 0,26 | 0,00 |
| Agricultural commodities | **0,00** | -0,04 | 0,02 | -0,01 | 0,00 | 0,00 | -0,00 | 0,03 | -0,00 | 0,02 | 0,00 | -0,02 | -0,00 |
| Traditional manufacturing | **0,30** | -0,14 | -0,01 | -0,11 | -0,01 | 0,04 | -0,00 | 0,31 | 0,00 | 0,21 | 0,00 | 0,01 | 0,00 |
| Innovative manufacturing | **0,65** | -0,10 | 0,03 | -0,03 | 0,00 | 0,14 | -0,01 | 0,55 | -0,02 | 0,06 | 0,00 | 0,04 | -0,00 |
| Public utility | **0,08** | -0,07 | 0,01 | -0,03 | -0,00 | 0,01 | -0,00 | 0,07 | -0,00 | 0,07 | 0,00 | 0,02 | -0,00 |
| Construction | **0,27** | 0,02 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,23 | 0,00 | 0,01 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **0,77** | 0,06 | 0,00 | 0,08 | -0,00 | 0,04 | -0,00 | 0,34 | -0,00 | 0,21 | 0,00 | 0,05 | -0,00 |
| Transportation, warehousing and information | **0,45** | 0,01 | 0,01 | -0,10 | -0,00 | 0,03 | -0,00 | 0,26 | 0,01 | 0,16 | 0,00 | 0,07 | -0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,22** | -0,24 | 0,03 | -0,12 | -0,00 | 0,04 | -0,00 | 0,22 | -0,00 | 0,24 | 0,00 | 0,05 | -0,00 |
| Private educational services, health care, and other personal services | **0,41** | -0,06 | 0,00 | -0,13 | 0,00 | 0,07 | -0,00 | 0,25 | -0,00 | 0,19 | 0,00 | 0,07 | -0,00 |
| Government Services: education, health care, defense, social security and public administration | **0,52** | 0,00 | -0,00 | -0,01 | -0,00 | 0,00 | -0,00 | 0,02 | 0,00 | 0,50 | 0,00 | 0,01 | -0,00 |
| **2003-2008 Total** | **4,57** | -0,40 | -0,03 | -0,60 | -0,01 | 0,43 | -0,03 | 2,73 | -0,03 | 1,91 | 0,00 | 0,60 | -0,00 |

*Table 10 - Disclosure of Output's Contribution to Consumption Growth by Period -11 Industries - p.p.*

| Industry | 2000-2003 | | 2003-2008 | | 2008-2009 | | 2010-2014 | | 2014-2016 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale |
| Agriculture, forestry, fishing, and hunting | -0,02 | 0,05 | 0,01 | 0,15 | 0,11 | -0,04 | 0,01 | 0,07 | 0,03 | -0,12 |
| Industrial commodities | -0,03 | 0,06 | 0,01 | 0,18 | 0,13 | -0,05 | 0,01 | 0,08 | 0,03 | -0,14 |
| Agricultural commodities | -0,01 | 0,01 | 0,00 | 0,04 | 0,03 | -0,01 | 0,00 | 0,02 | 0,01 | -0,02 |
| Traditional manufacturing | -0,11 | 0,24 | 0,05 | 0,76 | 0,58 | -0,20 | 0,05 | 0,35 | 0,13 | -0,57 |
| Innovative manufacturing | -0,02 | 0,04 | 0,01 | 0,13 | 0,10 | -0,04 | 0,01 | 0,06 | 0,02 | -0,09 |
| Public utility | -0,02 | 0,05 | 0,01 | 0,15 | 0,11 | -0,04 | 0,01 | 0,07 | 0,03 | -0,12 |
| Construction | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 |
| Trade, accommodation and food services | -0,12 | 0,25 | 0,05 | 0,86 | 0,74 | -0,26 | 0,07 | 0,54 | 0,21 | -0,95 |
| Transportation, warehousing and information | -0,06 | 0,12 | 0,02 | 0,38 | 0,29 | -0,10 | 0,02 | 0,18 | 0,06 | -0,27 |
| Finance, insurance, real estate, rental, and leasing | -0,14 | 0,31 | 0,06 | 0,92 | 0,73 | -0,26 | 0,06 | 0,49 | 0,20 | -0,87 |
| Educational services, health care, and other personal services (includes government services) | -0,09 | 0,19 | 0,04 | 0,60 | 0,46 | -0,16 | 0,04 | 0,30 | 0,12 | -0,53 |
| Total Output Contribution | -0,62 | 1,31 | 0,25 | 4,18 | 3,28 | -1,15 | 0,28 | 2,15 | 0,84 | -3,70 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 11 – continuation…*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2008-2009** | | | | | | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **-0,26** | -0,07 | 0,05 | 0,08 | -0,01 | 0,01 | 0,00 | -0,68 | 0,37 | 0,10 | 0,00 | -0,11 | 0,00 |
| Industrial commodities | **-2,47** | -1,28 | 0,52 | 0,18 | 0,03 | 0,03 | 0,00 | -1,21 | 0,37 | 0,19 | 0,00 | -1,31 | 0,00 |
| Agricultural commodities | **-0,13** | -0,04 | 0,01 | 0,03 | -0,02 | 0,00 | 0,00 | -0,07 | 0,03 | 0,02 | 0,00 | -0,09 | 0,00 |
| Traditional manufacturing | **-0,34** | -0,06 | 0,09 | 0,35 | 0,02 | 0,03 | 0,00 | -1,64 | 1,15 | 0,27 | 0,00 | -0,54 | 0,00 |
| Innovative manufacturing | **-1,15** | 0,06 | 0,07 | 0,11 | 0,01 | 0,07 | 0,01 | -0,89 | 0,10 | 0,07 | 0,00 | -0,76 | 0,00 |
| Public utility | **-0,05** | -0,00 | 0,02 | 0,02 | 0,00 | 0,01 | 0,00 | -0,17 | 0,07 | 0,08 | 0,00 | -0,08 | 0,00 |
| Construction | **0,65** | -0,00 | 0,01 | 0,02 | 0,00 | 0,00 | 0,00 | 0,63 | 0,01 | 0,02 | 0,00 | -0,02 | 0,00 |
| Trade, accommodation and food services | **0,70** | 0,10 | 0,10 | 0,94 | 0,01 | 0,04 | 0,00 | -0,65 | 0,29 | 0,31 | 0,00 | -0,44 | 0,00 |
| Transportation, warehousing and information | **-0,01** | -0,07 | 0,15 | 0,32 | 0,03 | 0,03 | 0,00 | -0,50 | 0,25 | 0,22 | 0,00 | -0,44 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,57** | -0,13 | -0,01 | 0,88 | 0,01 | 0,03 | 0,00 | -0,43 | 0,21 | 0,31 | 0,00 | -0,31 | 0,00 |
| Private educational services, health care, and other personal services | **0,64** | 0,21 | 0,03 | 0,55 | 0,00 | 0,09 | 0,00 | -0,43 | 0,22 | 0,30 | 0,00 | -0,34 | -0,00 |
| Government Services: education, health care, defense, social security and public administration | **0,64** | -0,01 | 0,01 | 0,03 | 0,00 | 0,00 | 0,00 | -0,04 | 0,02 | 0,66 | 0,00 | -0,03 | 0,00 |
| **2008-2009 Total** | **-1,21** | -1,30 | 1,04 | 3,50 | 0,08 | 0,34 | 0,01 | -6,09 | 3,09 | 2,57 | 0,00 | -4,46 | 0,00 |
| **Period 2010-2014** | | | | | | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,17** | 0,01 | -0,02 | 0,04 | -0,01 | -0,00 | -0,00 | -0,00 | -0,01 | 0,04 | -0,00 | 0,11 | -0,00 |
| Industrial commodities | **0,26** | 0,18 | -0,14 | 0,07 | -0,01 | -0,00 | -0,00 | 0,04 | -0,02 | 0,08 | -0,00 | 0,08 | -0,00 |
| Agricultural commodities | **-0,02** | -0,02 | -0,01 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 | 0,01 | -0,00 | 0,01 | -0,00 |
| Traditional manufacturing | **0,15** | 0,07 | -0,08 | 0,08 | -0,03 | -0,00 | -0,00 | -0,01 | -0,05 | 0,11 | -0,00 | 0,06 | -0,00 |
| Innovative manufacturing | **-0,18** | -0,01 | -0,07 | 0,00 | -0,01 | -0,00 | -0,01 | -0,09 | -0,02 | 0,03 | -0,00 | -0,00 | -0,00 |
| Public utility | **0,01** | 0,00 | -0,01 | -0,02 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,03 | -0,00 | 0,01 | -0,00 |
| Construction | **0,14** | -0,01 | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | 0,14 | -0,00 | 0,01 | -0,00 | 0,01 | -0,00 |
| Trade, accommodation and food services | **0,62** | 0,13 | -0,08 | 0,37 | -0,03 | -0,00 | -0,00 | 0,04 | -0,02 | 0,15 | -0,00 | 0,06 | -0,00 |
| Transportation, warehousing and information | **0,16** | 0,05 | -0,06 | 0,02 | -0,01 | -0,00 | -0,00 | 0,05 | -0,01 | 0,09 | -0,00 | 0,04 | -0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,30** | 0,03 | -0,06 | 0,17 | -0,01 | -0,00 | -0,00 | 0,02 | -0,01 | 0,12 | -0,00 | 0,04 | -0,00 |
| Private educational services, health care, and other personal services | **0,44** | 0,16 | -0,08 | 0,21 | -0,02 | -0,00 | -0,00 | 0,03 | -0,01 | 0,12 | -0,00 | 0,05 | -0,00 |
| Government Services: education, health care, defense, social security and public administration | **0,28** | 0,01 | -0,01 | 0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,27 | -0,00 | 0,00 | -0,00 |
| **2010-2014 Total** | **2,33** | 0,59 | -0,62 | 0,94 | -0,13 | -0,01 | -0,03 | 0,21 | -0,14 | 1,06 | -0,00 | 0,47 | -0,00 |

*Table 10 - Disclosure of Output's Contribution to Consumption Growth by Period -11 Industries - p.p.*

| Industry | 2000-2003 | | 2003-2008 | | 2008-2009 | | 2010-2014 | | 2014-2016 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale | Output Composition | Output Scale |
| Agriculture, forestry, fishing, and hunting | -0,02 | 0,05 | 0,01 | 0,15 | 0,11 | -0,04 | 0,01 | 0,07 | 0,03 | -0,12 |
| Industrial commodities | -0,03 | 0,06 | 0,01 | 0,18 | 0,13 | -0,05 | 0,01 | 0,08 | 0,03 | -0,14 |
| Agricultural commodities | -0,01 | 0,01 | 0,00 | 0,04 | 0,03 | -0,01 | 0,00 | 0,02 | 0,01 | -0,02 |
| Traditional manufacturing | -0,11 | 0,24 | 0,05 | 0,76 | 0,58 | -0,20 | 0,05 | 0,35 | 0,13 | -0,57 |
| Innovative manufacturing | -0,02 | 0,04 | 0,01 | 0,13 | 0,10 | -0,04 | 0,01 | 0,06 | 0,02 | -0,09 |
| Public utility | -0,02 | 0,05 | 0,01 | 0,15 | 0,11 | -0,04 | 0,01 | 0,07 | 0,03 | -0,12 |
| Construction | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 |
| Trade, accommodation and food services | -0,12 | 0,25 | 0,05 | 0,86 | 0,74 | -0,26 | 0,07 | 0,54 | 0,21 | -0,95 |
| Transportation, warehousing and information | -0,06 | 0,12 | 0,02 | 0,38 | 0,29 | -0,10 | 0,02 | 0,18 | 0,06 | -0,27 |
| Finance, insurance, real estate, rental, and leasing | -0,14 | 0,31 | 0,06 | 0,92 | 0,73 | -0,26 | 0,06 | 0,49 | 0,20 | -0,87 |
| Educational services, health care, and other personal services (includes government services) | -0,09 | 0,19 | 0,04 | 0,60 | 0,46 | -0,16 | 0,04 | 0,30 | 0,12 | -0,53 |
| Total Output Contribution | -0,62 | 1,31 | 0,25 | 4,18 | 3,28 | -1,15 | 0,28 | 2,15 | 0,84 | -3,70 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 11 – continuation…*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2014-2016** | | | | | | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,04** | -0,01 | -0,01 | 0,05 | -0,02 | -0,01 | -0,00 | -0,14 | -0,00 | -0,01 | -0,00 | 0,18 | -0,00 |
| Industrial commodities | **-0,65** | -0,24 | 0,03 | 0,06 | -0,02 | -0,04 | -0,00 | -0,48 | -0,04 | -0,01 | -0,00 | 0,09 | -0,01 |
| Agricultural commodities | **-0,02** | -0,02 | 0,00 | -0,00 | -0,02 | -0,00 | -0,00 | -0,04 | -0,01 | -0,00 | -0,00 | 0,07 | -0,00 |
| Traditional manufacturing | **-0,16** | 0,05 | -0,05 | 0,03 | -0,06 | -0,03 | -0,00 | -0,26 | -0,03 | -0,01 | -0,00 | 0,20 | -0,01 |
| Innovative manufacturing | **-0,54** | 0,04 | -0,10 | 0,01 | -0,03 | -0,13 | -0,01 | -0,38 | -0,05 | -0,00 | -0,01 | 0,15 | -0,03 |
| Public utility | **0,14** | 0,11 | -0,02 | 0,12 | -0,01 | -0,01 | -0,00 | -0,07 | -0,01 | -0,01 | -0,00 | 0,04 | -0,00 |
| Construction | **-0,40** | -0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,38 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 |
| Trade, accommodation and food services | **-0,31** | 0,14 | -0,05 | 0,03 | -0,04 | -0,05 | -0,00 | -0,44 | -0,03 | -0,02 | -0,00 | 0,16 | -0,01 |
| Transportation, warehousing and information | **-0,21** | -0,01 | -0,02 | 0,03 | -0,02 | -0,03 | -0,00 | -0,21 | -0,02 | -0,01 | -0,00 | 0,10 | -0,01 |
| Finance, insurance, real estate, rental, and leasing | **0,13** | 0,16 | -0,08 | 0,27 | -0,03 | -0,03 | -0,00 | -0,25 | -0,02 | -0,02 | -0,00 | 0,14 | -0,01 |
| Private educational services, health care, and other personal services | **-0,15** | 0,08 | -0,10 | 0,14 | -0,03 | -0,05 | -0,00 | -0,26 | -0,02 | -0,03 | -0,00 | 0,14 | -0,01 |
| Government Services: education, health care, defense, social security and public administration | **-0,05** | 0,01 | -0,01 | 0,01 | -0,00 | -0,00 | -0,00 | -0,02 | -0,00 | -0,05 | -0,00 | 0,01 | -0,00 |
| **2014-2016 Total** | **-2,18** | 0,29 | -0,43 | 0,75 | -0,27 | -0,37 | -0,03 | -2,91 | -0,21 | -0,17 | -0,02 | 1,27 | -0,08 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 12 - Contribution to Average Households' Consumption Growth by Component Disclosing Trade Pattern Effect – 11 Industries - p.p.*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2000-2003** | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,08** | 0,11 | 0,01 | -0,12 | 0,06 | 0,02 | 0,00 | 0,00 |
| Industrial commodities | **0,01** | 0,05 | 0,01 | -0,14 | 0,07 | 0,03 | -0,00 | 0,00 |
| Agricultural commodities | **-0,01** | -0,00 | -0,00 | -0,03 | 0,01 | 0,01 | -0,00 | 0,00 |
| Traditional manufacturing | **-0,28** | -0,10 | 0,02 | -0,62 | 0,30 | 0,13 | -0,00 | 0,00 |
| Innovative manufacturing | **-0,13** | -0,01 | -0,03 | -0,11 | 0,05 | 0,02 | -0,10 | 0,05 |
| Public utility | **-0,03** | 0,01 | -0,00 | -0,12 | 0,06 | 0,03 | -0,00 | 0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **-0,25** | -0,07 | 0,02 | -0,64 | 0,31 | 0,13 | 0,00 | 0,00 |
| Transportation, warehousing and information | **0,26** | 0,37 | -0,01 | -0,30 | 0,14 | 0,06 | -0,00 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **-0,97** | -0,72 | 0,00 | -0,79 | 0,38 | 0,16 | 0,00 | 0,00 |
| Education, health care, and other personal services | **-0,24** | -0,01 | -0,01 | -0,52 | 0,25 | 0,11 | -0,06 | 0,00 |
| **2000-2003 Total** | **-1,57** | -0,38 | -0,01 | -3,40 | 1,64 | 0,69 | -0,16 | 0,05 |
| **Period 2003-2008** | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,10** | -0,10 | 0,00 | 0,08 | -0,04 | 0,16 | 0,00 | 0,00 |
| Industrial commodities | **0,10** | -0,13 | -0,01 | 0,09 | -0,05 | 0,19 | 0,00 | -0,00 |
| Agricultural commodities | **0,03** | -0,03 | 0,01 | 0,02 | -0,01 | 0,04 | 0,00 | -0,00 |
| Traditional manufacturing | **0,54** | -0,44 | -0,02 | 0,40 | -0,21 | 0,81 | 0,00 | 0,00 |
| Innovative manufacturing | **0,39** | -0,10 | 0,00 | 0,07 | -0,04 | 0,14 | 0,34 | -0,03 |
| Public utility | **0,12** | -0,08 | -0,00 | 0,08 | -0,04 | 0,16 | 0,00 | 0,00 |
| Construction | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **1,29** | 0,17 | -0,01 | 0,45 | -0,24 | 0,91 | 0,00 | 0,00 |
| Transportation, warehousing and information | **0,20** | -0,30 | -0,00 | 0,20 | -0,11 | 0,41 | 0,00 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,66** | -0,55 | 0,00 | 0,49 | -0,26 | 0,98 | 0,00 | -0,00 |
| Education, health care, and other personal services | **0,45** | -0,49 | 0,01 | 0,33 | -0,17 | 0,66 | 0,12 | -0,00 |
| **2003-2008 Total** | **3,88** | -2,05 | -0,01 | 2,22 | -1,17 | 4,45 | 0,46 | -0,03 |

*Table 12 – continuation…*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2008-2009** | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **-0,12** | -0,32 | -0,00 | 0,15 | -0,03 | 0,07 | 0,00 | 0,00 |
| Industrial commodities | **0,08** | -0,19 | 0,04 | 0,18 | -0,04 | 0,09 | -0,00 | -0,00 |
| Agricultural commodities | **-0,05** | -0,02 | -0,08 | 0,04 | -0,01 | 0,02 | -0,00 | 0,00 |
| Traditional manufacturing | **0,50** | -0,54 | 0,04 | 0,79 | -0,17 | 0,38 | -0,00 | 0,00 |
| Innovative manufacturing | **0,33** | -0,06 | 0,02 | 0,14 | -0,03 | 0,07 | 0,18 | 0,02 |
| Public utility | **-0,13** | -0,33 | 0,00 | 0,16 | -0,03 | 0,07 | -0,00 | 0,00 |
| Construction | **0,01** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **2,66** | 1,35 | 0,02 | 1,02 | -0,21 | 0,48 | 0,00 | -0,00 |
| Transportation, warehousing and information | **0,32** | -0,26 | 0,08 | 0,39 | -0,08 | 0,19 | 0,00 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **2,24** | 0,98 | -0,00 | 1,00 | -0,21 | 0,47 | 0,00 | 0,00 |
| Education, health care, and other personal services | **1,17** | 0,16 | -0,01 | 0,65 | -0,14 | 0,31 | 0,19 | 0,00 |
| **2008-2009 Total** | **7,00** | 0,78 | 0,11 | 4,53 | -0,95 | 2,14 | 0,37 | 0,02 |
| **Period 2010-2014** | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,10** | 0,00 | -0,00 | 0,03 | -0,01 | 0,08 | 0,00 | 0,00 |
| Industrial commodities | **0,10** | -0,02 | -0,00 | 0,04 | -0,01 | 0,10 | -0,00 | -0,00 |
| Agricultural commodities | **0,00** | -0,03 | 0,01 | 0,01 | -0,00 | 0,02 | -0,00 | 0,00 |
| Traditional manufacturing | **0,33** | -0,13 | -0,05 | 0,18 | -0,05 | 0,39 | -0,00 | -0,00 |
| Innovative manufacturing | **-0,03** | -0,08 | -0,01 | 0,03 | -0,01 | 0,07 | -0,00 | -0,03 |
| Public utility | **-0,02** | -0,12 | 0,00 | 0,03 | -0,01 | 0,08 | -0,00 | 0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **1,46** | 0,70 | -0,04 | 0,27 | -0,08 | 0,61 | 0,00 | 0,00 |
| Transportation, warehousing and information | **0,05** | -0,19 | -0,01 | 0,09 | -0,03 | 0,20 | -0,00 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,83** | 0,10 | -0,00 | 0,25 | -0,08 | 0,56 | 0,00 | 0,00 |
| Education, health care, and other personal services | **0,73** | 0,30 | -0,02 | 0,16 | -0,05 | 0,35 | -0,01 | 0,00 |
| **2010-2014 Total** | **3,55** | 0,52 | -0,13 | 1,09 | -0,33 | 2,45 | -0,01 | -0,03 |

*Table 12 – continuation…*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2014-2016** | | | | | | | | |
| Agriculture, forestry, fishing, and hunting | **0,14** | 0,20 | -0,01 | 0,02 | 0,02 | -0,09 | 0,00 | 0,00 |
| Industrial commodities | **0,03** | 0,08 | 0,01 | 0,02 | 0,03 | -0,11 | -0,00 | -0,00 |
| Agricultural commodities | **-0,08** | -0,01 | -0,06 | 0,00 | 0,00 | -0,02 | 0,00 | 0,00 |
| Traditional manufacturing | **-0,34** | -0,11 | 0,02 | 0,08 | 0,10 | -0,44 | 0,00 | 0,00 |
| Innovative manufacturing | **-0,89** | -0,11 | -0,05 | 0,01 | 0,02 | -0,07 | -0,72 | 0,03 |
| Public utility | **0,18** | 0,24 | -0,00 | 0,02 | 0,02 | -0,09 | 0,00 | 0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 |
| Trade, accommodation and food services | **-0,75** | -0,33 | 0,01 | 0,14 | 0,17 | -0,73 | -0,00 | 0,00 |
| Transportation, warehousing and information | **-0,31** | -0,19 | 0,00 | 0,04 | 0,05 | -0,21 | 0,00 | 0,00 |
| Finance, insurance, real estate, rental, and leasing | **0,40** | 0,80 | -0,01 | 0,13 | 0,16 | -0,68 | -0,00 | -0,00 |
| Education, health care, and other personal services | **-0,12** | 0,24 | -0,02 | 0,08 | 0,10 | -0,43 | -0,10 | 0,00 |
| **2014-2016 Total** | **-1,75** | 0,81 | -0,11 | 0,54 | 0,68 | -2,87 | -0,81 | 0,03 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 13 - Contribution to Average Output Growth by Component Disclosing Trade Pattern - 42 Industries - p.p.*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2000-2003** | | | | | | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,47** | 0,12 | 0,01 | -0,04 | 0,01 | -0,00 | 0,00 | 0,09 | 0,00 | 0,01 | -0,00 | 0,28 | -0,00 |
| Extraction of oil and gas, including support activities | **0,17** | 0,02 | 0,02 | -0,02 | 0,00 | -0,00 | 0,00 | 0,03 | 0,00 | 0,00 | -0,00 | 0,11 | -0,00 |
| Extraction of iron ore, including processing and agglomeration | **0,04** | 0,02 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,03 | -0,00 |
| Other mining and quarrying | **0,01** | 0,01 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,02 | 0,01 | 0,00 | -0,00 | 0,01 | -0,00 |
| Food and drinks | **0,31** | 0,08 | 0,01 | -0,10 | 0,01 | -0,01 | 0,00 | -0,05 | 0,00 | 0,01 | -0,00 | 0,35 | -0,00 |
| Manufacture of tobacco products | **0,01** | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Manufacture of textiles | **-0,00** | 0,02 | 0,01 | -0,05 | -0,00 | -0,00 | 0,00 | -0,02 | -0,00 | 0,00 | -0,00 | 0,03 | -0,00 |
| Manufacture of footwear and leather goods | **-0,08** | -0,00 | 0,00 | -0,09 | -0,00 | -0,00 | 0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Manufacture of wearing apparel and accessories | **0,02** | 0,00 | 0,00 | -0,02 | 0,00 | -0,00 | 0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,03 | -0,00 |
| Manufacture of wood products | **0,02** | 0,01 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,02 | 0,00 | 0,00 | -0,00 | 0,04 | -0,00 |
| Manufacture of pulp, paper and paper products | **0,02** | 0,00 | -0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,02 | 0,01 | 0,00 | -0,00 | 0,05 | -0,00 |
| Printing and reproduction of recordings | **-0,02** | -0,01 | -0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,01 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 |
| Oil refining and coking plants | **0,30** | 0,11 | 0,05 | -0,06 | 0,00 | -0,00 | 0,00 | 0,01 | 0,01 | 0,00 | -0,00 | 0,17 | -0,00 |
| Manufacture of biofuels | **0,04** | 0,01 | 0,00 | 0,01 | -0,00 | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,17** | 0,11 | 0,01 | -0,03 | -0,00 | -0,00 | 0,00 | -0,02 | 0,00 | 0,00 | -0,00 | 0,10 | -0,00 |
| Pharmaceutical products | **-0,01** | 0,01 | -0,01 | -0,01 | -0,01 | -0,00 | 0,00 | -0,01 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Perfumery hygiene and cleaning | **-0,01** | -0,00 | -0,00 | -0,02 | -0,00 | -0,00 | 0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,02** | 0,04 | -0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,04 | 0,00 | 0,00 | -0,00 | 0,04 | -0,00 |
| Rubber & Plastics | **0,02** | 0,02 | 0,00 | -0,02 | -0,00 | -0,00 | 0,00 | -0,04 | 0,00 | 0,00 | -0,00 | 0,05 | 0,00 |
| Cement and other non-metallic mineral products | **0,03** | 0,08 | 0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,07 | 0,00 | 0,00 | -0,00 | 0,03 | -0,00 |
| Manufacture of steel and its derivatives | **0,15** | 0,09 | 0,01 | -0,01 | 0,00 | -0,00 | 0,00 | -0,04 | 0,00 | 0,00 | -0,00 | 0,09 | -0,00 |
| Metallurgy of nonferrous metals | **0,04** | 0,02 | 0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,02 | 0,00 | 0,00 | -0,00 | 0,03 | -0,00 |
| Metal products - exclusive machinery and equipment | **0,04** | 0,03 | 0,00 | -0,01 | 0,00 | -0,00 | 0,00 | -0,02 | 0,00 | 0,00 | -0,00 | 0,03 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **0,02** | 0,02 | 0,01 | -0,04 | -0,00 | -0,02 | 0,00 | -0,08 | 0,00 | 0,00 | -0,00 | 0,12 | -0,00 |
| Household appliances and electronic material | **0,02** | 0,02 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | -0,01 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Automobiles trucks and buses | **0,07** | 0,01 | 0,01 | -0,00 | 0,00 | -0,02 | 0,02 | -0,01 | 0,01 | 0,00 | -0,00 | 0,07 | -0,00 |
| Parts and accessories for motor vehicles | **0,08** | 0,04 | 0,01 | -0,01 | 0,00 | -0,00 | 0,00 | -0,02 | 0,01 | 0,00 | -0,00 | 0,05 | -0,00 |
| Other transportation equipment | **0,05** | 0,00 | 0,03 | 0,00 | 0,00 | 0,01 | 0,00 | 0,02 | 0,01 | 0,00 | -0,00 | -0,02 | -0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **0,07** | 0,07 | 0,00 | -0,06 | 0,00 | -0,00 | 0,00 | -0,04 | 0,00 | 0,00 | -0,00 | 0,09 | -0,00 |
| Construction | **-0,39** | 0,01 | 0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,41 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 |
| Trade | **0,20** | 0,17 | 0,01 | -0,13 | -0,00 | -0,01 | 0,00 | -0,07 | 0,01 | 0,01 | -0,00 | 0,21 | -0,00 |
| Transporting warehousing and mail | **0,09** | 0,02 | 0,02 | -0,05 | 0,01 | -0,01 | 0,00 | -0,05 | 0,00 | 0,01 | -0,00 | 0,14 | -0,00 |
| Accommodation and food services | **-0,05** | -0,01 | 0,01 | -0,10 | 0,01 | -0,00 | 0,00 | -0,02 | 0,00 | 0,00 | -0,00 | 0,06 | -0,00 |
| Information services | **0,01** | -0,05 | -0,05 | 0,03 | -0,01 | -0,01 | 0,00 | -0,03 | -0,01 | 0,01 | -0,00 | 0,12 | -0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,04** | 0,01 | 0,05 | -0,11 | -0,00 | -0,01 | 0,00 | -0,05 | 0,00 | 0,01 | -0,00 | 0,14 | -0,00 |
| Real estate activities and rentals | **-0,34** | -0,03 | 0,00 | -0,40 | -0,00 | -0,01 | 0,00 | -0,06 | 0,00 | 0,01 | -0,00 | 0,14 | -0,00 |
| Business and family services and maintenance services | **-0,22** | -0,10 | -0,04 | -0,18 | -0,01 | -0,03 | 0,00 | -0,09 | 0,00 | 0,01 | -0,00 | 0,21 | -0,00 |
| Public administration, defense and social security | **0,06** | -0,00 | -0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,06 | -0,00 | 0,01 | -0,00 |
| Public education | **-0,04** | -0,01 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,03 | -0,00 | 0,01 | 0,00 |
| Private education | **0,00** | 0,00 | 0,00 | -0,02 | -0,00 | -0,00 | 0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Public health | **0,03** | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,03 | -0,00 | 0,00 | -0,00 |
| Private health | **-0,01** | -0,00 | 0,00 | 0,01 | -0,00 | 0,00 | 0,00 | -0,01 | 0,00 | -0,04 | -0,00 | 0,03 | -0,00 |
| **2000-2003 Total** | **1,44** | 0,96 | 0,17 | -1,57 | -0,00 | -0,16 | 0,05 | -1,22 | 0,09 | 0,13 | -0,00 | 3,00 | -0,00 |

*Table 13 – continuation…*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2003-2008** | | | | | | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,07** | -0,09 | 0,01 | -0,05 | 0,00 | 0,01 | -0,00 | 0,07 | 0,00 | 0,08 | 0,00 | 0,04 | 0,00 |
| Extraction of oil and gas, including support activities | **0,19** | 0,09 | -0,01 | -0,02 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 | 0,02 | 0,00 | 0,08 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **0,07** | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | 0,00 | 0,06 | -0,00 |
| Other mining and quarrying | **0,03** | 0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | 0,00 | 0,01 | -0,00 |
| Food and drinks | **0,21** | -0,04 | -0,00 | -0,08 | 0,00 | 0,02 | -0,00 | 0,15 | -0,00 | 0,13 | 0,00 | 0,04 | 0,00 |
| Manufacture of tobacco products | **0,00** | -0,00 | 0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 |
| Manufacture of textiles | **-0,01** | -0,03 | -0,01 | -0,01 | -0,00 | 0,00 | -0,00 | 0,02 | 0,01 | 0,02 | 0,00 | -0,01 | -0,00 |
| Manufacture of footwear and leather goods | **0,04** | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 | 0,02 | 0,00 | -0,01 | -0,00 |
| Manufacture of wearing apparel and accessories | **-0,01** | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,01 | 0,00 | -0,02 | 0,00 |
| Manufacture of wood products | **-0,00** | -0,00 | 0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | 0,00 | -0,02 | -0,00 |
| Manufacture of pulp, paper and paper products | **0,00** | -0,04 | 0,02 | -0,00 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,01 | 0,00 | -0,01 | -0,00 |
| Printing and reproduction of recordings | **0,01** | -0,01 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,01 | 0,00 | 0,00 | -0,00 |
| Oil refining and coking plants | **0,16** | 0,05 | -0,05 | -0,05 | -0,00 | 0,01 | -0,00 | 0,08 | -0,00 | 0,07 | 0,00 | 0,06 | -0,00 |
| Manufacture of biofuels | **0,01** | -0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,01 | 0,00 | 0,01 | 0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,04** | 0,02 | -0,04 | -0,01 | -0,00 | 0,01 | -0,00 | 0,05 | -0,00 | 0,02 | 0,00 | 0,00 | 0,00 |
| Pharmaceutical products | **0,02** | -0,01 | 0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,01 | 0,00 | 0,02 | 0,00 | 0,00 | -0,00 |
| Perfumery hygiene and cleaning | **0,01** | -0,01 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,01 | 0,00 | 0,00 | -0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,03** | -0,02 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,04 | -0,00 | 0,01 | 0,00 | 0,00 | -0,00 |
| Rubber & Plastics | **0,04** | -0,03 | -0,00 | -0,01 | -0,00 | 0,01 | -0,00 | 0,05 | -0,00 | 0,01 | 0,00 | 0,01 | -0,00 |
| Cement and other non-metallic mineral products | **0,03** | -0,03 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,06 | -0,00 | 0,01 | 0,00 | -0,00 | -0,00 |
| Manufacture of steel and its derivatives | **0,16** | 0,08 | -0,01 | -0,00 | -0,00 | 0,01 | -0,00 | 0,06 | -0,00 | 0,01 | 0,00 | 0,02 | -0,00 |
| Metallurgy of nonferrous metals | **0,03** | 0,00 | -0,01 | -0,00 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 | 0,00 | 0,00 | 0,01 | -0,00 |
| Metal products - exclusive machinery and equipment | **0,10** | 0,02 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 | 0,06 | -0,00 | 0,01 | 0,00 | 0,01 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **0,21** | -0,06 | 0,01 | -0,02 | -0,00 | 0,02 | -0,00 | 0,25 | -0,01 | 0,03 | 0,00 | -0,00 | -0,00 |
| Household appliances and electronic material | **0,08** | -0,01 | 0,01 | -0,00 | 0,00 | 0,01 | 0,00 | 0,04 | 0,00 | 0,00 | 0,00 | 0,01 | -0,00 |
| Automobiles trucks and buses | **0,21** | 0,00 | 0,00 | 0,00 | -0,00 | 0,08 | -0,01 | 0,15 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 |
| Parts and accessories for motor vehicles | **0,08** | -0,02 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,08 | -0,00 | 0,01 | 0,00 | 0,01 | -0,00 |
| Other transportation equipment | **0,05** | -0,00 | -0,01 | 0,00 | -0,00 | 0,01 | -0,00 | 0,02 | -0,01 | 0,00 | 0,00 | 0,02 | -0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **0,08** | -0,07 | 0,01 | -0,03 | -0,00 | 0,01 | -0,00 | 0,07 | -0,00 | 0,07 | 0,00 | 0,02 | -0,00 |
| Construction | **0,27** | 0,02 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,23 | 0,00 | 0,01 | 0,00 | 0,00 | 0,00 |
| Trade | **0,68** | 0,07 | 0,01 | 0,06 | -0,00 | 0,03 | -0,00 | 0,30 | -0,00 | 0,16 | 0,00 | 0,05 | -0,00 |
| Transporting warehousing and mail | **0,26** | 0,04 | -0,02 | -0,03 | -0,01 | 0,02 | -0,00 | 0,13 | -0,00 | 0,08 | 0,00 | 0,06 | -0,00 |
| Accommodation and food services | **0,09** | -0,01 | -0,00 | 0,01 | -0,00 | 0,01 | -0,00 | 0,04 | -0,00 | 0,05 | 0,00 | 0,00 | 0,00 |
| Information services | **0,19** | -0,02 | 0,03 | -0,06 | 0,01 | 0,02 | -0,00 | 0,13 | 0,01 | 0,08 | 0,00 | 0,00 | -0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,18** | -0,22 | 0,03 | 0,09 | -0,00 | 0,02 | -0,00 | 0,11 | -0,00 | 0,11 | 0,00 | 0,03 | -0,00 |
| Real estate activities and rentals | **0,04** | -0,02 | 0,00 | -0,21 | -0,00 | 0,02 | -0,00 | 0,11 | -0,00 | 0,12 | 0,00 | 0,02 | -0,00 |
| Business and family services and maintenance services | **0,37** | -0,05 | -0,00 | -0,05 | 0,00 | 0,06 | -0,00 | 0,20 | -0,00 | 0,14 | 0,00 | 0,06 | -0,00 |
| Public administration, defense and social security | **0,32** | 0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | 0,00 | 0,29 | 0,00 | 0,00 | -0,00 |
| Public education | **0,12** | -0,01 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,12 | 0,00 | 0,00 | -0,00 |
| Private education | **-0,00** | -0,00 | 0,00 | -0,06 | 0,00 | 0,00 | -0,00 | 0,02 | -0,00 | 0,02 | 0,00 | 0,00 | -0,00 |
| Public health | **0,08** | -0,00 | 0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,08 | 0,00 | 0,00 | -0,00 |
| Private health | **0,04** | -0,01 | 0,00 | -0,02 | -0,00 | 0,01 | -0,00 | 0,03 | -0,00 | 0,02 | 0,00 | 0,01 | -0,00 |
| **2003-2008 Total** | **4,57** | -0,40 | -0,03 | -0,60 | -0,01 | 0,43 | -0,03 | 2,73 | -0,03 | 1,91 | 0,00 | 0,60 | -0,00 |

*Table 13 – continuation…*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2008-2009** | | | | | | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **-0,26** | -0,07 | 0,05 | 0,08 | -0,01 | 0,01 | 0,00 | -0,68 | 0,37 | 0,10 | 0,00 | -0,11 | 0,00 |
| Extraction of oil and gas, including support activities | **-0,58** | -0,41 | 0,08 | 0,02 | 0,01 | 0,00 | 0,00 | -0,12 | 0,06 | 0,03 | 0,00 | -0,25 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **-0,15** | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,05 | 0,00 | 0,00 | 0,00 | -0,11 | 0,00 |
| Other mining and quarrying | **-0,05** | -0,01 | 0,04 | 0,00 | 0,00 | 0,00 | 0,00 | -0,07 | 0,05 | 0,00 | 0,00 | -0,06 | 0,00 |
| Food and drinks | **-0,14** | -0,03 | 0,04 | 0,22 | 0,00 | 0,01 | 0,00 | -1,30 | 1,03 | 0,17 | 0,00 | -0,27 | 0,00 |
| Manufacture of tobacco products | **-0,00** | 0,00 | 0,00 | 0,01 | -0,02 | 0,00 | 0,00 | -0,01 | 0,00 | 0,00 | 0,00 | 0,01 | 0,00 |
| Manufacture of textiles | **-0,05** | 0,01 | 0,01 | 0,01 | -0,00 | 0,00 | 0,00 | -0,07 | 0,01 | 0,02 | 0,00 | -0,04 | 0,00 |
| Manufacture of footwear and leather goods | **0,00** | -0,02 | 0,00 | 0,04 | -0,01 | 0,00 | 0,00 | -0,03 | 0,02 | 0,03 | 0,00 | -0,03 | 0,00 |
| Manufacture of wearing apparel and accessories | **-0,06** | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,02 | 0,01 | 0,01 | 0,00 | -0,05 | 0,00 |
| Manufacture of wood products | **-0,05** | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,03 | 0,00 | 0,00 | 0,00 | -0,05 | 0,00 |
| Manufacture of pulp, paper and paper products | **-0,07** | -0,04 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | -0,04 | 0,02 | 0,02 | 0,00 | -0,05 | 0,00 |
| Printing and reproduction of recordings | **-0,02** | -0,02 | 0,00 | 0,01 | 0,00 | 0,00 | 0,00 | -0,03 | 0,01 | 0,01 | 0,00 | -0,01 | 0,00 |
| Oil refining and coking plants | **-0,22** | -0,16 | 0,26 | 0,06 | 0,02 | 0,01 | 0,00 | -0,30 | 0,13 | 0,09 | 0,00 | -0,33 | 0,00 |
| Manufacture of biofuels | **-0,02** | 0,00 | 0,01 | 0,03 | 0,00 | 0,00 | 0,00 | -0,06 | 0,01 | 0,01 | 0,00 | -0,02 | 0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **-0,48** | -0,39 | 0,09 | 0,03 | 0,00 | 0,00 | 0,00 | -0,22 | 0,07 | 0,03 | 0,00 | -0,09 | 0,00 |
| Pharmaceutical products | **0,04** | 0,00 | 0,01 | 0,03 | 0,00 | 0,00 | 0,00 | -0,02 | 0,01 | 0,01 | 0,00 | -0,01 | 0,00 |
| Perfumery hygiene and cleaning | **0,04** | -0,00 | 0,01 | 0,02 | 0,01 | 0,00 | 0,00 | -0,00 | 0,01 | 0,01 | 0,00 | -0,02 | 0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **-0,04** | 0,01 | 0,01 | 0,02 | 0,00 | 0,00 | 0,00 | -0,08 | 0,03 | 0,01 | 0,00 | -0,05 | 0,00 |
| Rubber & Plastics | **-0,07** | -0,01 | 0,02 | 0,03 | 0,00 | 0,00 | 0,00 | -0,10 | 0,04 | 0,02 | 0,00 | -0,07 | 0,00 |
| Cement and other non-metallic mineral products | **-0,00** | -0,00 | 0,01 | 0,01 | 0,00 | 0,00 | 0,00 | -0,01 | 0,01 | 0,01 | 0,00 | -0,03 | 0,00 |
| Manufacture of steel and its derivatives | **-0,68** | -0,26 | -0,02 | 0,01 | 0,00 | 0,01 | 0,00 | -0,18 | 0,02 | 0,01 | 0,00 | -0,27 | 0,00 |
| Metallurgy of nonferrous metals | **-0,11** | -0,03 | 0,04 | 0,01 | 0,00 | 0,00 | 0,00 | -0,07 | 0,01 | 0,00 | 0,00 | -0,08 | 0,00 |
| Metal products - exclusive machinery and equipment | **-0,17** | -0,02 | 0,01 | 0,02 | 0,00 | 0,00 | 0,00 | -0,14 | 0,02 | 0,02 | 0,00 | -0,07 | 0,00 |
| Furniture and products of various industries & Machinery and equipment | **-0,60** | -0,04 | 0,00 | 0,04 | 0,00 | 0,01 | 0,00 | -0,46 | 0,05 | 0,04 | 0,00 | -0,26 | 0,00 |
| Household appliances and electronic material | **-0,06** | 0,02 | 0,00 | 0,01 | 0,00 | 0,02 | 0,00 | -0,09 | 0,01 | 0,01 | 0,00 | -0,05 | 0,00 |
| Automobiles trucks and buses | **-0,28** | -0,02 | 0,02 | 0,01 | 0,00 | 0,02 | -0,00 | -0,14 | 0,01 | 0,00 | 0,00 | -0,18 | 0,00 |
| Parts and accessories for motor vehicles | **-0,16** | 0,07 | 0,03 | 0,01 | 0,00 | 0,00 | -0,00 | -0,16 | 0,02 | 0,01 | 0,00 | -0,15 | 0,00 |
| Other transportation equipment | **-0,08** | 0,01 | 0,02 | 0,00 | 0,00 | 0,01 | 0,00 | -0,02 | 0,01 | 0,00 | 0,00 | -0,12 | 0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **-0,05** | -0,00 | 0,02 | 0,02 | 0,00 | 0,01 | 0,00 | -0,17 | 0,07 | 0,08 | 0,00 | -0,08 | 0,00 |
| Construction | **0,65** | -0,00 | 0,01 | 0,02 | 0,00 | 0,00 | 0,00 | 0,63 | 0,01 | 0,02 | 0,00 | -0,02 | 0,00 |
| Trade | **0,50** | 0,08 | 0,08 | 0,75 | 0,01 | 0,03 | 0,00 | -0,57 | 0,25 | 0,24 | 0,00 | -0,37 | 0,00 |
| Transporting warehousing and mail | **-0,08** | -0,04 | 0,13 | 0,15 | 0,03 | 0,02 | 0,00 | -0,34 | 0,17 | 0,11 | 0,00 | -0,31 | 0,00 |
| Accommodation and food services | **0,20** | 0,02 | 0,02 | 0,20 | 0,01 | 0,01 | 0,00 | -0,08 | 0,04 | 0,07 | 0,00 | -0,07 | 0,00 |
| Information services | **0,07** | -0,03 | 0,02 | 0,17 | 0,00 | 0,01 | 0,00 | -0,16 | 0,08 | 0,11 | 0,00 | -0,12 | -0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,32** | -0,14 | -0,04 | 0,59 | 0,00 | 0,02 | 0,00 | -0,24 | 0,12 | 0,16 | 0,00 | -0,16 | 0,00 |
| Real estate activities and rentals | **0,25** | 0,00 | 0,03 | 0,29 | 0,00 | 0,01 | 0,00 | -0,19 | 0,10 | 0,15 | 0,00 | -0,15 | 0,00 |
| Business and family services and maintenance services | **0,52** | 0,23 | 0,02 | 0,42 | 0,00 | 0,07 | 0,00 | -0,34 | 0,18 | 0,20 | 0,00 | -0,27 | -0,00 |
| Public administration, defense and social security | **0,34** | -0,01 | 0,00 | 0,02 | 0,00 | 0,00 | 0,00 | -0,03 | 0,01 | 0,36 | 0,00 | -0,02 | 0,00 |
| Public education | **0,16** | -0,00 | 0,00 | 0,01 | 0,00 | 0,00 | 0,00 | -0,01 | 0,00 | 0,17 | 0,00 | -0,01 | 0,00 |
| Private education | **0,02** | -0,02 | 0,00 | 0,05 | -0,00 | 0,00 | 0,00 | -0,04 | 0,02 | 0,03 | 0,00 | -0,03 | 0,00 |
| Public health | **0,14** | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,14 | 0,00 | -0,00 | 0,00 |
| Private health | **0,09** | -0,00 | 0,01 | 0,08 | 0,00 | 0,01 | 0,00 | -0,05 | 0,03 | 0,07 | 0,00 | -0,04 | 0,00 |
| **2008-2009 Total** | **-1,21** | -1,30 | 1,04 | 3,50 | 0,08 | 0,34 | 0,01 | -6,09 | 3,09 | 2,57 | 0,00 | -4,46 | 0,00 |

*Table 13 – continuation…*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2010-2014** | | | | | | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,17** | 0,01 | -0,02 | 0,04 | -0,01 | -0,00 | -0,00 | -0,00 | -0,01 | 0,04 | -0,00 | 0,11 | -0,00 |
| Extraction of oil and gas, including support activities | **0,15** | 0,12 | -0,02 | 0,02 | -0,00 | -0,00 | -0,00 | 0,02 | -0,00 | 0,01 | -0,00 | 0,01 | -0,00 |
| Extraction of iron ore, including processing and agglomeration | **-0,02** | -0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 | -0,02 | -0,00 |
| Other mining and quarrying | **-0,01** | -0,01 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 |
| Food and drinks | **0,16** | 0,04 | -0,03 | 0,08 | -0,01 | -0,00 | -0,00 | -0,02 | -0,01 | 0,07 | -0,00 | 0,04 | -0,00 |
| Manufacture of tobacco products | **-0,01** | -0,00 | -0,00 | -0,01 | 0,00 | -0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 | -0,00 | -0,00 |
| Manufacture of textiles | **-0,02** | 0,00 | -0,01 | -0,01 | -0,00 | -0,00 | -0,00 | 0,01 | -0,02 | 0,01 | -0,00 | 0,00 | -0,00 |
| Manufacture of footwear and leather goods | **-0,01** | 0,00 | -0,00 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Manufacture of wearing apparel and accessories | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,01 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of wood products | **-0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 |
| Manufacture of pulp, paper and paper products | **-0,01** | -0,02 | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Printing and reproduction of recordings | **-0,01** | -0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 |
| Oil refining and coking plants | **0,15** | 0,07 | -0,05 | 0,05 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 | 0,03 | -0,00 | 0,03 | -0,00 |
| Manufacture of biofuels | **0,01** | 0,01 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,04** | 0,05 | -0,04 | 0,01 | -0,00 | -0,00 | -0,00 | -0,00 | -0,01 | 0,01 | -0,00 | 0,02 | -0,00 |
| Pharmaceutical products | **0,00** | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Perfumery hygiene and cleaning | **0,01** | -0,00 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | 0,01 | -0,01 | 0,00 | -0,00 | 0,00 | -0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,00** | 0,01 | -0,02 | 0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Rubber & Plastics | **0,01** | 0,03 | -0,01 | 0,01 | -0,00 | -0,00 | -0,00 | -0,01 | -0,01 | 0,01 | -0,00 | 0,00 | -0,00 |
| Cement and other non-metallic mineral products | **0,02** | 0,00 | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 |
| Manufacture of steel and its derivatives | **-0,05** | -0,05 | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Metallurgy of nonferrous metals | **-0,00** | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 |
| Metal products - exclusive machinery and equipment | **-0,02** | -0,01 | -0,01 | -0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **0,02** | -0,01 | -0,03 | 0,01 | -0,00 | 0,01 | -0,00 | 0,03 | -0,01 | 0,02 | -0,00 | -0,00 | -0,00 |
| Household appliances and electronic material | **-0,02** | -0,00 | -0,01 | -0,00 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 |
| Automobiles trucks and buses | **-0,11** | 0,00 | -0,01 | 0,00 | -0,00 | -0,00 | -0,01 | -0,08 | -0,00 | 0,00 | -0,00 | -0,02 | -0,00 |
| Parts and accessories for motor vehicles | **-0,08** | -0,00 | -0,02 | -0,00 | 0,00 | -0,00 | -0,00 | -0,05 | -0,00 | 0,00 | -0,00 | -0,01 | -0,00 |
| Other transportation equipment | **0,01** | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **0,01** | 0,00 | -0,01 | -0,02 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,03 | -0,00 | 0,01 | -0,00 |
| Construction | **0,14** | -0,01 | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | 0,14 | -0,00 | 0,01 | -0,00 | 0,01 | -0,00 |
| Trade | **0,48** | 0,11 | -0,06 | 0,26 | -0,01 | -0,00 | -0,00 | 0,03 | -0,01 | 0,11 | -0,00 | 0,05 | -0,00 |
| Transporting warehousing and mail | **0,16** | 0,09 | -0,04 | 0,05 | -0,01 | -0,00 | -0,00 | 0,00 | -0,01 | 0,05 | -0,00 | 0,02 | -0,00 |
| Accommodation and food services | **0,14** | 0,02 | -0,02 | 0,11 | -0,01 | -0,00 | -0,00 | 0,00 | -0,00 | 0,03 | -0,00 | 0,01 | -0,00 |
| Information services | **0,00** | -0,04 | -0,02 | -0,03 | -0,00 | -0,00 | -0,00 | 0,05 | -0,00 | 0,04 | -0,00 | 0,02 | -0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,03** | -0,00 | -0,03 | -0,01 | -0,01 | -0,00 | -0,00 | 0,01 | -0,01 | 0,06 | -0,00 | 0,02 | -0,00 |
| Real estate activities and rentals | **0,27** | 0,03 | -0,03 | 0,18 | -0,01 | -0,00 | -0,00 | 0,01 | -0,01 | 0,07 | -0,00 | 0,02 | -0,00 |
| Business and family services and maintenance services | **0,26** | 0,15 | -0,07 | 0,06 | -0,01 | -0,01 | -0,00 | 0,02 | -0,01 | 0,09 | -0,00 | 0,04 | -0,00 |
| Public administration, defense and social security | **0,04** | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,03 | -0,00 | 0,00 | -0,00 |
| Public education | **0,18** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,17 | -0,00 | 0,00 | -0,00 |
| Private education | **0,06** | 0,01 | -0,01 | 0,04 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Public health | **0,07** | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | 0,07 | 0,00 | 0,00 | -0,00 |
| Private health | **0,12** | 0,00 | -0,01 | 0,10 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,02 | -0,00 | 0,00 | -0,00 |
| **2010-2014 Total** | **2,33** | 0,59 | -0,62 | 0,94 | -0,13 | -0,01 | -0,03 | 0,21 | -0,14 | 1,06 | -0,00 | 0,47 | -0,00 |

*Table 13 – continuation…*

| Industry | Average Output Growth | Technology | | Endogenous Households Consumption | | Autonomous Households Consumption | | Investment | | Government Spending | | Exports | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern | Total Effect | Trade Pattern |
| **Period 2014-2016** | | | | | | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,04** | -0,01 | -0,01 | 0,05 | -0,02 | -0,01 | -0,00 | -0,14 | -0,00 | -0,01 | -0,00 | 0,18 | -0,00 |
| Extraction of oil and gas, including support activities | **-0,29** | -0,22 | 0,03 | 0,01 | -0,00 | -0,00 | -0,00 | -0,09 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 |
| Extraction of iron ore, including processing and agglomeration | **-0,11** | -0,02 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | -0,08 | -0,00 |
| Other mining and quarrying | **0,01** | 0,01 | -0,01 | 0,00 | -0,00 | -0,00 | -0,00 | -0,01 | 0,00 | -0,00 | -0,00 | 0,02 | -0,00 |
| Food and drinks | **-0,04** | 0,01 | -0,02 | 0,05 | -0,02 | -0,01 | -0,00 | -0,16 | -0,01 | -0,01 | -0,00 | 0,13 | -0,00 |
| Manufacture of tobacco products | **-0,01** | 0,00 | -0,00 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of textiles | **-0,03** | 0,00 | -0,00 | -0,01 | -0,01 | -0,00 | -0,00 | 0,00 | -0,02 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of footwear and leather goods | **-0,03** | -0,00 | -0,00 | -0,01 | -0,01 | -0,00 | -0,00 | -0,01 | 0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of wearing apparel and accessories | **-0,02** | -0,00 | -0,00 | -0,01 | -0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of wood products | **-0,02** | -0,01 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,02 | 0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of pulp, paper and paper products | **0,01** | -0,01 | 0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,01 | -0,00 | -0,00 | 0,05 | -0,00 |
| Printing and reproduction of recordings | **-0,01** | -0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 |
| Oil refining and coking plants | **-0,10** | -0,01 | 0,08 | 0,02 | -0,00 | -0,01 | -0,00 | -0,16 | -0,01 | -0,01 | -0,00 | 0,00 | -0,00 |
| Manufacture of biofuels | **0,02** | 0,02 | 0,00 | 0,03 | -0,00 | -0,00 | -0,00 | -0,03 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **-0,00** | 0,04 | -0,02 | 0,01 | -0,00 | -0,00 | -0,00 | -0,05 | -0,00 | -0,00 | -0,00 | 0,04 | -0,00 |
| Pharmaceutical products | **-0,01** | 0,00 | 0,00 | 0,01 | -0,02 | -0,00 | -0,00 | -0,00 | -0,01 | 0,00 | -0,01 | 0,01 | -0,00 |
| Perfumery hygiene and cleaning | **-0,01** | 0,01 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,01 | 0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,02** | 0,04 | -0,01 | 0,01 | -0,00 | -0,00 | -0,00 | -0,03 | -0,00 | -0,00 | -0,00 | 0,02 | -0,00 |
| Rubber & Plastics | **-0,05** | 0,00 | -0,02 | 0,00 | -0,00 | -0,01 | -0,00 | -0,04 | -0,00 | -0,00 | -0,00 | 0,02 | -0,00 |
| Cement and other non-metallic mineral products | **-0,06** | -0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,04 | -0,01 | -0,00 | -0,00 | 0,01 | -0,00 |
| Manufacture of steel and its derivatives | **-0,07** | -0,05 | -0,02 | 0,00 | -0,00 | -0,01 | -0,00 | -0,04 | -0,00 | -0,00 | -0,00 | 0,05 | -0,00 |
| Metallurgy of nonferrous metals | **0,01** | 0,01 | -0,02 | 0,00 | -0,00 | -0,00 | -0,00 | -0,02 | -0,00 | -0,00 | -0,00 | 0,04 | -0,00 |
| Metal products - exclusive machinery and equipment | **-0,05** | -0,01 | -0,01 | -0,00 | -0,00 | -0,00 | -0,00 | -0,04 | -0,00 | -0,00 | -0,00 | 0,02 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **-0,22** | 0,04 | -0,07 | -0,00 | -0,01 | -0,03 | -0,00 | -0,18 | -0,01 | -0,00 | -0,00 | 0,04 | -0,00 |
| Household appliances and electronic material | **-0,02** | 0,00 | -0,01 | 0,00 | -0,00 | -0,01 | -0,00 | -0,01 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Automobiles trucks and buses | **-0,19** | -0,02 | -0,01 | 0,00 | -0,00 | -0,07 | -0,00 | -0,10 | -0,01 | -0,00 | -0,00 | 0,03 | -0,00 |
| Parts and accessories for motor vehicles | **-0,08** | 0,01 | -0,02 | 0,00 | -0,00 | -0,01 | -0,00 | -0,08 | -0,00 | -0,00 | -0,00 | 0,03 | -0,00 |
| Other transportation equipment | **-0,01** | 0,01 | 0,00 | -0,00 | -0,00 | -0,01 | -0,00 | -0,01 | -0,01 | -0,00 | -0,00 | 0,04 | -0,03 |
| Electricity generation and distribution gas water sewage and urban cleaning | **0,14** | 0,11 | -0,02 | 0,12 | -0,01 | -0,01 | -0,00 | -0,07 | -0,01 | -0,01 | -0,00 | 0,04 | -0,00 |
| Construction | **-0,40** | -0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,38 | -0,00 | -0,00 | -0,00 | 0,00 | -0,00 |
| Trade | **-0,23** | 0,15 | -0,05 | 0,06 | -0,03 | -0,04 | -0,00 | -0,39 | -0,02 | -0,02 | -0,00 | 0,13 | -0,01 |
| Transporting warehousing and mail | **-0,11** | 0,02 | -0,01 | 0,02 | -0,02 | -0,02 | -0,00 | -0,14 | -0,01 | -0,01 | -0,00 | 0,06 | -0,00 |
| Accommodation and food services | **-0,08** | -0,00 | 0,00 | -0,03 | -0,01 | -0,01 | -0,00 | -0,05 | -0,00 | -0,01 | -0,00 | 0,03 | -0,00 |
| Information services | **-0,10** | -0,03 | -0,01 | 0,00 | -0,01 | -0,01 | -0,00 | -0,07 | -0,01 | -0,01 | -0,00 | 0,04 | -0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,13** | 0,14 | -0,05 | 0,15 | -0,02 | -0,02 | -0,00 | -0,12 | -0,01 | -0,01 | -0,00 | 0,09 | -0,00 |
| Real estate activities and rentals | **-0,00** | 0,02 | -0,02 | 0,12 | -0,01 | -0,02 | -0,00 | -0,12 | -0,01 | -0,01 | -0,00 | 0,05 | -0,00 |
| Business and family services and maintenance services | **-0,19** | 0,06 | -0,09 | 0,03 | -0,03 | -0,04 | -0,00 | -0,19 | -0,02 | -0,01 | -0,00 | 0,11 | -0,01 |
| Public administration, defense and social security | **-0,05** | 0,01 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 | -0,05 | -0,00 | 0,01 | -0,00 |
| Public education | **0,01** | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 | 0,00 | -0,00 |
| Private education | **0,01** | 0,01 | -0,01 | 0,04 | -0,00 | -0,00 | -0,00 | -0,02 | -0,00 | -0,00 | -0,00 | 0,01 | -0,00 |
| Public health | **-0,01** | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,00 | -0,01 | -0,00 | 0,00 | -0,00 |
| Private health | **0,02** | 0,01 | -0,01 | 0,07 | -0,01 | -0,01 | -0,00 | -0,04 | -0,00 | -0,01 | -0,00 | 0,02 | -0,00 |
| **2014-2016 Total** | **-2,18** | 0,29 | -0,43 | 0,75 | -0,27 | -0,37 | -0,03 | -2,91 | -0,21 | -0,17 | -0,02 | 1,27 | -0,08 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*

*Table 14 - Contribution to Average Households' Consumption Growth by Component Disclosing Trade Pattern Effect - 42 Industries - p.p.*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2000-2003** | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,08** | 0,11 | 0,01 | -0,12 | 0,06 | 0,02 | 0,00 | 0,00 |
| Extraction of oil and gas, including support activities | **0,00** | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Other mining and quarrying | **-0,00** | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Food and drinks | **0,04** | 0,16 | 0,02 | -0,42 | 0,20 | 0,09 | -0,00 | 0,00 |
| Manufacture of tobacco products | **0,00** | 0,01 | -0,00 | -0,01 | 0,01 | 0,00 | 0,00 | 0,00 |
| Manufacture of textiles | **-0,02** | -0,01 | 0,00 | -0,03 | 0,02 | 0,01 | -0,00 | 0,00 |
| Manufacture of footwear and leather goods | **-0,24** | -0,20 | -0,00 | -0,08 | 0,04 | 0,02 | -0,00 | 0,00 |
| Manufacture of wearing apparel and accessories | **-0,02** | -0,01 | 0,01 | -0,03 | 0,02 | 0,01 | -0,00 | 0,00 |
| Manufacture of wood products | **-0,00** | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Manufacture of pulp, paper and paper products | **-0,01** | -0,00 | 0,00 | -0,01 | 0,01 | 0,00 | -0,00 | 0,00 |
| Printing and reproduction of recordings | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 |
| Oil refining and coking plants | **-0,02** | 0,01 | 0,01 | -0,10 | 0,05 | 0,02 | 0,00 | 0,00 |
| Manufacture of biofuels | **0,04** | 0,05 | 0,00 | -0,02 | 0,01 | 0,00 | 0,00 | -0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **-0,01** | -0,01 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Pharmaceutical products | **-0,03** | 0,02 | -0,03 | -0,05 | 0,02 | 0,01 | -0,00 | 0,00 |
| Perfumery hygiene and cleaning | **-0,03** | -0,02 | -0,01 | -0,03 | 0,02 | 0,01 | -0,00 | -0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **-0,00** | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Rubber & Plastics | **-0,01** | -0,00 | -0,00 | -0,02 | 0,01 | 0,00 | -0,00 | 0,00 |
| Cement and other non-metallic mineral products | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Manufacture of steel and its derivatives | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 |
| Metallurgy of nonferrous metals | **0,00** | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Metal products - exclusive machinery and equipment | **0,01** | 0,01 | 0,00 | -0,01 | 0,01 | 0,00 | 0,00 | 0,00 |
| Furniture and products of various industries & Machinery and equipment | **-0,11** | -0,03 | -0,00 | -0,05 | 0,02 | 0,01 | -0,06 | -0,00 |
| Household appliances and electronic material | **-0,00** | 0,00 | -0,00 | -0,00 | 0,00 | 0,00 | 0,00 | -0,01 |
| Automobiles trucks and buses | **-0,02** | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,07 | 0,05 |
| Parts and accessories for motor vehicles | **-0,00** | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 |
| Other transportation equipment | **0,04** | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,02 | 0,01 |
| Electricity generation and distribution gas water sewage and urban cleaning | **-0,03** | 0,01 | -0,00 | -0,12 | 0,06 | 0,03 | -0,00 | 0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Trade | **-0,04** | 0,11 | -0,00 | -0,47 | 0,23 | 0,10 | 0,00 | 0,00 |
| Transporting warehousing and mail | **0,05** | 0,08 | 0,02 | -0,14 | 0,07 | 0,03 | -0,00 | 0,00 |
| Accommodation and food services | **-0,21** | -0,18 | 0,02 | -0,17 | 0,08 | 0,03 | -0,00 | 0,00 |
| Information services | **0,21** | 0,29 | -0,03 | -0,16 | 0,08 | 0,03 | -0,00 | 0,00 |
| Financial intermediation insurance and supplementary pension and related services | **-0,03** | 0,02 | 0,00 | -0,17 | 0,08 | 0,03 | 0,00 | 0,00 |
| Real estate activities and rentals | **-0,93** | -0,74 | 0,00 | -0,62 | 0,30 | 0,13 | 0,00 | 0,00 |
| Business and family services and maintenance services | **-0,35** | -0,20 | -0,01 | -0,24 | 0,12 | 0,05 | -0,07 | 0,00 |
| Public administration, defense and social security | **-0,01** | -0,00 | 0,00 | -0,01 | 0,01 | 0,00 | -0,00 | 0,00 |
| Public education | **-0,01** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Private education | **0,01** | 0,05 | -0,00 | -0,12 | 0,06 | 0,02 | -0,00 | 0,00 |
| Public health | **-0,00** | -0,00 | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 |
| Private health | **0,11** | 0,15 | 0,00 | -0,14 | 0,07 | 0,03 | 0,01 | 0,00 |
| **2000-2003 Total** | **-1,57** | -0,38 | -0,01 | -3,40 | 1,64 | 0,69 | -0,16 | 0,05 |

*Table 14 – continuation…*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2003-2008** | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,10** | -0,10 | 0,00 | 0,08 | -0,04 | 0,16 | 0,00 | 0,00 |
| Extraction of oil and gas, including support activities | **-0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Other mining and quarrying | **0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Food and drinks | **0,35** | -0,35 | 0,01 | 0,28 | -0,15 | 0,56 | 0,00 | 0,00 |
| Manufacture of tobacco products | **0,01** | -0,02 | 0,01 | 0,01 | -0,00 | 0,02 | 0,00 | 0,00 |
| Manufacture of textiles | **0,00** | -0,04 | -0,00 | 0,02 | -0,01 | 0,04 | 0,00 | 0,00 |
| Manufacture of footwear and leather goods | **0,11** | 0,01 | -0,02 | 0,05 | -0,03 | 0,10 | 0,00 | 0,00 |
| Manufacture of wearing apparel and accessories | **0,03** | -0,01 | -0,01 | 0,02 | -0,01 | 0,04 | 0,00 | 0,00 |
| Manufacture of wood products | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Manufacture of pulp, paper and paper products | **0,02** | -0,00 | 0,00 | 0,01 | -0,00 | 0,02 | 0,00 | 0,00 |
| Printing and reproduction of recordings | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Oil refining and coking plants | **0,03** | -0,12 | -0,01 | 0,07 | -0,03 | 0,13 | 0,00 | 0,00 |
| Manufacture of biofuels | **0,03** | -0,00 | -0,00 | 0,01 | -0,01 | 0,03 | 0,00 | 0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Pharmaceutical products | **0,04** | -0,05 | 0,01 | 0,03 | -0,02 | 0,07 | 0,00 | 0,00 |
| Perfumery hygiene and cleaning | **0,03** | -0,02 | 0,00 | 0,02 | -0,01 | 0,04 | 0,00 | 0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Rubber & Plastics | **-0,00** | -0,03 | -0,00 | 0,01 | -0,01 | 0,02 | 0,00 | 0,00 |
| Cement and other non-metallic mineral products | **0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Manufacture of steel and its derivatives | **0,00** | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Metallurgy of nonferrous metals | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Metal products - exclusive machinery and equipment | **0,02** | -0,00 | -0,00 | 0,01 | -0,00 | 0,02 | 0,00 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **0,05** | -0,05 | -0,00 | 0,03 | -0,02 | 0,06 | 0,03 | -0,01 |
| Household appliances and electronic material | **0,04** | -0,00 | 0,00 | 0,00 | -0,00 | 0,01 | 0,03 | 0,01 |
| Automobiles trucks and buses | **0,21** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,24 | -0,03 |
| Parts and accessories for motor vehicles | **0,01** | 0,00 | -0,00 | 0,00 | -0,00 | 0,01 | 0,00 | 0,00 |
| Other transportation equipment | **0,04** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,04 | -0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **0,12** | -0,08 | -0,00 | 0,08 | -0,04 | 0,16 | 0,00 | 0,00 |
| Construction | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade | **1,01** | 0,16 | 0,00 | 0,34 | -0,18 | 0,68 | 0,00 | 0,00 |
| Transporting warehousing and mail | **0,12** | -0,09 | -0,02 | 0,09 | -0,05 | 0,19 | 0,00 | 0,00 |
| Accommodation and food services | **0,28** | 0,01 | -0,01 | 0,11 | -0,06 | 0,22 | 0,00 | 0,00 |
| Information services | **0,08** | -0,21 | 0,02 | 0,11 | -0,06 | 0,22 | 0,00 | 0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,64** | 0,31 | 0,00 | 0,13 | -0,07 | 0,27 | 0,00 | -0,00 |
| Real estate activities and rentals | **0,02** | -0,86 | -0,00 | 0,35 | -0,19 | 0,70 | 0,00 | 0,00 |
| Business and family services and maintenance services | **0,33** | -0,15 | -0,00 | 0,15 | -0,08 | 0,30 | 0,11 | 0,00 |
| Public administration, defense and social security | **0,02** | -0,01 | -0,00 | 0,01 | -0,00 | 0,02 | 0,00 | 0,00 |
| Public education | **0,00** | -0,01 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Private education | **-0,04** | -0,22 | 0,01 | 0,07 | -0,04 | 0,14 | 0,00 | 0,00 |
| Public health | **-0,00** | -0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 |
| Private health | **0,14** | -0,10 | -0,00 | 0,10 | -0,05 | 0,19 | 0,00 | 0,00 |
| **2003-2008 Total** | **3,88** | -2,05 | -0,01 | 2,22 | -1,17 | 4,45 | 0,46 | -0,03 |

*Table 14 – continuation…*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2008-2009** | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **-0,12** | -0,32 | -0,00 | 0,15 | -0,03 | 0,07 | 0,00 | 0,00 |
| Extraction of oil and gas, including support activities | **0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **-0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Other mining and quarrying | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 |
| Food and drinks | **0,32** | -0,37 | -0,01 | 0,55 | -0,12 | 0,26 | -0,00 | 0,00 |
| Manufacture of tobacco products | **-0,05** | 0,01 | -0,08 | 0,02 | -0,00 | 0,01 | -0,00 | 0,00 |
| Manufacture of textiles | **-0,01** | -0,05 | 0,00 | 0,03 | -0,01 | 0,02 | -0,00 | -0,00 |
| Manufacture of footwear and leather goods | **0,08** | -0,03 | -0,02 | 0,10 | -0,02 | 0,05 | -0,00 | 0,00 |
| Manufacture of wearing apparel and accessories | **-0,01** | -0,07 | 0,01 | 0,04 | -0,01 | 0,02 | -0,00 | 0,00 |
| Manufacture of wood products | **-0,00** | -0,01 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Manufacture of pulp, paper and paper products | **0,00** | -0,02 | 0,00 | 0,02 | -0,00 | 0,01 | -0,00 | 0,00 |
| Printing and reproduction of recordings | **-0,00** | -0,01 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | -0,00 |
| Oil refining and coking plants | **-0,04** | -0,22 | 0,03 | 0,12 | -0,03 | 0,06 | -0,00 | -0,00 |
| Manufacture of biofuels | **0,08** | 0,05 | -0,00 | 0,03 | -0,01 | 0,01 | -0,00 | -0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,01** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Pharmaceutical products | **0,08** | -0,01 | 0,01 | 0,06 | -0,01 | 0,03 | -0,00 | 0,00 |
| Perfumery hygiene and cleaning | **0,07** | -0,03 | 0,05 | 0,04 | -0,01 | 0,02 | -0,00 | 0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,02** | 0,01 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Rubber & Plastics | **0,03** | 0,00 | 0,00 | 0,02 | -0,00 | 0,01 | -0,00 | 0,00 |
| Cement and other non-metallic mineral products | **0,01** | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Manufacture of steel and its derivatives | **-0,01** | -0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Metallurgy of nonferrous metals | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Metal products - exclusive machinery and equipment | **0,01** | -0,01 | 0,00 | 0,02 | -0,00 | 0,01 | -0,00 | 0,00 |
| Furniture and products of various industries & Machinery and equipment | **0,06** | -0,05 | 0,01 | 0,06 | -0,01 | 0,03 | 0,02 | 0,01 |
| Household appliances and electronic material | **0,10** | 0,01 | 0,00 | 0,01 | -0,00 | 0,00 | 0,07 | 0,01 |
| Automobiles trucks and buses | **0,05** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,06 | -0,01 |
| Parts and accessories for motor vehicles | **0,00** | -0,00 | 0,00 | 0,01 | -0,00 | 0,00 | -0,00 | 0,00 |
| Other transportation equipment | **0,04** | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,03 | 0,01 |
| Electricity generation and distribution gas water sewage and urban cleaning | **-0,13** | -0,33 | 0,00 | 0,16 | -0,03 | 0,07 | -0,00 | 0,00 |
| Construction | **0,01** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade | **2,06** | 1,08 | 0,00 | 0,78 | -0,16 | 0,37 | 0,00 | 0,00 |
| Transporting warehousing and mail | **0,17** | -0,14 | 0,08 | 0,18 | -0,04 | 0,09 | 0,00 | 0,00 |
| Accommodation and food services | **0,60** | 0,27 | 0,02 | 0,25 | -0,05 | 0,12 | 0,00 | -0,00 |
| Information services | **0,15** | -0,12 | -0,00 | 0,21 | -0,04 | 0,10 | -0,00 | 0,00 |
| Financial intermediation insurance and supplementary pension and related services | **1,52** | 1,07 | -0,00 | 0,35 | -0,07 | 0,17 | 0,00 | 0,00 |
| Real estate activities and rentals | **0,73** | -0,09 | -0,00 | 0,65 | -0,14 | 0,31 | 0,00 | 0,00 |
| Business and family services and maintenance services | **0,82** | 0,25 | -0,01 | 0,31 | -0,06 | 0,15 | 0,18 | 0,00 |
| Public administration, defense and social security | **0,01** | -0,01 | 0,00 | 0,02 | -0,00 | 0,01 | -0,00 | 0,00 |
| Public education | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Private education | **0,13** | -0,02 | -0,00 | 0,12 | -0,03 | 0,06 | -0,00 | 0,00 |
| Public health | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Private health | **0,21** | -0,05 | -0,00 | 0,19 | -0,04 | 0,09 | 0,02 | 0,00 |
| **2008-2009 Total** | **7,00** | 0,78 | 0,11 | 4,53 | -0,95 | 2,14 | 0,37 | 0,02 |

*Table 14 – continuation…*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2010-2014** | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,10** | 0,00 | -0,00 | 0,03 | -0,01 | 0,08 | 0,00 | 0,00 |
| Extraction of oil and gas, including support activities | **0,00** | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Other mining and quarrying | **-0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Food and drinks | **0,32** | -0,03 | -0,01 | 0,12 | -0,04 | 0,27 | 0,00 | 0,00 |
| Manufacture of tobacco products | **-0,01** | -0,03 | 0,01 | 0,00 | -0,00 | 0,01 | 0,00 | 0,00 |
| Manufacture of textiles | **-0,02** | -0,03 | -0,00 | 0,01 | -0,00 | 0,02 | -0,00 | 0,00 |
| Manufacture of footwear and leather goods | **-0,01** | -0,05 | -0,03 | 0,02 | -0,01 | 0,05 | 0,00 | 0,00 |
| Manufacture of wearing apparel and accessories | **0,01** | -0,01 | -0,00 | 0,01 | -0,00 | 0,02 | 0,00 | 0,00 |
| Manufacture of wood products | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Manufacture of pulp, paper and paper products | **0,01** | -0,01 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 | 0,00 |
| Printing and reproduction of recordings | **-0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Oil refining and coking plants | **0,12** | 0,03 | -0,00 | 0,03 | -0,01 | 0,07 | 0,00 | 0,00 |
| Manufacture of biofuels | **-0,02** | -0,03 | -0,00 | 0,01 | -0,00 | 0,01 | 0,00 | 0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,00** | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Pharmaceutical products | **0,00** | -0,03 | -0,00 | 0,01 | -0,00 | 0,03 | -0,00 | 0,00 |
| Perfumery hygiene and cleaning | **0,02** | -0,01 | -0,00 | 0,01 | -0,00 | 0,02 | -0,00 | 0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **-0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Rubber & Plastics | **0,01** | 0,00 | -0,00 | 0,00 | -0,00 | 0,01 | -0,00 | -0,00 |
| Cement and other non-metallic mineral products | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Manufacture of steel and its derivatives | **0,00** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Metallurgy of nonferrous metals | **0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 |
| Metal products - exclusive machinery and equipment | **-0,01** | -0,02 | 0,00 | 0,00 | -0,00 | 0,01 | -0,00 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **0,06** | -0,01 | -0,00 | 0,01 | -0,00 | 0,03 | 0,04 | -0,00 |
| Household appliances and electronic material | **-0,04** | -0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,03 | -0,01 |
| Automobiles trucks and buses | **-0,02** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | -0,02 |
| Parts and accessories for motor vehicles | **-0,02** | -0,02 | 0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Other transportation equipment | **-0,02** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | -0,01 | -0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **-0,02** | -0,12 | 0,00 | 0,03 | -0,01 | 0,08 | -0,00 | 0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Trade | **1,05** | 0,45 | -0,00 | 0,20 | -0,06 | 0,46 | 0,00 | 0,00 |
| Transporting warehousing and mail | **0,11** | -0,02 | -0,01 | 0,05 | -0,01 | 0,10 | -0,00 | 0,00 |
| Accommodation and food services | **0,41** | 0,25 | -0,04 | 0,07 | -0,02 | 0,15 | -0,00 | 0,00 |
| Information services | **-0,06** | -0,17 | -0,00 | 0,04 | -0,01 | 0,09 | -0,00 | 0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,05** | -0,22 | -0,00 | 0,09 | -0,03 | 0,21 | 0,00 | 0,00 |
| Real estate activities and rentals | **0,78** | 0,32 | 0,00 | 0,16 | -0,05 | 0,35 | 0,00 | 0,00 |
| Business and family services and maintenance services | **0,15** | -0,02 | -0,02 | 0,07 | -0,02 | 0,16 | -0,02 | 0,00 |
| Public administration, defense and social security | **0,02** | 0,00 | -0,00 | 0,00 | -0,00 | 0,01 | 0,00 | -0,00 |
| Public education | **0,01** | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 | 0,00 | 0,00 |
| Private education | **0,18** | 0,09 | -0,00 | 0,03 | -0,01 | 0,07 | -0,00 | 0,00 |
| Public health | **-0,01** | -0,01 | -0,00 | 0,00 | -0,00 | 0,00 | -0,00 | 0,00 |
| Private health | **0,39** | 0,23 | 0,00 | 0,05 | -0,01 | 0,11 | 0,01 | 0,00 |
| **2010-2014 Total** | **3,55** | 0,52 | -0,13 | 1,09 | -0,33 | 2,45 | -0,01 | -0,03 |

*Table 14 – continuation...*

| Industry | Average Consumption Growth | Endogenous Consumption Pattern | | Average Wages | Inverse of Productivity | Output | Autonomous Consumption | |
|---|---|---|---|---|---|---|---|---|
| | | Total Effect | Trade Pattern | Total Effect | Total Effect | Total Effect | Total Effect | Trade Pattern |
| **Period 2014-2016** | | | | | | | | |
| Agriculture, forestry, livestock and fisheries | **0,14** | 0,20 | -0,01 | 0,02 | 0,02 | -0,09 | 0,00 | 0,00 |
| Extraction of oil and gas, including support activities | **-0,00** | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Extraction of iron ore, including processing and agglomeration | **-0,00** | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Other mining and quarrying | **-0,00** | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 |
| Food and drinks | **-0,04** | 0,16 | -0,01 | 0,06 | 0,07 | -0,31 | 0,00 | 0,00 |
| Manufacture of tobacco products | **-0,07** | -0,00 | -0,06 | 0,00 | 0,00 | -0,01 | -0,00 | 0,00 |
| Manufacture of textiles | **-0,05** | -0,04 | -0,01 | 0,00 | 0,00 | -0,01 | -0,00 | 0,00 |
| Manufacture of footwear and leather goods | **-0,13** | -0,12 | 0,02 | 0,01 | 0,01 | -0,05 | -0,00 | 0,00 |
| Manufacture of wearing apparel and accessories | **-0,09** | -0,07 | -0,01 | 0,00 | 0,01 | -0,02 | -0,00 | 0,00 |
| Manufacture of wood products | **-0,01** | -0,01 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Manufacture of pulp, paper and paper products | **-0,01** | -0,00 | 0,00 | 0,00 | 0,00 | -0,01 | 0,00 | 0,00 |
| Printing and reproduction of recordings | **-0,00** | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Oil refining and coking plants | **0,01** | 0,04 | 0,01 | 0,02 | 0,02 | -0,08 | 0,00 | 0,00 |
| Manufacture of biofuels | **0,05** | 0,06 | -0,00 | 0,00 | 0,00 | -0,01 | 0,00 | 0,00 |
| Manufacture of other organic and inorganic chemicals, resins and elastomers | **0,00** | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Pharmaceutical products | **-0,06** | 0,00 | -0,05 | 0,01 | 0,01 | -0,03 | 0,00 | 0,00 |
| Perfumery hygiene and cleaning | **-0,01** | -0,03 | 0,03 | 0,00 | 0,01 | -0,02 | 0,00 | 0,00 |
| Manufacture of pesticides, disinfectants, paints and various chemicals | **0,00** | 0,01 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 |
| Rubber & Plastics | **-0,02** | -0,01 | 0,00 | 0,00 | 0,00 | -0,01 | -0,00 | 0,00 |
| Cement and other non-metallic mineral products | **0,00** | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Manufacture of steel and its derivatives | **-0,00** | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Metallurgy of nonferrous metals | **0,00** | 0,00 | 0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 |
| Metal products - exclusive machinery and equipment | **-0,04** | -0,02 | -0,01 | 0,00 | 0,00 | -0,01 | -0,00 | -0,00 |
| Furniture and products of various industries & Machinery and equipment | **-0,27** | -0,11 | 0,00 | 0,01 | 0,01 | -0,03 | -0,14 | 0,00 |
| Household appliances and electronic material | **-0,06** | -0,01 | 0,00 | 0,00 | 0,00 | -0,00 | -0,05 | 0,00 |
| Automobiles trucks and buses | **-0,46** | -0,00 | 0,00 | 0,00 | 0,00 | -0,00 | -0,48 | 0,03 |
| Parts and accessories for motor vehicles | **0,00** | 0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Other transportation equipment | **-0,05** | -0,01 | 0,00 | 0,00 | 0,00 | -0,00 | -0,04 | 0,00 |
| Electricity generation and distribution gas water sewage and urban cleaning | **0,18** | 0,24 | -0,00 | 0,02 | 0,02 | -0,09 | 0,00 | 0,00 |
| Construction | **-0,00** | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | 0,00 | 0,00 |
| Trade | **-0,46** | -0,13 | -0,01 | 0,10 | 0,13 | -0,55 | -0,00 | 0,00 |
| Transporting warehousing and mail | **-0,12** | -0,05 | -0,00 | 0,02 | 0,03 | -0,12 | 0,00 | 0,00 |
| Accommodation and food services | **-0,29** | -0,20 | 0,02 | 0,03 | 0,04 | -0,18 | 0,00 | 0,00 |
| Information services | **-0,20** | -0,15 | 0,00 | 0,02 | 0,02 | -0,09 | 0,00 | 0,00 |
| Financial intermediation insurance and supplementary pension and related services | **0,39** | 0,54 | -0,01 | 0,05 | 0,06 | -0,24 | -0,00 | -0,00 |
| Real estate activities and rentals | **0,01** | 0,26 | 0,00 | 0,08 | 0,10 | -0,43 | 0,00 | 0,00 |
| Business and family services and maintenance services | **-0,32** | -0,11 | -0,01 | 0,03 | 0,04 | -0,17 | -0,10 | 0,00 |
| Public administration, defense and social security | **0,00** | 0,01 | -0,00 | 0,00 | 0,00 | -0,01 | 0,00 | 0,00 |
| Public education | **-0,01** | -0,01 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Private education | **0,09** | 0,14 | 0,00 | 0,02 | 0,02 | -0,09 | -0,00 | 0,00 |
| Public health | **-0,00** | -0,00 | -0,00 | 0,00 | 0,00 | -0,00 | -0,00 | 0,00 |
| Private health | **0,12** | 0,22 | -0,01 | 0,03 | 0,03 | -0,15 | -0,00 | 0,00 |
| **2014-2016 Total** | **-1,75** | 0,81 | -0,11 | 0,54 | 0,68 | -2,87 | -0,81 | 0,03 |

*Source: own calculation based on Passoni and Freitas (2018) IO database.*