1 INTER-INDUSTRIES PRODUCTIVITY GAP AND THE SERVICES EMPLOYMENT DYNAMICS

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Abstract

The dynamics of employment in final services depends on a set of economic, social and cultural factors. On the other hand, the increase in the population incomes (and the influence of some national factors) leads to an increase in the demand for services. However, the relatively poor productivity (Baumol, Blackman and Wolff, 1989) also determines the increase in prices, this evolution leading to a decrease in the demand for services. In the paper, the conditions in which the effect induced by the demand-income elasticity over the dynamics of the services surpasses the substitution effect generated by the demand-price elasticity are analyzed so that the growth rate of the production in the service sector is higher than the growth rate of the productivity in the same sector. From the different evolution of the two variables results the long-term growth of the share of employment in services in the total employment at the national level.

Key words: Labor productivity, employment, services, price elasticity and income elasticity of demand for services
JEL classification: J21, L80, O40.

1. Introduction

The reason for this analysis comes from the fact that the final (individual and collective) services represent an important part – and continuously growing – of the internal market. In order to evaluate the tendencies in the services development and their impact on the global rates and orientation of economic growth we start from the analysis of the factors which determine the evolution of the demand and supply on the specific market.

40 years ago, Baumol (1967) demonstrated that if the growth rates of the factors' productivity were different from a sector to another, then the productivity factors tended to go to the sectors in which the productivity increase more slowly (the

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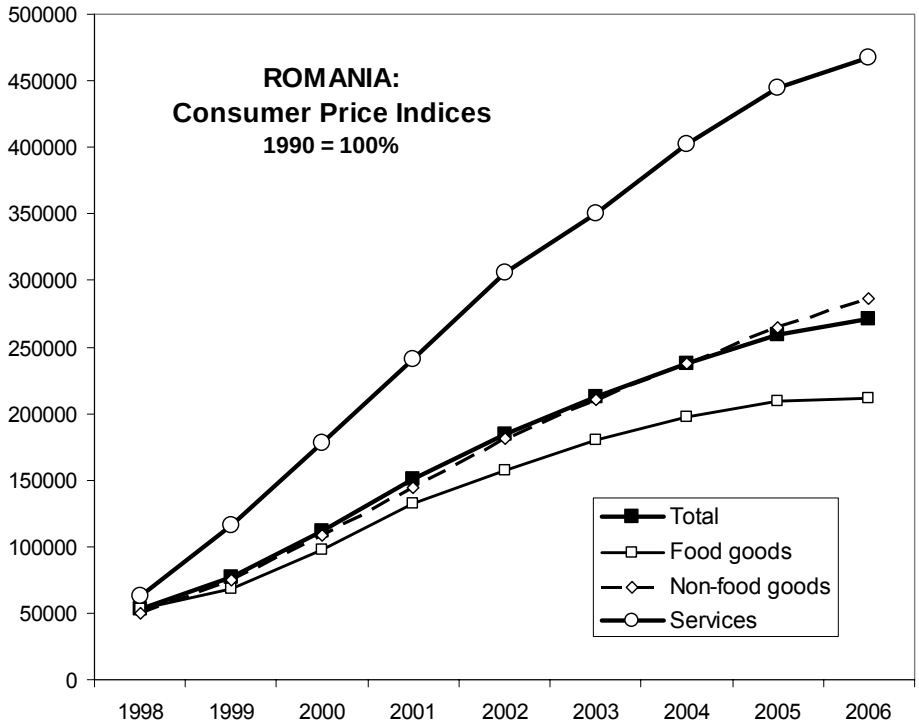
technological stagnant sectors). The result was that the productivity rate would decrease asymptotically to the specific rate of the technological stagnant sector.

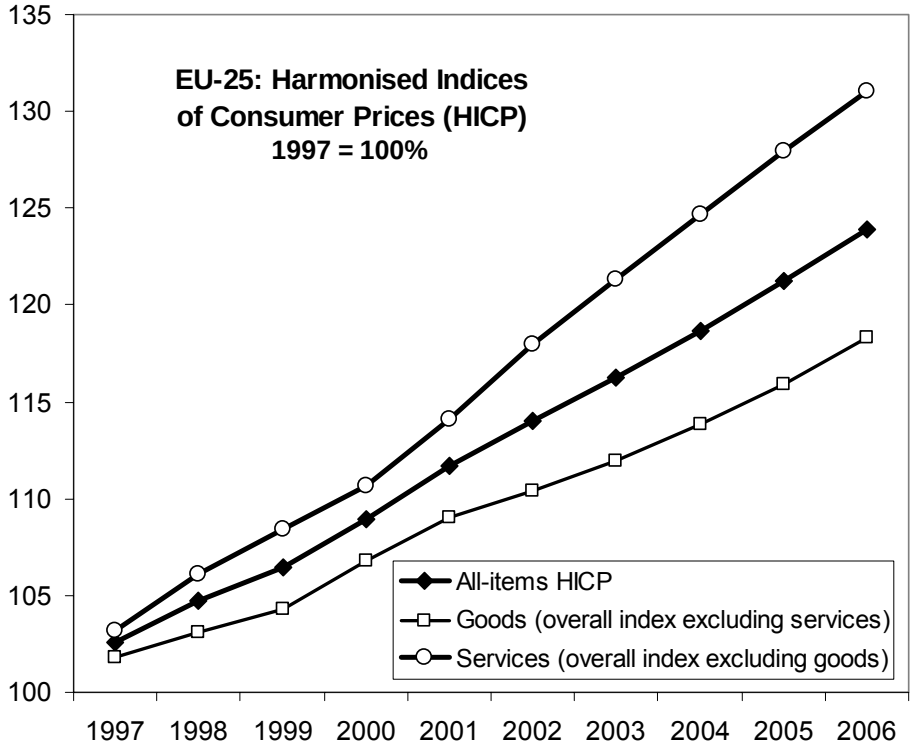
The service industry is seen as a sector with a high consumption of production factors. At the same time, the labor productivity and, generally, the production factor effectiveness in the services have a slower evolution than in other sectors of the economy, especially as compared to the manufacturing industry (Baumol, 1967 and 1985, Baumol, Blackman and Wolff, 1989). These and also other reasons, like resources management, led to a trend of the service price to increase more rapidly than in other economic activities. Such evolutions create some difficulties for the financial support of the service sector, especially the collective ones, but also the individual ones.

In Romania, for example, between 1997 and 2006 the consumer prices for the services increased 1.74 times more rapidly than the global consumer price index.



Source: Authors' computations on the basis of the National Institute of Statistics, *Romanian Statistical Yearbook - 2006*, *Table 10.1 – Consumer Price Indices.*

A similar evolution was observed in the EU countries: in 2006 as compared to 1996 the consumer prices for the services have increased by 31% (the dynamics is calculated starting from the harmonized index of consumer prices in services - overall index, excluding goods), while the general increase in the consumer prices by 23.9% (HICP).



Source: *Authors' computations on the basis of the Eurostat data, (http://epp.eurostat.ec.europa.eu).*

An essential factor in determining the evolution of the demand for services is the dynamics of the populations' incomes, together with the increase in social expenditures, especially the ones related to human capital (education and vocational training, life insurance) and social protection. At the same time, the evolution of the services is influenced by the dynamics of the global economic activity, social and economic policies, evolution of foreign trade or the turning up of some new demands for services at the consumer level. Besides these factors, we consider that the general economic forecasts (estimated through the evolution of the main macroeconomic variables – GDP, goods consumption, gross fixed capital formation, structure of the investments and so on) also influence the demand and the supply of services of final consumption (Jula, D., Jula, N., 1999, pp.322-330).

The production in the service industry is considered to be an increasing function regarding the investment dynamics and different autonomous factors, like technical progress and product level innovation.

2. Dynamic model of employment in services

In order to analyze the employment in services, we develop a relatively simple model. Theoretically, we may consider that the services are normal goods (Jula, D., Jula, N., 2007a, pp.109-150), so that the demand for services S_d is an increasing function related to the population incomes (V) and an decreasing one regarding the level of the prices (p) on the services market.

Formally,

$$S_d = f(V, p(w))$$

$$\frac{\partial S_d}{\partial V} = \frac{\partial f(V,p(w))}{\partial V} > 0$$

$$\frac{\partial S_d}{\partial p} = \frac{\partial f(V,p(w))}{\partial p(w)} < 0$$

We also admit the hypothesis that the level of the prices on the service market (p) is a decreasing function in the labor productivity dynamics (w):

$$\frac{\partial p(w)}{\partial w} < 0$$

The absolute modification of the demand for service volume – the total differential of the function $S_d(V,p(w))$, may be written here as:

$$dS_d = \frac{\partial f(V,p(w))}{\partial V} dV + \frac{\partial f(V,p(w))}{\partial p} \frac{\partial p}{\partial w} dw$$

Symbols used:

S_d – demand in service industry; S_{of} – supply in service industry; p – service prices; r_p – growth rate of service prices; w – labor productivity in service industry; r_w – labor productivity rate of services; W – labor productivity at national level (calculated, for example, on the basis of gross domestic product or gross added value and total employment); r_W – global rate of labor productivity	V – total income; r_V – growth in total income; f – function of demand in service industry; L – employment in service industry; r_L – rate of employment in service industry; d – differencing function; e_v – income elasticity of demand; e_p – price elasticity of services demand; e_{pw} – elasticity of service price related to labor productivity in these activities.

The services supply (S_{of}) depends on the resources involved in the production process, factors of technological ground, the dynamics of the prices, economic policies or other specific factors: the structure of the market, the evaluation of the economic environment evolution and so on. In a short run, we consider that the supply of services is a function of the number of workers in services (L) and the recorded productivity of those employees (w). That means:

$$S_{of} = wL$$

The change in the supply of services (the total differential of S_{of} function) is:

$$dS_{of} = Ldw + wdL$$

Let us suppose that at the initial moment there is equilibrium on the services market:

$$S_d = S_{of}$$

Moreover, we agree with the hypothesis of a balanced evolution of that market, so that the modification of the demand leads to a corresponding evolution of the supply:

$$dS_d = dS_{of}$$

Using the expanded expression for dS_d, the equilibrium condition is:

$$\frac{\partial f}{\partial V} dV + \frac{\partial f}{\partial p} \frac{\partial p}{\partial w} dw = L\, dw + w\, dL$$

Through simple transformations, the previous equation can be written:

$$f \cdot e_V \cdot \frac{dV}{V} + f \cdot e_p \cdot e_{pw} \cdot \frac{dw}{w} = Ldw + wdL$$

In the previous relation:

- $e_V = \frac{\partial f}{\partial V} \cdot \frac{V}{f}$ is the elasticity of the services demand, related to population income;
- $e_p = \frac{\partial f}{\partial p} \cdot \frac{p}{f}$ is the elasticity of the services demand, related to the price of services;
- $e_{pw} = \frac{\partial p}{\partial w} \cdot \frac{w}{p}$ is the elasticity of the price of services, related to the labor productivity in those activities.

From the equilibrium equation, taking into account that $S_d = S_{of}$, so f = w L, we obtain:

$$\frac{dL}{L} = \frac{dV}{V} \cdot e_V + \frac{dw}{w} \cdot \left(e_p \cdot e_{pw} - 1\right)$$

That means:

$$r_L = r_V \cdot e_v + r_w(e_p e_{pw} - 1)$$

Because in the production cost the labor cost is an important factor, we may say that an increase in the productivity, resulting in diminishing this element in the total cost, potentially leads to a decrease in the prices on the services market. Furthermore, because in the structure of production cost there are also elements with a significant contribution, we may admit the hypothesis that through an increase by 1% in the labor productivity the price may decrease by more than 1% (*ceteris paribus*). This means that the elasticity of the price modification related to the modification of the productivity is negative, but not below -1 (the price of services is inelastic regarding the productivity):

$$-1 < e_{pw} < 0$$

If we admit that the final consumption services are normal goods, then the elasticity of the demand regarding the price of these goods is negative. If

$$-1 < e_p < 0$$

then

$$0 < e_p e_{pw} < 1$$

so that

$$-1 < e_p e_{pw} - 1 < 0$$

Let

$$e_p e_{pw} - 1 = -\alpha$$

And then, obviously

$$0 < \alpha < 1$$

With these, the relation $r_L = r_v \cdot e_v + r_w(e_p e_{pw} - 1)$ becomes:

$$r_L = r_v \cdot e_v - \alpha\, r_w$$

That means

$$r_L > r_v \cdot e_v - r_w$$

Furthermore, we suppose that, regarding the evolution of the prices, the demand for services is, generally, elastic, which means the elasticity demand-income is equal to 1 or more:

$$e_v \geq 1$$

In these conditions,

$$r_L > r_v - r_w$$

Let us suppose that in the national economy, at least as a tendency, the population incomes are changing in a comparable way with productivity (W) on the national level. We calculate, for example, this productivity through the GDP related to the total employment. That means:

$$r_v \approx r_W$$

Then:

$$r_L > r_W - r_w$$

Let dr_w be the difference between the productivity in the national economy and the dynamics of productivity in services (the productivity differential).

In the above-mentioned hypothesis regarding the demand-income elasticity, demand-price elasticity and the relation between incomes and productivity, if the productivity of services has a slower evolution than the one in the national economy, then the modification rate of employment in services is positive. Moreover,

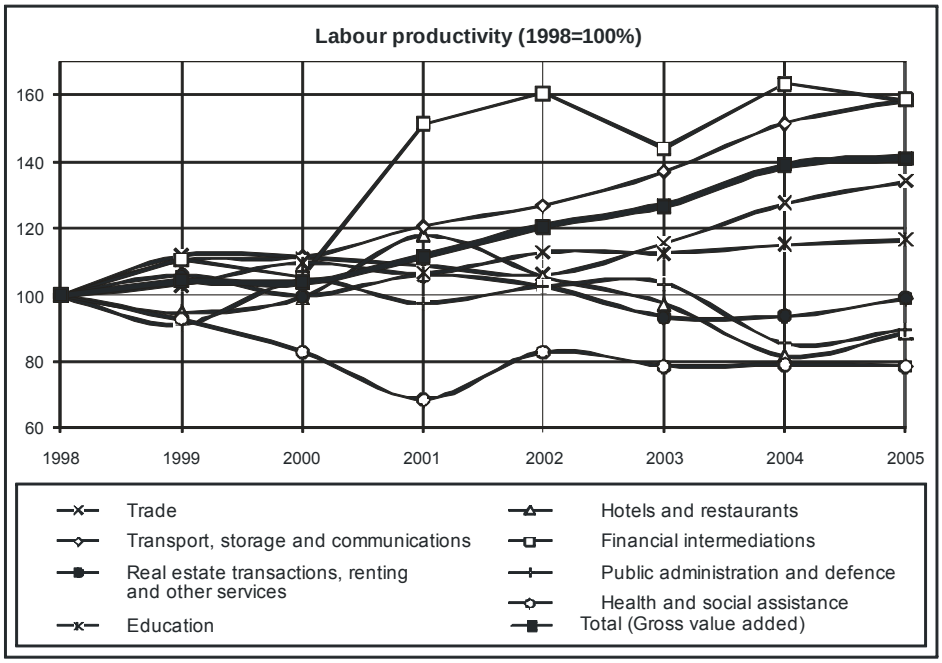
$$r_L > dr_w$$

In other words, the increase in employment in services outnumbers the productivity differential between the national economy and that sector. In the long run this has the effect of an increase in employment in services, with a higher rate related to the dynamics of employment recorded at a national level, and of an increase in the ratio of employment in services to the total employment.

The recorded data on the Romanian economy confirm the theoretical conclusions. The labor productivity has increased at the national level between 1999 and 2005 by more than 40%, and that evolution was recorded on different activities. In services, the productivity outranked the national average only in *Transport, storage and communications* (+58.7%) and *Financial intermediations* (+158.6%). In other service industry, the productivity was below average.

Labor productivity (1998=100%)	1999	2000	2001	2002	2003	2004	2005
Agriculture, hunting and sylviculture, fishery and fish-farming	99.9	79.4	103.6	112.4	123.4	160.2	130.3
Industry (including electric and thermal energy, gas and water)	111.1	120.6	125.1	124.9	134.4	143.7	153.0
Constructions	113.0	115.1	132.7	132.7	131.2	135.4	134.5
Services							
Trade	111.8	111.0	108.9	106.3	115.7	127.7	134.3
Hotels and restaurants	94.7	99.3	118.0	105.5	97.4	81.8	88.7
Transport, storage and communications	110.2	111.5	120.7	126.9	137.3	151.8	158.7
Financial intermediations	110.8	105.5	151.6	160.8	144.0	163.7	158.6
Real estate transactions, renting and service activities mainly rendered to enterprises	106.0	99.6	106.0	102.7	93.5	93.7	99.0
Public administration and defense	91.1	104.6	97.6	102.5	103.6	85.6	89.7
Education	102.9	109.8	106.6	112.9	112.7	115.2	116.6
Health and social assistance	92.7	83.0	68.7	83.1	78.8	79.1	78.7
Total (calculated on the basis of Gross Value Added)	104.1	103.9	111.7	120.6	127.0	139.0	141.3
Total (calculated on the basis of Gross Domestic Product)	103.5	103.2	109.9	118.7	125.3	137.0	140.1

Source: *National Institute of Statistics, Romanian Statistical Yearbook - 2006, Table 11.1 – Gross Domestic Product, by Category of Resources, and Table 3.8 – Civil Employment, by Activity of National Economy at Level of NACE Section.*



Similar situations were recorded also in most of the EU countries. For comparison, we present in the following table the relation between the labor productivity in some economic activities and the labor productivity in manufacturing in the EU and Romania:

Labor productivity: Value added at factor cost by economic activities (million EUR) / persons employed by activities

Labor productivity in Manufacturing = 100

	EU-25		Romania	
	2000	2004	2000	2004
Mining and quarrying	229	236	203	266
Manufacturing	100	100	100	100
Electricity, gas and water supply	213	241	146	191
Construction	69	70	90	71
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	69	70	85	97
Hotels and restaurants	43	40	69	64
Transport, storage and communication	102	113	207	206
Real estate, renting and business activities	100	95	112	122

Source: *Authors' computations on the basis of the Eurostat data, (http://epp.eurostat.ec.europa.eu).*

In accordance with the theoretical model presented, in Romania the services have contributed to the creation of jobs in the national economy: the employment loss of more than 1 million persons (-1021 thousand) in agricultural and industrial activities between 1998 and 2005 was partially counterbalanced by the increase by almost 450 thousands persons in the employment in services.

	Labor productivity dynamics from 1998 to 2005 (1998=100%) (%)	Employment evolution from 1998 to 2005 (thousand persons)
Agriculture, hunting and sylviculture, fishery and fish-farming	130.3	-677
Industry (including electric and thermal energy, gas and water)	153.0	-344
Construction	134.5	72
Services		
Trade	134.3	203
Hotels and restaurants	88.7	35
Transport, storage and communications	158.7	-43
Financial intermediations	158.6	14
Real estate transactions, renting and service activities mainly rendered to enterprises	99.0	143
Public administration and defense	89.7	39
Education	116.6	4
Health and social assistance	78.7	53
Total	140.1*)	-423**)

*) *Labor productivity calculated on the basis of GDP.*

**) *Incorporates 78 thousand persons employed in Other activities of the national economy.*

Source: National Institute of Statistics, *Romanian Statistical Yearbook - 2006, Table 11.1 – Gross Domestic Product, by Category of Resources, and Table 3.8 – Civil Employment, by Activity of National Economy at theLevel of NACE Section*

This evolution led to a growth in the services ratio in the total employment and has diminished the tendency of global growth of productivity.

Similar evolutions were recorded not just in the EU countries, but also in the European national economies. For example, we present the situation in the main European economies: Germany, France, Italy, and United Kingdom.

	Germany	**France**

	Labor productivity (manufacturing = 1)		Employment (persons)	Labor productivity (manufacturing = 1)		Employment (persons)
	2000	2004	2000-2004	2000	2004	2000-2004
Mining and quarrying	1.24	1.15	-33071	1.14	1.52	-3033
Manufacturing	1	1	-323062	1	1	-138690
Construction	0.64	0.59	-540156	0.65	0.72	111105
Electric and thermal energy, gas and water	2.18	2.39	-11130	1.97	2.24	-5462
Hotels and restaurants	0.36	0.30	102239	0.53	0.54	113556
Real estate and other services	1.16	0.91	872468	0.91	1.03	238040
Transport and communications	0.98	1.08	312322	0.93	1.08	41972
Trade	0.70	0.70	56270	0.76	0.81	201140

	Italy			United Kingdom		
	Labor productivity (manufacturing = 1)		Employment (persons)	Labor productivity (manufacturing = 1)		Employment (persons)
	2000	2004	2000-2004	2000	2004	2000-2004
Mining and quarrying	2.99	3.49	4285	8.65	6.87	-7640
Manufacturing	1	1	-148729	1	1	-691235
Construction	0.64	0.68	270407	0.83	0.96	8671
Electric and thermal energy, gas and water	3.30	3.14	-27652	2.56	2.90	-3479
Hotels and restaurants	0.50	0.41	177083	0.32	0.33	134405
Real estate and other services	0.81	0.81	540003	0.93	0.92	286625
Transport and communications	1.11	1.34	19845	1.09	1.08	28713
Trade	0.66	0.70	198382	0.62	0.64	81118

Source: *Authors' computations on the basis of the Eurostat data, (http://epp.eurostat.ec.europa.eu).*

In conclusion, the recorded data from the last years seem to confirm the hypothesis and also the deduction of a theoretical model such as the one described in the paper.

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