

JOB GENERATION PROFILE EVALUATION FOR ROMANIA USING SHAPLEY METHOD

Speranța PIRCIOG¹
Cristina LINCARU²

Abstract

Romania is an emergent country with relative high rates of growth but still with low quality of life. The strong connection between quality of life and quality of work especially for poor – "as the poor derive most of their income/consumption from work: as employees, as the self-employed, or in subsistence activities" (WBM JoGGs, p.2) request an answer regarding the research question: "In what extent in Romania growth generates employment and good earning opportunities?" In this article we intend to analyse the profile of job generation applying Job Generation and Growth Decomposition Tool, provided by The World Bank (WBM JoGG's). The Shapley decomposition will be applied by 10 NACE Rev. 2 structure (1 digit) in view to catch the economic growth effect over the sectoral structure and the employment generation. The main conclusion of this article is that in the last 2 years is becoming visible the positive contribution to employment of the sectors 'Professional, scientific and technical activity...' next to "Wholesale and retail trade, transport, etc..." and "Information and communication", fact that confirm the tendency of structural positive change of economy.

Keywords: Employment, Aggregate Labor Productivity, Multisector Growth Models

Rezumat

România este o economie emergentă care înregistrează rate relativ ridicate de creștere economică, dar având încă o calitate scăzută a vieții. Legătura puternică între calitatea vieții și calitatea ocupării prezintă în special pentru săraci - "pentru cei săraci venitul/sursa pentru consum principal este cel din muncă obținut: în calitate de angajați, lucrătorii independenți, sau în activități de subzistență" (WBM JoGGs, p.2) să solicite un răspuns cu privire la întrebarea de cercetare: "în ce măsură, în România creșterea economică generează locuri de muncă și oportunități de câștig decente?". În acest articol ne propunem să analizăm profilul de generare de locuri de muncă aplicarea Metodologiei Bancii Mondiale (WBM JoGGs) Generarea de Locuri de Muncă și Instrumentul de Descompunere a Creșterii. Am aplicat Descompunerea Shapley la nivel de 10 sectoare de activitatea CAEN Rev. 2 (1 digit), în scopul de a surprinde efectul creșterii economice asupra structurii sectoriale și a generării de locuri de muncă.

¹ Dr., Director Științific al INCSMPS. INCSMPS - National Research Institute for Labour and Social Protection, Povernei st. 6-8, ucharest, Romania, pirciog@incsmps.ro

² Dr. INCSMPS - National Research Institute for Labour and Social Protection, Povernei st. 6-8, Bucharest, Romania, cristina.lincaru@yahoo.de

Concluzia principală a acestui articol este reprezentată de faptul că, în ultimii 2 ani, devine vizibilă contribuția pozitivă în ocupare a sectoarelor: "Activitate profesională, științifică și tehnică ... " alături de "Comerț cu ridicata și cu amănuntul, transport etc ... " și se "Tehnologia informației IT", fapt care confirmă tendința de modificare structurală pozitivă a economiei.

Cuvinte-cheie: ocupare, productivitatea agregată a muncii, modele de creștere multisectorială

Cod JEL (disponibil la www.aea.web): **E24, J21, O41, O47**

Cod REL (disponibil pe www.asociatiaeconomistilor.ro): **18B, 18E, 12I**

1. Introduction

Romania is an emergent country with relative high rates of growth but still with low quality of life. The strong connection between quality of life and quality of work especially for poor – "as the poor derive most of their income/consumption from work: as employees, as the self-employed, or in subsistence activities" (WBM JoGGs, p.2) request an answer regarding the research question: "In what extent in Romania growth generates employment and good earning opportunities?"

Regarding the characterization of the economic framework and of the economic perspectives, the following conclusions have been reached in relation to "economic growth and to the growth potential"(1) of Romanian's economy stated that "before the crisis, Romania recorded high GDP growth rates, which turned out to be unsustainable in view of emerging imbalances and also the crisis had a large and lasting impact on the Romanian economy" ({COM(2015) 85 final}p.4)

A sustainable economic growth – in the sense of an economic growth followed by the jobs creation could be analysed applying the Shapley decomposition method. The decomposition methods help us give an answer to some crucial questions, institutional investigated by World Bank, like: to what extent does labour income drive poverty reduction, and how can it be measured?(2)

Solow in 1957 (3) applied decomposition to quantify the contribution of labour and other factors to growth. Fortin et.al. (2010, p2.) emphasis that decompositions are useful for "quantifying the contribution of various factors to a difference or change in outcomes in an accounting sense, they may not necessarily deepen our understanding of the mechanisms underlying the relationship between factors and outcomes." Shorrocs (1999) (5) suggested that the Shapley decomposition methodology is "a general method of assessing the contributions of a set of factors which together account for the observed value of some aggregate statistic. The proposed solution involves calculating the marginal impact of each of the factors as they are eliminated in succession, and then averaging these marginal effects over all the possible elimination sequences. The resulting formula is formally identical to the Shapley value in cooperative game theory, and has therefore been referred to as the Shapley decomposition." Shorrocs (1999, p. 29)

The case of development countries in view to understand the relationship between the growth and employment was studied by Ajakaike et.al. (2015) for Nigeria. Albu et.al.

(2012) emphasis the need to improve the macroeconomic evaluation institutional capacity in the field of economic convergence. Fields (2004) conclude that the multisector models, employment and wages in each sector of the economy are determined by labour market conditions in all sectors of the economy (p.34).

In this article we start from (Fields, 2004, p.36) remark that “Sound labour market policies require sound labour market models” consolidate perspective by Martins et.al. (2013, p.17) that points that “the type of growth matters for employment creation (e.g., employment intensity of growth), the quality of jobs created, and who can access these improved opportunities”.

2. Research Question

Based on the JoGGs -Job Generation and Growth Decomposition Tool, provided by The World Bank (5)(6) we have in this article the research question:

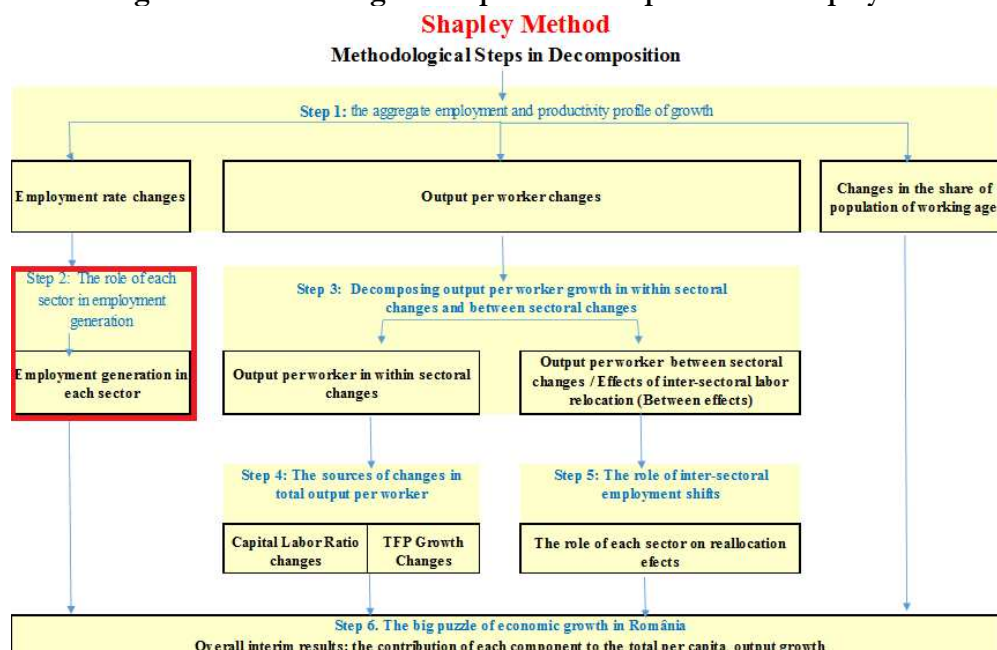
„How is growth reflected in the sectoral pattern of growth and employment generation?”

Our research objective represents the 2nd Step (Figure 1) from the Shapley Method of decomposition applied in Joggs. We analyse the contribution of each of the 10 sectors by NACE activities to total change in employment (including also the percent contribution of the sectors to total employment rate growth) and to change in percapita value added (as well as the percent contribution to growth in total percapita output).

3. Models, Variables and data

Model of “Sectoral Pattern of Growth and its Employment and Productivity Intensity” obtained by applying the methodology of the World Bank: "Job Generation and Growth Decomposition tool - JoGGs". JoGGs methodology is used to decompose changes in GDP applying the Shapley decomposition method by the components: employment (regardless the status in employment), productivity and labour force, in circumstances of ignoring the international mobility of labour. (Figure 1)

Figure 1. Methodological Steps in Decomposition – Shapley Method



Source: WB JoGss, p.6

There was resulted in different growth profiles made by Romania in the last almost 2 decades (1997-2014) time spin with breakdowns in the following periods given by the GDP variation calculated at Real prices in 2010 Euro: 1997-2008 (crises point initiation effect), 2008-2009 (maximum effect of crises) and 2009-2014 time intervals; the joining in EU: 2007-2012 and 2012-2014 (short term perspective).

In view to identify the economic sectors that contributed to employment generation and to total per capita growth we shall apply the Step 2 of Shapley decomposing tool JoGGs based on the following equation:

$$\Delta e = \Delta e = \sum_{i=1}^s \Delta e_i \tag{1}$$

Where:

$$\Delta e = \Delta \frac{E_i}{A} \tag{2}$$

A - total working age population;

i - sector of economic activity;

E_i - employment in sector i;

e - Employment rate = E/A - is the share of working age population (i.e. the labor force) employed

Δe= the change in employment in sector i as a share of total working age population;

Contribution of each sector to change in per capita value added = (Δe_i/Δe)*ē/100
(3)

(4) Percent of total change in per capita value added = $(\Delta e_i / \Delta e) * (\ddot{e} / \Delta y) * 100$

Where:

$\ddot{e} = \Delta e / \Delta y [1/2(\omega_t=1 + \omega_t=2) * a]$ captures the contribution of changes in the employment rate e (as opposed to changes in total employment, E) to growth in GDP per capita y (as opposed to growth in total GDP, Y), while there is no change in a ;

$\omega = Y/E$ is total output per worker;

$a = A/N$ is the labor force as a fraction of total population – activity rate;

$y = Y/N$ income per capita (output per capita)

$\ddot{e} * \Delta y$ - the amount of growth consistent with a scenario in which output per worker ω , and the share of population of working age a , had remained ‘unchanged’;

N – total population

Y – GDP, Y_i GAV by sector NACE i

Input data provided by EUROSTAT: total population, active population by working age,

Employment, GAV_i (Gross Added value) by sector I NACE

3. Results and discussions

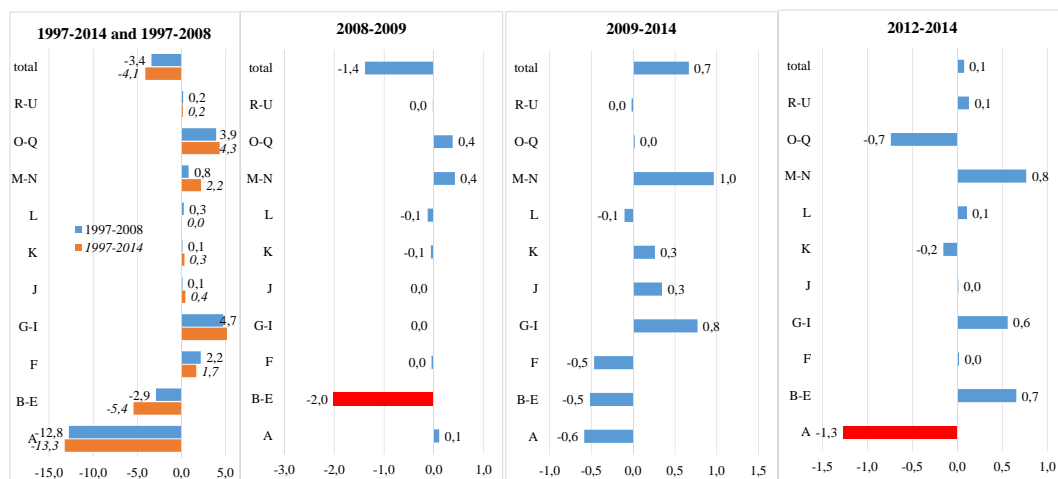
3.1. Contribution to change in total employment rate (percent points)

In Figure 2 is presented the contribution of sectors to total changes in employment rate as results of the growth employment decomposition by sectors, expressed in pp.

During full period 1997-2014 the employment rate growth was -4.1%. Agriculture with -13.3pp and industry with -5.4pp are responsible for most of the decrease, while Wholesale and retail with 5.5pp, Public Administration with 4.3pp and Construction with 1.7pp gives the main positive contribution to employment growth. (Figure 2)

Agriculture suffered the most important restructuring process in both terms size and percentage changes, closely followed by industry. Employment in agriculture decreased powerfully from 4.7 mil person in 1997 to 2.5 mil persons in 2014 with a growth rate of -46.2% and in industry (without construction) decreased also strongly from 2.9 mil person in 1997 to 1.8 mil persons in 2014 with a growth rate of -37.4%. At the begging of this period almost 66% from working age population was employed in agriculture (with a share of 41% from labour force) and industry (with a share of 25% from labour force), at the end of the this share decreased at 47% (respectively with a share of 27% from labour force in agriculture and 20% from labour force in industry). The share of working age employed in agriculture.

**Figure 2. The contribution to change in total employment rate (percent points)
Percent contribution of the sector to total employment rate growth during**



Source: Calculated by authors following the steps in JoGGs, Eurostat data.

registered an negative growth of -32.6% compared to growth in Industry of -21.5%, also negative but lower in absolute terms.

Wholesale and retail increases its employment from 1.5 mil person in 1997 to 1.7 mil persons in 2014 with a growth rate of 13.5%. In terms of working age employed in this sector it is visible an increase from 13% in 1997 to 18% in 2014 with a growth rate of 42.2%. Public Administration increases its employment from 0.8 mil person in 1997 to 1 mil persons in 2014 with a growth rate of 28.8%. In terms of the share of employed persons in working age population for this sector it is visible an increase from 7% in 1997 to 11% in 2014 with a growth rate of 61.4%.

3.2. Percent contribution of the sector to total employment rate growth ($\Delta e_i / \Delta e$)

In terms of percent contribution of the sector to total employment rate growth to total employment rate growth during 1997-2014 the highest contribution in total growth rate of employment (of -4,1pp) is coming from agriculture (with negative contribution in employment growth -13,3pp) with 321.7%, from industry (with negative contribution in employment growth -5,4pp) with 131.7%, and with negative changes of employment rates at sector level in report with negative changes at national level in all other sectors:

Wholesale and retail (with positive contribution in employment growth with 5,5pp) with -133%, Public administration (with positive contribution in employment growth with 4,3pp) with -104.5%, Professional, scientific and technical activities (with positive contribution in employment growth with 2,2pp) -53%, Construction (with positive contribution in employment growth with 1,7pp) with -40%.

3.3. Contribution of employment changes to overall change in output (GDP) per capita

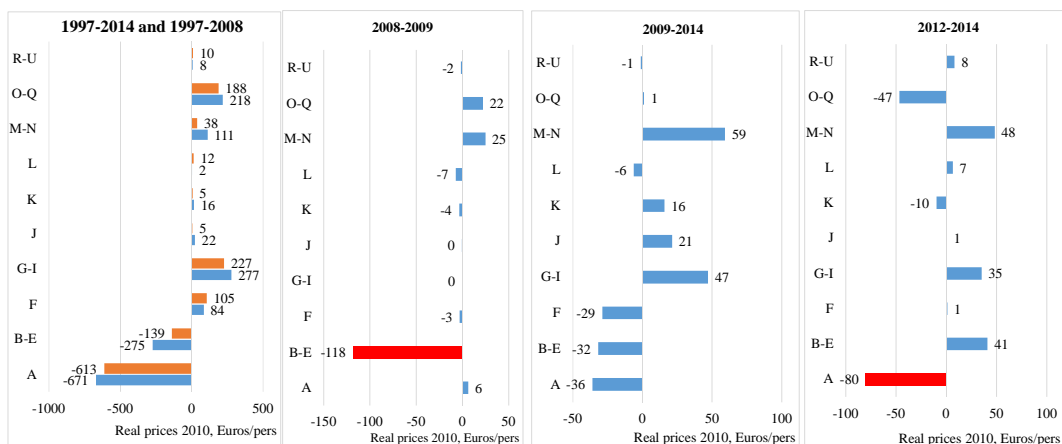
The Figure 3, show the contribution of sectoral employment changes to growth in total per capita output.

Applying JoGGs methodology (combining the Step 1 and Step 2) it is visible that for entire period 1997-2014 of the -208 Euros 2010/person capita output, is the result of negative contribution of the primary sectors: agriculture with -671 Euros 2010/person and industry with -275 Euros 2010/person. The sectors with positive contribution in growth were: GI Wholesale and retail with 277 Euros 2010/person, O-Q Public Administration with 218 Euros 2010/person, M-N, Professional, scientific and technical activities 111 Euros 2010/person and F Construction with 84 Euros 2010/person (all other 4 sectors were with very small contribution less than 22 Euros 2010/person). (See Figure 3)

The contribution of the agriculture sector, can be interpreted as the growth which would have resulted in the counterfactual scenario in which the share of working age population, total output per worker, and employment in all sectors other than agriculture had remained unchanged, but employment in agriculture had negative grown with -13,3pp as observed in Tabel 1 & Figure 2. If this had been the case, total per capita output would have decreased by -671 Euros 2010/person.

As presented before, for the period 1997-2008 the pattern is the same with the difference in the level of the contributions. Respectively, the -163 Euros 2010/person of capita output, is the result of negative contribution of the primary sectors: agriculture with -613 Euros 2010/person and industry with -1395 Euros 2010/person. The sectors with positive contribution in growth were: GI Wholesale and retail with 227 Euros 2010/person, O-Q Public Administration with 188 Euros 2010/person, M-N Professional, scientific and technical activities 38 Euros 2010/person and F Construction with 105 Euros 2010/person (all other 4)

Figure3. The contribution of sectoral employment changes to growth in total per capita output (Real prices 2010, Euros/pers.), during



Source: Calculated by authors following the steps in JoGGs, Eurostat data; sectors were with very small contribution less than 22 Euros 2010/person).

The pattern during the crises time 2008-2009 indicates that the decrease with -1,4 pp of the employment rate is corresponding a total change in per capita value added of -81 Euros 2010/person. The highest negative contribution of this period is given by Industry with a sectoral employment change which have a negative contribution to total per capita output of -118 Euros 2010/person, explaining an -2 pp contribution of industry to total employment rate growth during 2008-2009. The positive contribution (but not enough) was realized by sectors O-Q Public Administration with 22 Euros 2010/person and M-N Professional, scientific and technical activities 25 Euros 2010/person, these sectors contribution to employment rate was of 0,4pp.

During the period 2009-2014 is realised 41 Euros 2010/person a total positive change in per capita value added corresponding to an increase of employment rate with 0,7pp. In this period only the services sectors provide an positive contribution of sectoral employment changes to growth in total changes in per capita output of 59 Euros 2010/person by the sector M-N, 47 Euros 2010/person by the sector G-I and with 21 Euros 2010/person by the sector J. The primary sectors each at its turn, realized a negative contribution of sectoral employment changes to growth in total changes in per capita output of -36 Euros 2010/person by the sector A Agriculture, -32 Euros 2010/person by the sector B-E Industry and with -29 Euros 2010/person by the sector F Constructions.

During the period 2012-2014 is realised 5 Euros 2010/person a total positive change in per capita value added corresponding to an increase of employment rate with 0,1pp. In this period sectors that provide an positive contribution of sectoral employment changes to growth in total changes per capita output were: of 48 Euros 2010/person by the sector M-N, 35 Euros 2010/person by the sector G-I and with 41 Euros 2010/person by the sector B-E-Industry. Also there are 3 main sectors that realized a negative contribution of sectoral employment changes to growth in total changes in per capita output of -80 Euros 2010/person by the sector Agriculture, -47 Euros 2010/person by the sector O-Q Public administration and with -10 Euros 2010/person and by the sector K Financial and insurance activities

4. Conclusions

Romania's economy illustrate in the last two decades a tendency of structural change from primary and secondary sectors employment toward tertiary sectors. "Professional, scientific and technical activity..." next to "Wholesale and retail trade, transport, etc..." and "Information and communication ..." are the tree sectors that realises, regardless the analysed period and sub period of time, a positive contribution to a total change in employment rate and also a positive contribution in change per capita value added. The case of public administration is distinct. This sector is one of the main employers in the economy that provided a "shelter" during the crises time but in a short time released labour force indicating an increasing the balance between public and business sector.

This new structure of economy more oriented towards knowledge and information indicates a qualitative improvement tendency especially since Romania joins EU. Even if in the transition period (with the exception of the crises period) the Romanian economy registered the positive changes in terms of GPD and GDP per capita in both real and current terms the labour contribution was negative. The positive contribution to employment of the before mentioned sectors (science, it and wholesale...) confirm the structural positive change of economy. This process if it will be well managed could

improve the growth model of Romanian economy in a more inclusive and smart manner.

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Note

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