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STRUCTURAL DECOMPOSITION ANALYSIS ON EMPLOYMENT CHANGES IN SELECTED COUNTRIES

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ABSTRACT

The objective of this paper was to measure the drivers of the variation in employment and to make a comparative analysis of the results among 43 countries in the period 2000-2014. The methodology of Structural Decomposition Analysis was used to decompose the employment variation into four effects: intensity of labor use, technology, structure of final demand and volume of final demand. The results showed that the increase in labor productivity (negative intensity effect) is the main responsible for the loss of jobs in the economy, a figure close to 50% of the countries' total jobs in the 2000-2014 period of analysis. The creation of jobs occurs mainly due to final demand effects. However, the effect of demand structure tends to be negative for developed countries and positive for developing countries. In developing countries, the effect of final demand structure is relatively more important in creating jobsthan final demand volume effect. The inter-sector relocation of employment, disappearance of professions and increased requirements for qualification lead workers to a continuous learning process, adaptation to new technologies and a probable change of sector of activity in their professional life.

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INTRODUCTION

The evolution of technology and variations in final demand lead economies to modify productive structures and it has a double-sided nature of technological change, which both destroys old jobs, firms and even whole industries on the one side and creates jobs, firms and industries on the other side (Hagemann, 2012). A key factor is the changing composition of the production and employment sectors (Roncolato and Kucera, 2013). The effects of technological change on employment have two views, pessimistic and optimistic, the pessimist view is that the jobs lost will not be compensated by the increase in wages resulting from increased productivity and economic growth. Developed countries had a characteristic of "jobless growth" since from the 1980s. The main causes were the dissociation between productivity, compensation and the use of labor (Compagnucci *et al*., 2018).The optimistic view is that dismissed workers from sectors affected by the technology changes need training to work in other activities and time to find new jobs and it is expected that the inter-sector reallocation of physical and human assets will happen.

Technical progress results in increased productivity and economic growth with new jobs, this allows the reintegration of workers who were affected. The optimistic view of the impact of technological changes on employment considers that adverse effect on unemployment persists in the short term and disappears later. Therefore, the effect is transitory, not permanent (Feldman, 2013). Considering the possible impacts of technological changes and demand on the economy, different outcomes result from the circle of causation among productivity, employment, wages and aggregate demand as developed by Myrdal (1957). The labor market adjustment process in relation to technological changesis time-sensitive and depends on the current stage of development in a countryas well as its socio-institutional features. Therefore, both views, optimistic and pessimistic, can occur depending on the characteristics of the sectors. Effects of technological innovation can be accompanied by an increase in the use of labor and total wages in some sectors of the economy while another group of sectors presents labor dislocation offset by the increase in wages and sectors those there is a fall in the use of work and total wages (Gentili *et al*., 2020).

The changes in the structure of the economy and their impacts on labor are the motivation for this research that aims at measuring the drivers of employment variation in forty-three countries. Inter-sector employment reallocation is measured by a Structural Change Index, which can be interpreted as an index of labor market instability. The study measures the technological effects and effects of final demand on employment variation to identify the main drivers and provide information for policies regarding the relocation of workers, job losses due to technological changes, labor market instability and labor productivity. The countries analyzed are those of the European Union and fifteen other major economies in the world, which comprise a group of forty-three countries. The text is divided in five parts including the introduction. Recent studies on structural decomposition of employment are analyzed in the second part. The third part presents the methodology and database for the study. The results and discussion are presented in the fourth part, and the last is the main conclusions of the research.

MATERIALS AND METHODS

Data: The section presents the calculations of the structural decomposition of the employment variation to be made using the interregional input-output system with forty-three countries and the rest of the world in the period of 2000-2014. The World Input Output Database (WIOD) provides the Multiregional Input-output System (MRIO) with 56 sectors and data on engaged people (jobs) in the productive sectors. For details on the database see Timmer *et al*. (2015) and Timmer *et al*. (2014). The methodology requires the elimination of the inflation effect. Therefore, it is necessary to make comparisons of matrices from different years at current prices.WIOD presents matrices from different years in current values and values from the previous year (Previous Years' Prices - PYP).

The input-output matrix: The Multiregional Input-output System (MRIO)presents the structure of the economy divided into regions and flows of goods and services. The matrix has data on the final demand and number of jobs, for this study is the number of people engaged (Isard, 1951 and Leontief, 1951). Figure 1 is based on Isard (1951), it shows in a schematic way the relationships within an interregional input-product system with two regions. The present study analyzes 44 regions (43 countries and the rest of the world) with regional and interregional flows of goods and services. The analysis period is between the years 2000 and 2014. The basic relations of the input-output matrix use the matrix of monetary flow Z of sector i to sector j and the vector of sectorial production X to calculate A, which is the matrix of technical coefficients is calculated by Equation (1):

$$A = Z(\hat{X})^{-1} \quad (1)$$

The relationship between the production system and the final demand are calculated by:

$$(I - A)X = Y \quad (2)$$

X is the vector of sectorial production;A is the matrix of technical coefficients and Y is the vector of the final demand. The matrices can be arranged as Equation (3):

$$X = (I - A)^{-1}Y \quad (3)$$

The Leontief inverse matrix is given by Equation (4):

$$S = (I - A)^{-1} \quad (4)$$

And its elements are s_{ij}.

Structuraldecompositionanalysis(SDA): Structural decomposition analysis is commonly used to measure drivers of changes in environmental variables. The present study uses the method to measure technological effects on employment variation, which are the intensity and technology effect and the effects of final demand, which are the structure and volume of final demand. The model of Structural Decomposition Analysis (SDA) adopted in the present study was adapted from Wier and Hasler (1999), De Haan (2001), Dietzenbacher and Los (2000), Jacobsen (2000) and Pompermayer Sesso *et al.* (2020). The authors used the structural decomposition method to analyze environmental variables. For this study, the method was used to measure the drivers of employment variation in the selected countries. The method considers thatemployment changes by sector (Δc) is described as function of economic growth regarding gain or not of efficiency. Equation (5) presents the calculation for the factor decomposition:

$$\Delta c = \Delta e + \Delta s + \Delta y^{s} + \Delta y^{v} \quad (5)$$

(Δe) is the employment variationin relation to product unit, which means intensity of use of the production factor (labor);

(ΔS)variation in employment caused by changesin the technical coefficients of the economy;

(Δy^{s}) variation in employment caused by changes in the composition of the final demand structure;

(Δy^{v})variation in employment caused by the modification in the volume in the final demand.

The analysis of the structural decomposition regarding the factor of interest can be derived as follows: supposing that c_j of C represents the value of the factor of activity j. Then, the total of the variable generated by all productive activities can be determined as a function of the total product:

$$c = EX \quad (6)$$

The element c indicates the total value of the factor generated (jobs) in all productive activities. The column vector X has the values of the total sectoral product and in which the elements of E indicate the coefficients of the factor, that is, the quantity of the jobs generated by a monetary unit of production of sector j, represents the diagonalized matrix of X, this is a vector with values of the sectorial production. The equation shows the value of the total sectoral production as a function of the final demand, representing the Leontief inverse matrix and A represents the matrix of technical coefficients. The matrix with the values of components of the final demand, y, with dimension (nxm) contains the elements of the final demand: export, consumption of non-profit civil institutions, gross fixed capital formation, consumption of public administration and consumption of households. The sectoral values of inventory variation were added to the household consumption because the model does not consider negative values which may occur in the inventory variation component and this sum cancels possible values below zero. There are five components of the final demand. The total in the line of this matrix is the line vector y^{v}, which is the final demand volume with dimension (mx1). The final demand composition, y^{s}, is a matrix of coefficients obtained by dividing each element of the matrix by the vector y^{v} in its inverse and diagonalized form:

$$y^{s} = y\hat{y}^{v-1} \quad (7)$$

Thus, the values of the variable of interest generated by all productive activities can be determined by the following equation:

$$c = EX = ESy^{s}y^{v} \quad (8)$$

In equation (8), for this paper:

E is the vector (1xn) of employment coefficients (people engaged per production unit);

S is the Leontief inverse matrix (nxn);

y^s is the matrix (nxm) of coefficients of final demand and

y^v is the vector (mx1) with final total demand by category.

The structural decomposition of the employment variation and its total value between the periods of t and *t-1* can be determined as:

$$\Delta c = {}^1/_2\left((\Delta E)S_{(t)}y^s_{(t)}y^v_{(t)} + (\Delta E)S_{(t-1)}y^s_{(t-1)}y^v_{(t-1)}\right) \text{ (intensity effect)}$$
$$+ {}^1/_2\left(E_{(t-1)}(\Delta S)y^s_{(t)}y^v_{(t)} + E_{(t)}(\Delta S)y^s_{(t-1)}y^v_{(t-1)}\right) \text{ (technology effect)}$$
$$+ {}^1/_2\left(E_{(t-1)}S_{(t-1)}(\Delta y^s)y^v_{(t)} + E_{(t)}S_{(t)}(\Delta y^s)y^v_{(t-1)}\right) \text{ (final demand structure effect)}$$
$$+ {}^1/_2\left(E_{(t-1)}S_{(t-1)}y^s_{(t-1)}(\Delta y^v) + E_{(t)}S_{(t)}y^s_{(t)}(\Delta y^v)\right) \text{ (final demand volume effect)} \quad (9)$$

In order to obtain the results separated by sector, it is necessary to take E in its diagonalized form in the equation equation $C = \hat{E}X = \hat{E}Sy^s_{(t)}y^v_{(t)}$ The intensity effect refers to the variation of the people engaged per million dollars of 2014. Negative values mean increases in labor productivity. The technology effect shows the variation in the number of indirect jobs in the production chains. The effect of the final demand structure is the measurement of the modification of the purchases proportion of demand components (households, government, exports, and investment) influencing the number of people engaged. Finally, the effect of the final demand volume can be interpreted as impact of economic growth on employment.

The results of structural decomposition of employment variation refer to number of people engaged. The intensity effect measures the variation in labor use per unit of production (million dollars of 2014).The technology effect shows the variation in the number of indirect jobs in the production chains. The effect of the final demand structure is the measurement of the modification of the purchases proportion of demand components (households, government, exports, and investment) influencing the number of people engaged. Finally, the effect of the final demand volume can be interpreted as impact of economic growth on employment, this is the main effect of increasing employment for the countries analyzed by the literature review studies.

Employment Structural Change Index (ECI): The Employment Structural Change Index (ECI) is an estimate of the reallocation effect caused by the various factors that influence employment, such as technology change, international trade and variations in domestic final demand. The indicator can be interpreted as an index of labor market instability. The ECI is calculated as follows:

$$ECI = \{(\Sigma|pi_{(t)} - pi_{(t-1)}|)/2\}100 \quad (10)$$

The pi_t e pi_{t-1}elements represent the share of each sector in the total number of persons employed in the economy in different periods, years t and t-1. The use of the value in module (absolute) ensures that positive and negative values will not be canceled when added and the sum is divided by two so as not to incur double counting.

The ECI can be between zero (no structural change) and 100% (total structural change in employment). Value closer to zero mean stability of the sectors' participation in the total number of engaged people in the economy. The higher the ECI value, the greater the structural change and variation in the sectors' participation (Sesso Filho *et al*., 2010).

RESULTS AND DISCUSSION

The aggregated results of the structural decomposition of employment variationof the countries in the period of 2000 to 2014 are shown in Table 1 and Figure 2. Values refer to the number of people engaged (millions of jobs).The total values show that 529.4 million jobs were created in the 43 of the countries in 14 years. The decomposition of the total variation in employment into four structural effects shows that the final demand was responsible for the increase in the number of people employed with the creation of 761 million jobs due to the effect of economic growth (volume of final demand) and 745 million jobs per structure effect of final demand. On the other hand, the increase in labor productivity (negativeintensity effect) caused the disappearance of 918.5 million jobs and the technology effect (modification of the technical coefficient matrix) made 57.6 million jobs disappear. The intensity effect is negative for thirteen years between the years 2000 and 2014, which shows that the increase in labor productivity is a persistent process. The technology effect is variable. Therefore, the modification of the productive structure can happen for or against the creation of jobs over time. The effects of final demand are positive in thirteen of the fourteen years of the study period and are the main structural factor in creating jobs over time, with changes in the composition of final demand being just as important as economic growth.

The increase in labor productivity (negative intensity effect) has a greater impact on job losses than the technology effect measured as modification of the technical coefficient matrix (combination of inputs). The two structural effects determine the loss of jobs in the economy over the period of 2000-2014. Changing the structure of final demand has approximately the same impact as economic growth in job creation. The structure effect results from the change in the proportion of final demand that includes household consumption, government, investment, and exports. The increase in the volume of final demand can be understood as economic growth. Table 2 presents the employment values in the countries in millions of jobs between the years 2000 and 2014, as well as the results of the structural decomposition and the Employment Structural Change Index (ECI) in percentage values in relation to the base year 2000. Table 2 was divided among countries of the European Union and the other fifteen largest economies in the world. Figure 3 shows the effects of structural decomposition onemployment changesin 43 countries in percentage values to make comparison between countries possible. The total results for the 43 countries showed that in the year 2000 there were approximately 1932.9 million jobs and in 2014 around 2462.3 million, a variation of 529.4 million jobs that corresponded to anincrease of 27% in the period. The results of the structural decomposition show that the effect intensity of labor use factor caused the disappearance of 48% (-48%) of jobs in relation to the year 2000, the technology effect had an impact of -3%, the effect of final demand structure was+39% and the effect volume of final demand was+39%. The sum of the effects resulted in an increase of 27% in the number of engaged people in relation to the year 2000.

The countries with the highest percentagesof increase in the number of jobs were Indonesia (74%), India (61%), Luxembourg (54%), Turkey (42%) and South Korea (34%). It can be said that these countries showed a growth in the population able to work or in immigration. There are countries with a reduction in numbers of engaged people such as Romania (-18%), Portugal (-10%), Greece (-8%), Japan (-6%), Lithuania (-6%), Latvia (-3%) and Croatia (-2%), which indicates that these countries have an aging population, economic recession or emigration. The increase in labor productivity, which is measured by a negative value of the intensity effect, was greater for China (-94%), Romania (-67%), Lithuania (52%) and Estonia (- 50%). Developing countries that have not kept up with these percentages, such as Brazil, India, Mexico, Indonesia and Turkey, should increase investments in education, capital per worker and technological innovation in order to obtain higher rates of growth in labor productivity.

Figure 1. Input-output relations in an interregional system with two regions

	Sectors–Region (L)	Sectors–Region (M)	Final demand (L)	Final demand (M)	
Sectors Region (L)	Intermediate Inputs (LL)	Intermediate Inputs (LM)	Final demand (LL)	Final demand(LM)	Total output (L)
Sectors Region (M)	Intermediate Inputs (ML)	Intermediate Inputs (MM)	Final demand (ML)	Final demand (MM)	Total output (M)
	Imports from the Rest of the World (L)	Imports from the Rest of the World (M)			
	Taxes less subsidies (L)	Taxes less subsidies (M)			
	Valueadded (L)	Valueadded (M)			
	Output at basic prices (L)	Output at basic prices (M)			

Table 1. Effects of structural decomposition of the variation in employment in the forty-three countries in the period of 2000-2014. Values in millions of jobs

Period	Technological Effects		Effects of final demand		Total variation
	Intensity	Technology	Structure	Volume	
2000-2001	- 45	-10	53	28	25
2001-2002	-13	-21	31	28	24
2002-2003	-69	2	33	62	27
2003-2004	-72	-7	23	89	33
2004-2005	-109	2	49	79	21
2005-2006	-126	3	52	90	18
2006-2007	-121	-21	78	85	20
2007-2008	-80	-12	69	36	13
2008-2009	-58	18	94	-58	-4
2009-2010	-117	-23	67	81	9
2010-2011	-52	-6	69	61	71
2011-2012	0	1	35	65	101
2012-2013	-21	5	55	52	92
2013-2014	-34	13	37	61	78
Total	-919	-58	745	761	529

Source: calculated by the authors

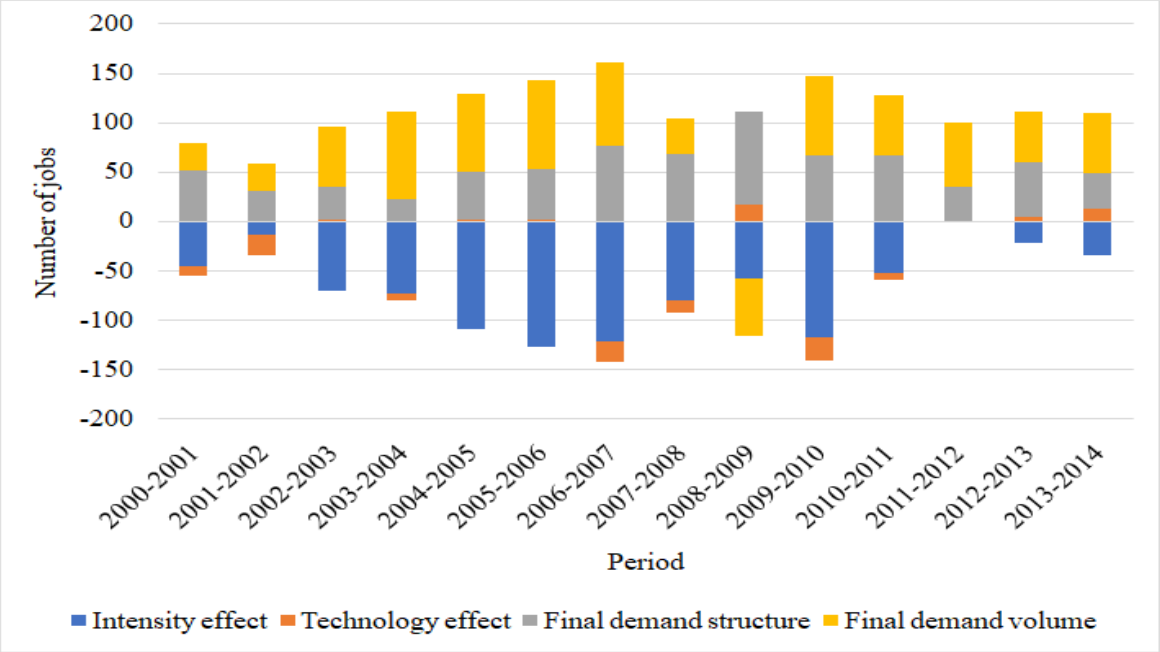

Figure 2. Effects of structural decomposition on employment changes in 43 countries (aggregate results) in the period of 2000-2014 Values in millions of jobs

Labor-saving technologies could be implemented in Brazil, Indonesia, and Turkey, as these had a positive technology effect on employment. The Employment Structural Change Index (ECI) shows the effect of inter-sector reallocation of jobs measured in percentage values. The value of the ECI is a percentage of jobs reallocated among sectors of the economy in the period of 2000-2014, which can also be interpreted as an index of labor market instability. The highest values refer to China (23%), Romania (22.2%), Lithuania (18.5%), Malta (17.3%), South Korea (16.7%), India (16, 6%) and Hungary (15.8%). The structural changes in China's economy caused a variation in sectors' participation of total employment in the economy of 23% with an increase in the number of jobs. However, Romania and Lithuania reduced the number of jobs and in Hungary there was no growth, which indicates that workers were forced to change sectors. The results of this study can be compared with previous research analyzed in the literature review.

Table 2. Number of jobs in millions, effects of the Structural Decomposition Analysis (SDA) and Employment Structural Change Index (ECI) in percentage in relation to the year 2000

Country	Jobs (millions)			Structural decomposition of employment variation2000-2014						ECI (%)
				Technologic Effects			Final Demand Effects		Total Variation %	
	2000	2014	Variation	Intensity (1)	Technology (2)		Structure (3)	Volume (4)		
European Union										
1.Austria	3,8	4,3	0,5	-0,4	0,2	-0,7	1,4	-0,4	14	9,5
2.Belgium	4,1	4,5	0,4	-0,3	-0,1	-0,7	1,6	-0,3	11	10,7
3.Bulgaria	3,3	3,6	0,3	-1,3	0,5	-0,2	1,3	-1,3	8	12,9
4.Cyprus	0,3	0,4	0,0	-0,1	0,0	-0,1	0,1	-0,1	13	11,1
5.CzechRepublic	4,9	5,1	0,2	-1,7	0,5	-0,3	1,8	-1,7	5	9,9
6.Germany	39,9	42,7	2,8	-3,7	1,0	-9,0	14,5	-3,7	7	8,1
7.Denmark	2,7	2,8	0,0	-0,5	0,0	-0,5	1,0	-0,5	1	8,3
8.Spain	16,7	18,0	1,3	-1,7	0,0	-3,8	6,9	-1,7	8	15,6
9.Estonia	0,6	0,6	0,0	-0,3	0,1	0,0	0,2	-0,3	5	13,8
10.Finland	2,3	2,5	0,2	-0,3	0,0	-0,4	0,9	-0,3	9	10,0
11.France	25,7	27,3	1,6	-2,8	-1,0	-4,2	9,6	-2,8	6	6,8
12.United Kingdom	27,5	30,7	3,2	-5,2	0,8	-2,7	10,4	-5,2	12	10,1
13.Greece	4,3	4,0	-0,3	0,5	-0,3	-2,2	1,6	0,5	-8	11,9
14.Croatia	1,6	1,6	0,0	-0,3	0,0	-0,3	0,6	-0,3	-2	15,3
15.Hungary	4,2	4,2	0,0	-1,4	0,3	-0,5	1,5	-1,4	0	15,8
16.Ireland	1,7	1,9	0,2	0,0	-0,3	-0,2	0,7	0,0	12	15,0
17.Italy	23,0	24,4	1,3	2,2	-0,8	-8,8	8,8	2,2	6	8,3
18.Lithuania	1,4	1,3	-0,1	-0,7	0,1	0,1	0,5	-0,7	-6	18,5
19.Luxembourg	0,3	0,4	0,1	-0,1	0,1	0,0	0,1	-0,1	54	11,8
20.Latvia	0,9	0,9	0,0	-0,4	0,1	0,0	0,3	-0,4	-3	16,3
21.Malta	0,2	0,2	0,0	0,0	0,0	0,0	0,1	0,0	28	17,3
22.Netherlands	8,2	8,7	0,5	-0,8	-0,2	-1,6	3,1	-0,8	6	7,7
23.Poland	14,8	15,6	0,8	-5,5	0,9	0,1	5,3	-5,5	5	13,2
24.Portugal	5,0	4,5	-0,5	-0,4	0,1	-2,0	1,8	-0,4	-10	11,9
25.Romania	10,7	8,8	-1,9	-7,2	0,7	1,3	3,3	-7,2	-18	22,2
26.Slovakia	2,0	2,2	0,2	-0,7	0,2	0,0	0,8	-0,7	10	15,1
27.Slovenia	0,9	0,9	0,0	-0,2	0,1	-0,2	0,3	-0,2	4	12,1
28.Sweden	4,3	4,8	0,4	-0,6	0,0	-0,5	1,6	-0,6	10	8,5
Other countries										
29.Australia	9,0	11,9	2,8	-1,3	-0,7	1,0	3,8	-1,3	31	10,0
30.Brazil	81,0	104,0	23,0	-26,5	2,7	12,9	34,0	-26,5	28	13,5
31.Canada	15,1	18,4	3,3	-1,2	-0,6	-0,9	6,0	-1,2	22	5,7
32.China	719,6	858,4	138,8	-678,4	-33,0	569,5	280,8	-678,4	19	23,0
33.India	410,1	658,8	248,7	-97,2	-29,3	203,3	171,8	-97,2	61	16,6
34.Indonesia	96,9	168,8	71,9	-5,1	5,6	29,8	41,7	-5,1	74	14,9
35.Japan	65,3	61,2	-4,0	-3,8	-4,5	-18,6	22,8	-3,8	-6	9,4
36.Mexico	31,7	39,0	7,2	-1,9	-0,9	-2,8	12,9	-1,9	23	5,9
37.Norway	2,3	2,7	0,4	-0,5	0,0	0,0	0,9	-0,5	18	10,5
38.Republico f Korea	18,2	24,4	6,2	-4,7	1,9	1,4	7,6	-4,7	34	16,7
39.Russian Federation	74,2	74,3	0,1	-33,8	-0,2	6,6	27,5	-33,8	0	14,6
40.Switzerland	4,0	5,1	1,1	0,0	-0,1	-0,5	1,6	0,0	27	9,5
41.Taiwan	16,9	20,2	3,3	-4,9	1,4	0,0	6,8	-4,9	19	9,8
42.Turkey	22,7	32,3	9,6	-1,5	0,3	2,4	8,3	-1,5	42	15,4
43.United States	150,4	155,8	5,3	-24,0	-2,9	-22,0	54,3	-24,0	4	6,9
Total	1932,9	2462,3	529,4	-918,5	-57,6	744,7	760,8	-918,5	27	-

Source: calculated by the authors.

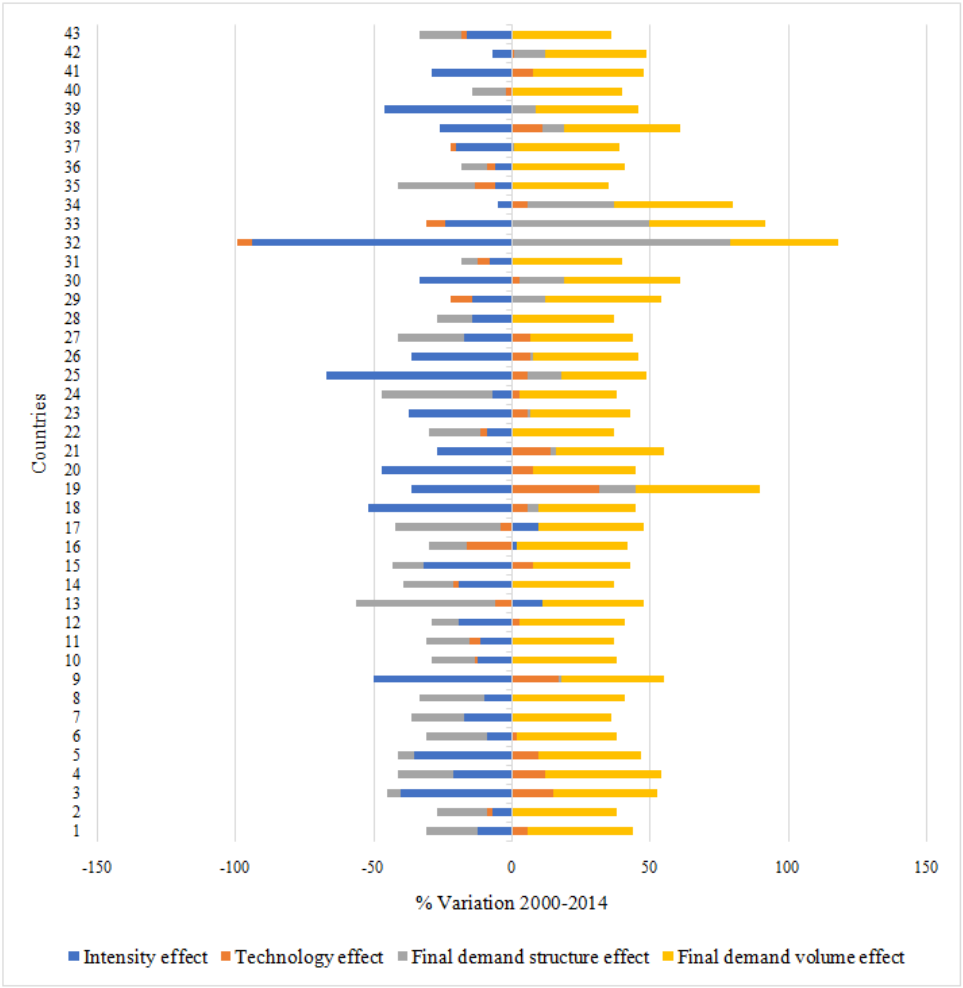

Figure 3. Effects of structural decomposition on employment changes in 43 countries in the period of 2000-2014

In the case of Brazil, the results obtained in this study showed that the effect of final demand volume (an increase of 42% in relation to the year 2000) was the main creator of jobs in Brazil, as stated by Sesso Filho *et al*. (2010), Fiuza-Moura *et al*. (2017), Nakatani-Macedo *et al*. (2015) and Fiuza-Moura *et al*. (2016). However, unlike the analyzed studies, the effect of demand structure played an important role, contributing with a 16% in employment increase. In addition, the intensity effect was -33%, which shows an increase in labor productivity greater than in countries like South Korea, Turkey and India in the period of 2000-2014. In Greece, the structural decomposition of employment variation for the period of 2000-2014 showed a decrease in the number of jobs. The effect intensity of labor factor use was positive by 11% compared to the year 2000, which indicates a decrease in labor productivity. The effect of final demand structure caused job losses (-50%) and the effect of demand volume was +37%. The results obtained in this research show data from a very different economic scenario from the period of 2000-2008 analyzed by Belegri-Roboli and Markaki (2010). The common point was the negative technology effect, which these authors called variations on the Leontief inverse matrix. China had the biggest increase in labor productivity (negative intensity effect) in all countries. Considering that jobs loss due to technological effects was compensated by the effects of final demand, the total effect was positive. These values are aligned with the results obtained by Doan and Trinh (2019). However, this study also shows that the demand structure effect is more important than the volume demand effect (economic growth) to create jobs in China in the period of 2000-2014, this fact agrees with the results of Yang and Lahr (2010), as well as the technology effect on employment wasless important than others. The results obtained for China show that changes in the population's consumption structure, exports, investment and government spending are important to increase the number of jobs.

In addition, the structural changes in demand imply a rapid adaptation of companies to market trends and inter-sector reallocation of jobs, which was measured by this study as the highest Employment Structural Change Index (ECI), which was 23%. For Czech Republic, Romania, Poland and Hungary, the results indicated that the negative intensity effect was compensated by a positive effect of the final demand, conclusions close to those obtained by Hudcovský, Lábaj, Morva (2017). However, the total variationwas between 5% to -18% in the period of 2000-2014, which indicates a decrease in employment or small growth, this is worrying factor for the maintenance of economic growth in these countries. The variation in employment in Russia showed negative technological effects compensated by positive demand effects leading to a total variation approximately zero, results close to those obtained in the study by Voskoboynikov (2017). It was not possible to compare formal and informal employment between studies, as this study does not make this distinction about engaged people in the economy.

CONCLUSION

The Structural Decomposition Analysis (SDA) using the interregional input-output system proved to be an adequate method to estimate the causes of variation in employment in countries and to decompose into effects of intensity, technology, demand structure and demand volume. The inter-sector reallocation of employment was measured by the Employment Structural Change Index (ECI). The results vary significantly among the countries analyzed and show different productive structures changing over the 2000-2014 period of analysis. The results showed that the increase in labor productivity (negative intensity effect) is the main responsible for the loss of jobs in the economy, a figure close to 50% of the countries' total jobs in the

2000-2014 period of analysis. The creation of jobs occurs mainly due to final demand effects. However, the effect of demand structure tends to be negative for developed countries and positive for developing countries. In developing countries, the effect of final demand structure is relatively more important in creating jobs than the final demand volume effect. The Employment Structural Change Index (ECI) is highly variable among countries in the period of 2000-2014, with China and Romania having the highest values indicating instability in the labor market in terms of variation in the participation of sectors in employment. The inter-sector relocation of employment, disappearance of professions and increased requirements for qualification lead workers to a continuous learning process, adaptation to new technologies and a probable change of sector of activity in their professional life. Future studies may include a larger number of countries and a longer period to apply the methodology. However, the difficulty is that the database must provide the input-product matrices in current values and at prices of previous years so that the effect of the inflation is neutralized.

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