Journal of Service Science (2010) 2:25-53
DOI 10.1007/s12927-010-0002-2

Productivity in European Private and Public Services: A Growth Accounting Exercise

Andrés Maroto-Sánchez

Received: 24 March 2010/ Accepted: 1 June 2010 / Published: 30 June 2010

ABSTRACT

One of the most outstanding debates in the international economic circles is the one on productivity and related issues. Low productivity growth in most advanced countries has historically been related to structural changes and, more precisely, to the performance and weight of service industries (both in terms of labour and value added). The aim of the paper is, first, to describe the behaviour of productivity in service industries and the factors shaping it. Secondly, to apply growth accounting techniques to analyze the contribution of the different service activities to economic growth and the contribution of several factors to their productivity growth. The focus is the European case (as the work belongs to a broader European Commission project-ServPPIN), both old and new member states, although the United States is referenced too. The database has been elaborated using Groningen Growth and Development Centre (GGDC) databases and EUKLEMS database. The time range of the research is from 1979 onwards.

KEYWORDS

Productivity, Services, Growth accounting, Europe, Private-Public

Andrés Maroto-Sánchez(✉)
Institute of Economic and Social Analysis (IAES) University of Alcalá Plaza de la Victoria 2
28802 Alcalá de Henares, Madrid, Spain
andres.maroto@uah.es

1. INTRODUCTION

European economies are advanced economies. In developed countries, the service sector has evolved continually over the past thirty years, modifying the structure of employment and the composition of value added (Chenery & Taylor 1968; Bell 1974; Fuchs 1968). Nowadays, services companies generate about 70 per cent of value added and employment in the most developed countries. Despite the recent advances, services are still inadequately studied by researchers, underestimated by politicians, and insufficiently exploited by many entrepreneurs (Maroto & Cuadrado 2009). The traditional perception of services as unproductive still persists in the common mind of the present society (Akehurst 2008). Even today, in the centre of a society characterized by knowledge, information and intangibles, many still consider services as secondary activities to economic growth. This idea is inherited from a materialist concept which, literally speaking, conflicts with the current reality (Illeris 1996).

The question of why services grow has been the object of many explanatory hypotheses and theories throughout economic literature. Although a sole factor cannot answer that question (Rubalcaba 2007), two hypotheses on the growth of the service sector prevail over the rest: i) productivity, and ii) income elasticity. Taking into account the aim of this paper, we will focus on the first one.

One of the most outstanding debates in recent years around the service sector, especially in the European economies, has been on productivity issues (European Commission 2004, 2005; O'Mahony & Van Ark 2003; Wölfl 2003, 2005; Rubalcaba & Maroto 2007). The reasoning is twofold. First, services have increased their role, both in quantitative and strategic terms, in European countries. Secondly, conventional theories have traditionally suggested an unproductive nature for the service sector. This injurious myth set on the productivity of services has led many economists to assert that the tertiarization processes in advanced countries restrain the productivity growth of their overall economies, worsening their long run growth and the life standards of their population.

Although the issues on the relationship between productivity and the growth of services come from the 40s (Fourastie 1949), only after two decades they obtained his maximum apogee through the seminal works by Baumol (1967 and 1986; et al., 1985 and 1989). Its well-known '*cost disease*' explains the unbalanced growth of services from the reallocation of

productive factors-mainly labour force-towards these activities, generally less productive than other industrial sectors. Services, which have often difficulties to incorporate technology advances and to replace labour by capital, consider labour force as an end issue in itself and present greater price and income elasticities. Nevertheless, services tend to adopt those wages from the most productive sectors, playing the role of activities 'in stagnation' in these models on unbalanced growth.

This assumption is, as it has been introduced before, controversial, although certain legitimacy cannot be denied. It is certain that labour productivity in services grow at lower rates than that in other economic sectors. However, the majority of empirical studies in recent years[1] have concluded that some service industries, such as transports and communications, financial intermediation, or some dynamic and technological business and professional services, have contributed to the productivity growth of the western countries from the mid 90s. This evidence which clearly resists the conventional thesis on the unproductive nature of services has led the academic community to look for new theoretical approaches and inputs on the relationships between productivity and services.[2] These new waves, more kindly with respect to the tertiary sector, consider issues as diverse as the inherent quality of the services, the innovation and knowledge, some measurement difficulties, or the indirect and positive effects that some service activities induce in the productivity growth of other economic industries through the externalization or outsourcing processes.

Table 1 summarizes the main contributions that specialized literature has left on the relationship between services and productivity, from the early *marginalist* approaches and the establishment of the classical theories on the stagnation of the productivity in services, to those most novel and present waves. The conclusion of this conceptual, theoretical, and empirical argumentation has been a change, or at least one clarification, of the conventional hypotheses. Thus, the current vision is more positive for the service sector, at least concerning some countries.

[1] See, among others, Maroto & Cuadrado (2009) for an OECD sample, Bosworth & Triplett (2007) and Triplett & Bosworth (2004) for the United States; Crespi et al. (2006) for the United Kingdom; McLachlan et al. (2002) for Australia; or O'Mahony & van Ark (2003) and Maroto & Rubalcaba (2008) for the European Union.

[2] See Maroto (2010) for a revisión.

Table 1. Relationships between Services and Productivity: Main Theoretical Approaches

Historical age	Cited authors	Theoretical views	Summary
First half of the 20th century	Fisher (1935), Clark (1940), Fuchs (1968), Wolfe (1955)	First appearance of services in the studies on long run economic growth	**First marginalist approaches** on the relationship between services and productivity
	Fourastié (1949)	Low relative productivity of services as explanation of growth of the sector → ***First approach to the relationship between productivity and services*** (1949)	
From end-60s to the 90s	Baumol (1967, 1986, 1989) and others (Baumol et al. 1985; Baumol & Bowen 1966; Baumol & Wolff 1984)	Services' ***cost disease*** and its explanations	'Boom' on productivity and services: services as guilty of low overall productivity → **Conventional theories**
From the 90s	Foster, Haltiwanger, & Krizan (1998)	Effects of the reallocation of resources towards services on the productivity growth	
	Bernard & Jones (1996)	Effects of the low relative productivity growth within services on the overall productivity growth	
	Baumol (2001, 2002), Triplett & Bosworth (2004)	***Services dualism or heterogeneity:*** Dynamic services versus labour intensive ones	**Revisions and new theoretical inputs →** Services as themselves are not unproductive, but it depends on the analyzed branch or subsector and other issues to be taken into account
	Gadrey & Gallouj (2002)	Role of **innovation and knowledge** on the productivity growth within some services	
	Oulton (2001); Schreyer (1996)	Service'quality' and theories on **hedonic prices**	
	Wolff (1999); Fixler & Siegel (1999); Rubalcaba (2007)	Indirect indicators and estimations (Baumol's thesis could only be observed in the final demand services → ***Outsourcing and indirect productivity***	
	Pilat (2000); Kox (2002)	Role of ***other elements independent from the labour factor***, such as the nature of the service, the substitution relationships or the market segmentation	
	Van Ark & Piatkowski (2004); O'Mahony & Van Ark (2003); Stiroh (2001)	Role of ***ITCs and the Information Society*** in the dynamism of some service subsectors	
	Griliches (1992); Wölfl (2003); Inklaar & Timmer, (2008); Ahmad et al. (2003).	***Measurement and definition issues*** and possible infraestimation of services productivity	

Source: Own elaboration.

Following these ideas, the aim of this paper is showing the more current empirical evidence on the productivity in the service sector and their heterogeneous industries of the European countries. To reach this objective, we will use the EU KLEMS database. The research hypothesis is that the service sector is not unproductive per se, but a clear duality appears within it, where some dynamic branches coexist with some others which, due to their labour intensive nature and organization, hardly can secure a high productivity growth. After this brief introduction, Section 2 describes the state of the productivity in the service sector in the European Union, as well as its evolution from the beginning of the 80s. Later, Section 3 deepens in the behaviour of the different service industries. Finally, the fourth section displays empirical evidence of the heterogeneity within services analyzing the sectoral and

factorial contributions to the productivity and economic growth during the last twenty-five years in Europe.

2. PRODUCTIVITY OF THE SERVICES SECTOR IN THE EUROPEAN UNION (1980-2005)

The aim of this section is to analyze the current state of the productivity in the European services, as well as its evolution from 1980 onwards. EU KLEMS[3] database released in March 2008 has been used. This source provides estimations on economic growth, pro-ductivity (both labour and multifactor), labour force, and capital accumulation at the sectoral level for the member states of the European Union, Japan, and the United States from 1970 onwards. We have chosen this statistical source due to the wide sectoral breakdown for the service sector (as it will be seen with more detail in the following section), as well as the long time span covered and the comparability among countries that their estimations allow.

One of the most controversial subjects in the recent years has been the productivity gap between the European countries and the United States, especially from the mid 90s. Some empirical studies have underlined the interest to explain this phenomenon from a sectoral point of view, trying to answer some questions that an aggregate analysis might not cover. Data on aggregate productivity-both in terms of employed people or hours worked-can hide important differences in the respective levels and growth rates within the different economic sectors and particular branches. We will focus on sectoral differences, taking as reference the six great economic sectors: agriculture, mining, manufacturing, energy, construction, and service sector. Additionally, since the attention of this paper is services, we will differentiate between private and public services.[4] The following section analyzes the productivity patterns within its great subsectors and branches of activity.

---

[3] The ***EU KLEMS Growth and Productivity Accounts*** are the result of a research project, financed by the European Commission, to analyze the productivity in the European Union at sectoral level. Data and main results are available in http://www.euklems.net. For a brief methodological description, as well as to a summary of the main results, see Timmer et al. (2007).

[4] Concretely, throughout this paper we will refer as '***market services***' to those wholesale and retail trade activities (Nace 50-52), hotels and restaurants (55), transport (60-63), communications (64), finance (65-67), real state (70) business services (71-74), other communitarian, social and personal services (90-93) and private household services (95). On the opposite side, '***public services***' contain Public Administration and defense (75), education (80), and health and social work (85).

Data on labour productivity in the European Union show a wide variation at the sectoral level, although only the most important sectors will be analyzed. Thus, the productive structure of the economies plays a key role in the productivity patterns of them. Table 2 presents the main indicators of labour and hourly productivity at sectoral level for the EU 15 (old member states), the EU 10 (new member states), and the EU 25. Both levels in 2005 (last available data) and growth rates from 1980[5] are displayed.

In 2005, the level in the labour productivity in the EU 15 was up to 48,674 Euros per employed individual and 30.1 Euros per hour worked. In the EU 25 the productivity levels are slightly lower (46,518 Euros per employee and 28.1 Euros per hour worked), as levels within the EU 10 (30,543 and 16.3) are notably below than the EU 15 average ones. Therefore, the European productivity levels are lower than the ones in the United States[6] which are around 6-9 percentage points higher than the EU 15 case and 12-13 percent higher than the EU 25 case. Notably remarkable are the differences between the EU 10 and the United States, surpassing the 40 percentage points in terms of productivity per employee and 60 percentage points in terms of hourly productivity (see Table 3).

In the European service sector, the productivity level was up to 47,757 Euros per employee and 30.4 Euros per hour worked (since the total hours worked in the service sector is slightly above than the one at aggregate level, notably in the new member states). These numbers suppose that the tertiary sector in Europe displays productivity levels around the one in the overall economy for the EU 15 case (as productivity levels account for the 98-101% of the overall productivity level) and for the EU 25 cases (101-104%), but notably above the overall level for the Eastern countries (124-128%). However, although productivity levels within services rise above the ones within some economic sectors, such agriculture or construction, independently of the way we measure the labour productivity, they stand clearly below the levels within the rest of economic activities, especially manufacturing, mining, and energy. The comparison between private and public services shows that the labour productivity is noticeably higher in the private services.

[5] For the new member states (and consequently for the EU25) data are only available from 1995.
[6] Overall productivity levels in the United States were 53,371 Euros per employee and 31.9 Euros per hour worked in 2005. In the service sector, productivity levels were respectively 48,475 Euros and 25.9 Euros.

Table 2. Productivity Levels in the European Union, 1980-2005

	LABOUR PRODUCTIVITY			HOURLY PRODUCTIVITY		
	Level 2005	Index (related to total economy)	Annual average growth rate 1980-2005*	Level 2005	Index (related to total economy)	Annual average growth rate 1980-2005
EUROPEAN UNION 15 (Old Member States)						
TOTAL ECONOMY	48674	100.0	1.84	30.11	100.0	2.50
AGRICULTURE	23465	48.2	7.30	11.82	39.3	8.19
MINING	131812	270.8	6.47	75.96	252.3	7.16
MANUFACTURING	58306	119.8	3.81	35.51	117.9	4.51
ENERGY	221641	455.4	6.28	138.75	460.8	7.14
CONSTRUCTION	37115	76.3	0.79	20.57	68.3	0.97
SERVICES	**47757**	**98.1**	**0.97**	**30.37**	**100.9**	**1.49**
PRIVATE SERVICES	**53426**	**109.8**	**1.22**	**32.73**	**108.7**	**1.79**
PUBLIC SERVICES	**36086**	**74.1**	**0.31**	**24.94**	**82.8**	**0.76**
EUROPEAN UNION 10 (New Member States)						
TOTAL ECONOMY	30543	100.0	3.87	16.33	100.0	4.17
AGRICULTURE	7778	25.5	4.35	3.72	22.8	4.63
MINING	27668	90.6	4.52	16.06	98.4	4.51
MANUFACTURING	23964	78.5	9.75	12.84	78.6	9.87
ENERGY	52487	171.8	3.58	28.94	177.2	3.90
CONSTRUCTION	27943	91.5	2.42	14.15	86.6	2.50
SERVICES	**37875**	**124.0**	**2.47**	**20.84**	**127.6**	**2.80**
PRIVATE SERVICES	**37432**	**122.6**	**2.36**	**19.64**	**120.3**	**2.91**
PUBLIC SERVICES	**38765**	**126.9**	**2.72**	**23.50**	**143.9**	**2.76**
EUROPEAN UNION 25						
TOTAL ECONOMY	46518	100.0	1.36	28.15	100.0	1.79
AGRICULTURE	18725	40.3	3.09	9.26	32.9	3.43
MINING	89147	191.6	2.86	51.54	183.1	2.83
MANUFACTURING	50825	109.3	2.86	30.21	107.3	3.30
ENERGY	168557	362.4	5.34	101.30	359.8	6.04
CONSTRUCTION	37983	81.7	0.30	20.80	73.9	0.38
SERVICES	**47112**	**101.3**	**0.90**	**29.43**	**104.5**	**1.28**
PRIVATE SERVICES	**50609**	**108.8**	**1.02**	**30.44**	**108.1**	**1.50**
PUBLIC SERVICES	**39877**	**85.7**	**0.48**	**27.09**	**96.2**	**0.73**

Note: 1995-2005 for the EU 10 and EU 25.
Source: Own elaboration. Data EUKLEMS.

Table 3. Productivity Levels in the European Union, 2005
European Union *Versus* United States (unit: %)

	LABOUR PRODUCTIVITY			HOURLY PRODUCTIVITY		
	EU-15	**EU-10**	**EU-25**	**EU-15**	**EU-10**	**EU-25**
TOTAL ECONOMY	91.2	57.2	87.2	94.3	36.1	88.1
AGRICULTURE	61.0	20.2	48.7	70.2	15.1	55.0
MINING	121.1	25.4	81.9	159.3	23.2	108.1
MANUFACTURING	57.9	23.8	50.5	67.7	12.3	57.6
ENERGY	89.6	21.2	68.2	102.4	15.4	74.8
CONSTRUCTION	121.4	91.4	124.3	133.3	73.3	134.8
SERVICES	**98.0**	**77.7**	**96.7**	**99.4**	**53.3**	**96.3**
PRIVATE SERVICES	**99.9**	**70.0**	**94.6**	**100.0**	**46.5**	**93.0**
PUBLIC SERVICES	91.2	57.2	87.2	94.3	36.1	88.1

Source: Own elaboration. Data EUKLEMS.

On the other hand, as shown in Table 3, productivity levels within European services are approximately close to those within the United States (with the exception of the EU 10 countries), especially thanks to some private services. Therefore, the productivity gap between Europe and the United States is less important in the service sector than in other sectors, such as agriculture or manufacturing.

Nevertheless, the current state might hide some interesting changes during the last twenty-five years. The annual average growth rate of the overall productivity in the EU 15 has been up to 1.8% (2.5%) in terms of labour (hourly) productivity. Thus, the growth in hourly productivity is than the growth in labour productivity due to the lower number of work hours in most European countries during the last decades. Secondly, this pattern is also observed within services, which has experienced an average growth rate up to 1.0% (1.5%) in terms of labour (hourly) productivity from 1980 to 2005. Additionally, data show that productivity growth rates in the EU 10 countries have been markedly higher than those in the old EU member states during the period analyzed, especially from the mid 90s when productivity growth rates in the EU 15 slowed down.

The evolution of the sectoral productivities in the European economy from the beginning of the 80s onwards, briefly described in the Table 2, has its base on the growth patterns of its

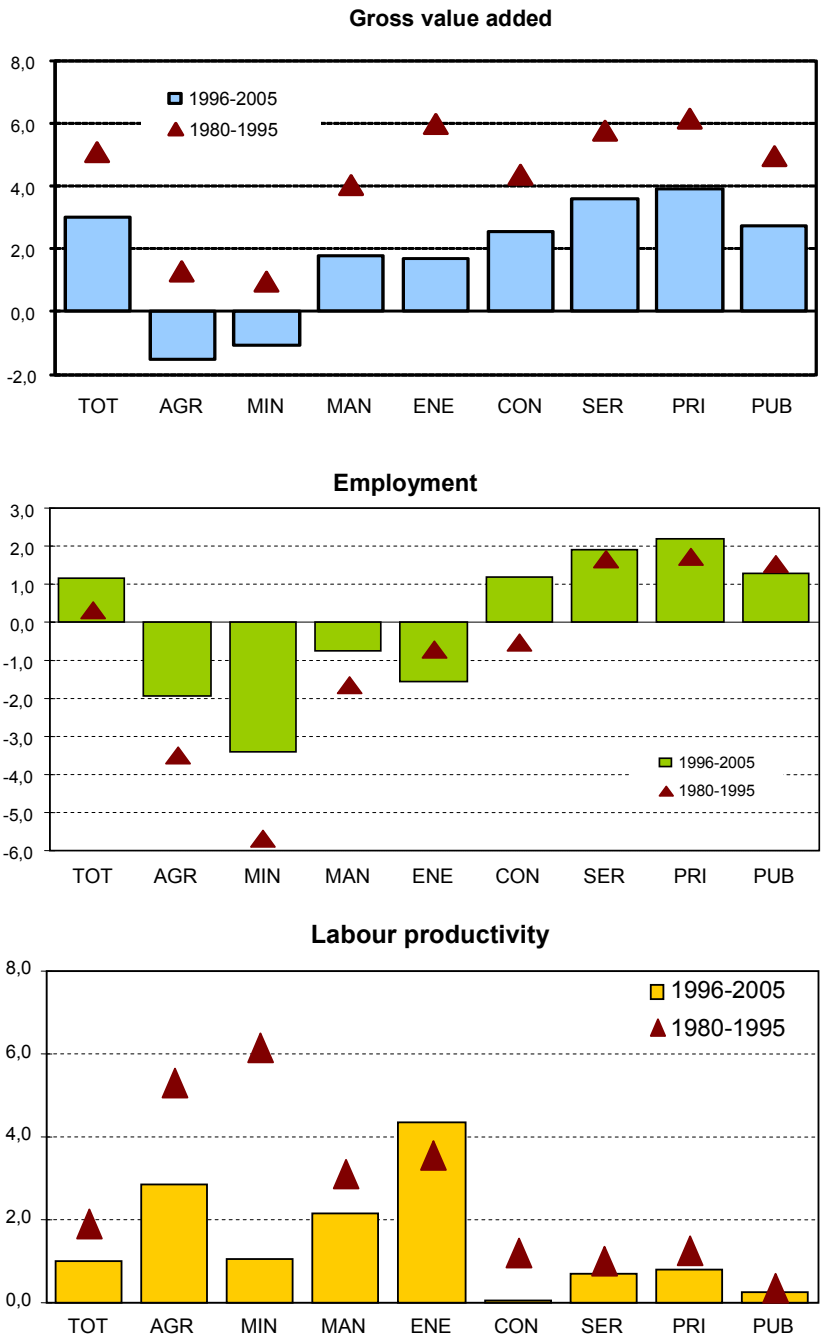
two main components: production and labour use. Figure 1 presents these growth paths for the case of the gross value added (first graph of the figure), employment (second graph), and labour productivity (third graph). Relative figures in terms of work hours and hourly productivity are very similar to the presented graphs. Two subperiods have been differentiated: until 1995 and from this year onwards. This cut-off year has been chosen on the basis of the general consensus in the specialized literature that the productivity gap between European countries and the United States might have taken off since this point.

Data clearly confirm the change observed since 1995. The growth of value added fell down from an annual average of 5% until 1995 to 3% since then. This poorer behaviour can be observed in every economic sector analyzed, especially in agriculture or mining where the growth rates since the mid 90s have been negative. Particularly, in the service sector the annual growth rate has fallen down from a 5.7% to a 3.6% between both subperiods. Therefore, the main conclusion is that the European production has undergone an important deceleration, both from the aggregate and sectoral points of view, since mid 90s. Services follow the same trend.

The opposite image is obtained when the graph related to overall employment is analyzed. Whereas it practically stayed stable during the 80s and the beginning of the 90s (reaching a growth rate of 0.3%), since 1995 it annually grew up to a 1.2%. Even this good behaviour is also observed in those economic sectors such as agriculture, mining, manufacturing, or construction. The service sector has also experienced a slight acceleration (from a 1.6% until 1995 to a 1.9% since then). This process of creation of tertiary jobs is observed only within the private services, as the growth rate in the public services has fallen since 1995.

These growth paths of the production and the employment can be translated to the productivity graph. Due to the deceleration of value added and the acceleration of employment in the European Union, a remarkable slowdown of the productivity growth is observed since the mid 90s, both in aggregate and sectoral levels. Only the energy sector has shown greater productivity growth rates in the recent years than in the previous time period. In the service sector, for example, whereas the growth rate until 1995 was up to a 1% it fell down to a 0.7% in the last decade. Nevertheless, this slowdown in the productivity growth in European services since 1995 has not been as pronounced as in aggregate terms (where the productivity

growth rate since 1995 has been approximately the half of the one between 1980 and 1995).



Note: TOT = Total economy; AGR = Agriculture; MIN = Mining; MAN = Manufacturing; ENE = Energy; CON = Construction; SER = Services; PRI = Private services; and PUB = Public services

Figure 1. Growth in Gross Value Added, Employment and Labour Productivity: Main Economic Sectors, EU-15, 1980-1995 Versus 1996-2005

3. HETEROGENEITY WITHIN THE SERVICE SECTOR: DYNAMIC *VERSUS* STAGNANT SERVICES

After the presentation of the current state and recent evolution of the labour productivity in the service sector as a whole of the European economy, this section will deepen into the tertiary activities. For this purpose, private services are broken down into nine subsectors: a) wholesale & retail trade, b) hotels & restaurants, c) transport, d) communications, e) financial services, f) real estate, g) business services, h) other communitarian, social, & personal services, and i) finally private household activities. Similarly, j) public administration & defence, k) education, and l) health & social work belong to public services. Whenever possible, these subsectors will be divided further into their main activity branches (according to Nace 2 digit codes).

Table 4 displays the main estimations of labour and hourly productivity for the different subsectors and economic branches belonging to the service sector during the 1980-2005 period. As shown in the previous section, the productivity level in 2005 of private services in the EU 15 was 53,426 Euros per employee (32.7 Euros per hour) which is about ten percent above the level in the aggregate service sector, whereas in public services the productivity level was notably lower (36,086 Euros per employee and 24.9 Euros per hour which are around 20-25% below the level in the aggregate service sector). In contrast, in the EU 10 (those Central and Eastern new member states) the productivity in private services stands significantly below the EU 15 levels, whereas the productivity in public services behaves better than that in the Western European countries.

Within the private services, the most productive subsectors[7] are communications (with an index of 311), finance (216), and transport (108), whereas the less productive ones are private household activities (22), hotels & restaurants (49), and other communitarian, personal & social services (73). If we disaggregate even more, the most dynamic tertiary activities are water & air transport, wholesale trade, financial & insurance services, renting activities, and computer services. Public services present productivity figures lower than private ones. The most productive public services are those related to public administrations, near to the

[7] With the exception of real estate activities where the particular way of estimating their production (only with the manpower in gross terms) is translated into huge labour productivity levels, as we can see in Table 4.

aggregate services levels; whereas the education is the least productive among public services.

Table 4. Productivity in Service Industries in the European Union, 1980-2005

	EU 15 (Old Member States)						EU 10 (New Member States)					
	Labour productivity			Hourly productivity			Labour productivity			Hourly productivity		
	Level 2005	80-05 growth	Index 2005	Level 2005	80-05 growth	Index 2005	Level 2005	95-05 growth	Index 2005	Level 2005	95-05 growth	Index 2005
SERVICES	**47757**	**1.0**	**100.0**	**30.4**	**1.5**	**100.0**	**37875**	**2.5**	**100.0**	**20.8**	**2.8**	**100.0**
PRIVATE SERVICES	**53426**	**1.2**	**111.9**	**32.7**	**1.8**	**107.8**	**37432**	**2.4**	98.8	**19.6**	**2.9**	94.2
Wholesale and retail trade	37246	1.8	78.0	22.6	2.6	74.5	23386	5.0	61.7	11.9	5.8	57.3
50	39351	1.3	82.4	22.2	1.9	73.2	25400	0.9	67.1	12.8	1.2	61.4
51	58857	2.4	123.2	33.4	3.1	110.0	28671	8.0	75.7	14.9	8.7	71.4
52	26034	1.6	54.5	16.8	2.4	55.2	19766	4.0	52.2	10.0	4.9	48.1
Hotels & restaurants	23229	-1.0	48.6	13.6	-0.5	44.8	9287	-1.8	24.5	4.8	-1.1	23.2
Transports	51412	3.0	107.7	27.5	3.6	90.7	31374	2.8	82.8	16.2	3.0	77.7
60	45256	3.8	94.8	25.0	4.4	82.4	27917	4.7	73.7	14.4	5.0	69.1
61	185410	12.6	388.2	90.5	13.8	298.0	32375	0.6	85.5	17.0	0.8	81.6
62	78235	0.3	163.8	48.0	0.8	158.0	36562	-2.5	96.5	18.6	-2.3	89.1
63	48240	1.5	101.0	24.2	2.1	79.7	44448	-1.7	117.4	23.1	-1.6	110.8
Communications	148420	12.0	310.8	96.2	13.2	316.9	31917	16.3	84.3	17.4	17.3	83.5
Finance	103044	2.2	215.8	64.0	2.7	210.7	82731	10.5	218.4	45.7	10.3	219.3
65	142204	5.4*	297.8	89.7	5.6*	295.5	92026	10.4	243.0	51.2	10.2	245.8
66	61068	-1.9*	127.9	37.7	-1.6*	124.3	73771	18.5	194.8	40.6	18.2	194.8
67	48049	2.0*	100.6	28.8	2.5*	94.7	51293	2.2	135.4	27.6	2.4	132.3
Real estate	455283	-0.2	953.3	284.5	0.2	936.9	288240	-1.0	761.0	157.4	-0.6	755.1
Business services	45790	-0.3	95.9	28.0	-0.1	92.3	27407	-0.4	72.4	14.6	0.2	70.0
71	222681	2.9	466.3	131.1	3.3	431.9	87338	4.5	230.6	47.7	5.0	228.7
72	57233	-0.4	119.8	32.7	-0.3	107.8	42818	6.0	113.1	22.0	6.8	105.8
73	50049	0.5	104.8	30.4	0.9	100.1	21695	-1.9	57.3	10.7	-2.7	51.2
741	48862	-0.7*	102.3	29.7	-0.4*	97.9	32919	-1.2	86.9	17.7	-0.5	84.8
749	29105	-1.0*	60.9	18.4	-1.0*	60.5	16619	-1.0	43.9	8.9	-0.2	42.9
Other private services	34899	-0.4	73.1	22.4	-0.1	73.9	28392	0.9	75.0	15.8	1.3	76.0
Private household services	10141	-0.6	21.2	8.1	-0.6	26.8	63881	-4.2	168.7	37.6	-4.8	180.6
PUBLIC SERVICES	**36086**	**0.3**	**75.6**	**24.9**	**0.8**	**82.1**	**38765**	**2.7**	102.4	**23.5**	**2.8**	112.8
Public Administration	45264	1.0	94.8	28.7	1.5	94.6	44282	2.6	116.9	24.6	2.4	118.2
Education	31890	-0.0	66.8	24.3	0.2	80.1	39843	2.5	105.2	27.7	2.5	132.9
Health & social work	32672	0.1	68.4	22.5	0.6	74.1	31010	2.5	81.9	17.6	2.7	84.7

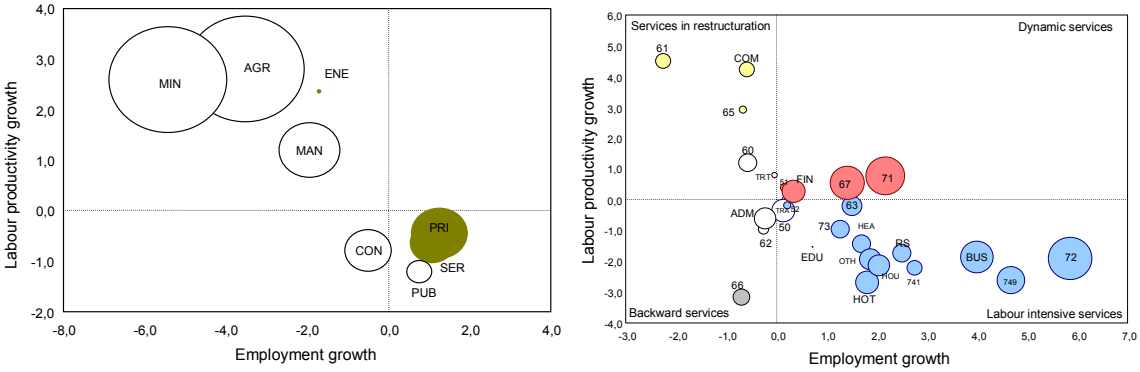
Note: * 1995-2005.
Source: Own elaboration. Data EUKLEMS.

The image previously shown for the levels in 2005 remains almost unchanged for the period of 1980-2005. Those services with the highest productivity levels are the ones experimenting quicker growth rates, and *vice versa*. Thus, private services show an annual growth rate between 1980 and 2005 of 1.2% (1.8%) in terms of employed people (hours worked). In particular, the branches with higher growth rates in these years are communications, financial intermediation, wholesale trade, and water transport. This growth is even more pronounced in the new EU member countries, especially in communications and financial sectors.

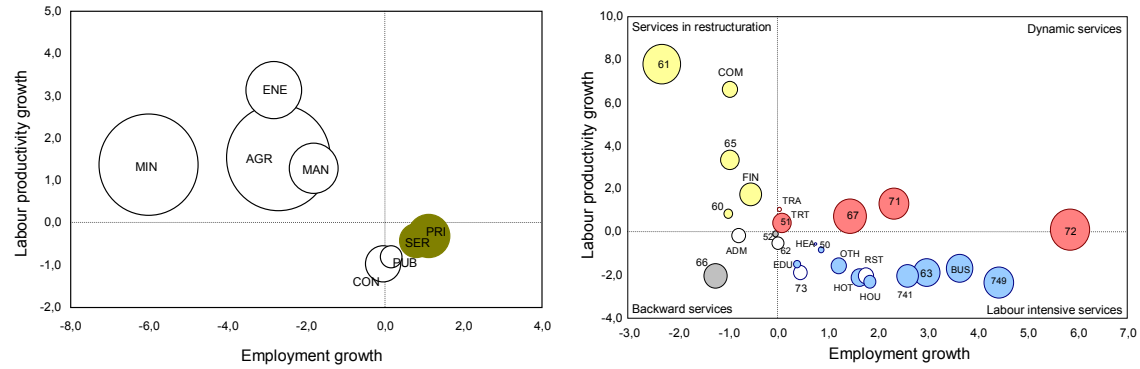
The growth in public services during this period was clearly low (0.3% and 0.8% respectively). Nevertheless, different and particular patterns stand when disaggregating ser-vices. Some service industries, such as education, private households, other communitarian & personal services, real estate, business & insurance services, and hotels & restaurants even experienced negative growth rates during these years. One remarkable fact is that in the EU 10 countries services such as education and other communitarian, personal, & social activities have not followed that negative trend, showing positive growth rates (although only for the last ten years).

Another way to analyze the trend in the productivity, jointly with the one of its two main components (production and employment) is the one introduced by Camagni & Capellin (1985).[8] These authors represent in the X axis the employment growth (related to the national overall average growth rate) and the growth labour productivity in the Y axis. Finally, the size of the pointer shows the relative growth in terms of production. According to this methodology, economic sectors can be distinguished in four typologies: dynamic (higher growth in both employment and productivity), backward (lower growth in both employment and productivity), labour intensive (lower growth in productivity due to a stronger process of labour use), and sectors in reconstruction (higher growth in productivity principally due to a process of jobs destruction). Figure 2 shows the results of this methodological approach for the main economic sectors (at the left side graphs) and the tertiary activities (at the right side ones) for the EU 15 (Figure 2(a)), the EU 25 (Figure 2(b)), and the EU 10 (Figure 2(c)) during the available time period.

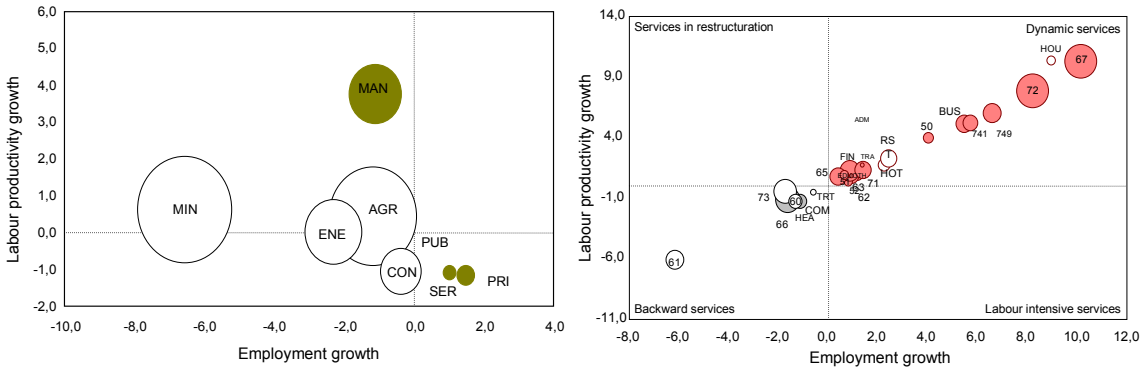
[8] Recently used in some papers on sectoral and services productivity, such as Maroto & Cuadrado (2007, 2009).



(a) European Union 15 (1980-2005)



(b) European Union 25 (1995-2005)



(c) European Union 10 (1995-2005)

Note: 50 = Commercial and motor vehicle repair; 51 = Wholesale (except motor vehicles); 52 = Retailing (except motor vehicles) and repair; HOT = hotels and restaurants; 60 = Land Transport; 61 = Water Transport; 62 = Air Transport; 63 = Auxiliary Transport Activities; COM = Communications; 65 = Financial Services (except insurance and pensions); 66 = Insurance; 67 = Auxiliary Financial Activities; RST = Real Estate; 71 = Equipment and Machinery Renting; 72 = Computer Services; 73 = R&D; 741-3 = Legal, technical and Publishing Services; 749 = Other Business Services; ADM = Public Administration and Defence; EDU = Education; HEA = Health Care; OTH = Other Social, Personal and Community Services; and HOU = Private Households Services.

Figure 2. Sectoral Typologies in the European Union

These figures show that no extreme behaviours are observed in the European economies. There is neither dynamic nor backward sector during the years analyzed. More concretely, agriculture, manufacturing, mining, and energy display high productivity growths because they have undergone strong processes of jobs destructions. They might be characterized as sectors in reconstruction since the 80s. On the other hand, the service sector and the construction sector behave oppositely, since their employment has grown above the overall average, impelling lower growths in their productivity.

Nevertheless, if we analyze the tertiary activities more deeply those extreme patterns appear, as we might expect. Air transport (62), insurance (66), and public administration (ADM) have been backward services in the EU 15 countries since 1980. In the opposite side, wholesale trade (51), finance (FIN), auxiliary financial activities (67), and equipment & machinery renting (71) have been dynamic services. Some other branches, such as transport (TRT), inland & water transport (60-61), financial intermediation (65), and communications (COM) have experienced high productivity growth rates originated by remarkable decreases in their employment use. The rest of services might be characterized as labour intensive activities. Extreme behaviours are clearer when shorter time spans are used and in the case of the new EU member states, as Figure 2(c) displays. In these countries, only dynamic and backward services stand from 1995 to 2005.

Table 5 displays the growth of the value added, employment, and labour productivity during the 1980-2005 period in the EU 15.[9] Additionally, sectoral contributions to the productivity growth are also presented. Data demonstrate that the growth of gross value added was significantly high, especially during the 80s (see Table A.1 and Table A.2 in the Appendix). Concretely, the annual growth rate was up to 4%. Employment in European economies (both in terms of employed people and hours worked) experienced lower growth rates during these years (0.6% and 0.2%). Obviously, this success in terms of production growth jointly with the relatively weak creation of employment has originated a productivity growth during these twenty-five years, despite the evident deceleration since the mid 90s. Labour productivity has reached an annual growth rate of 1.5%, whereas the rate in hourly

[9] For country results see van Ark et al. (2007).

productivity has been even more pronounced (2.0%).

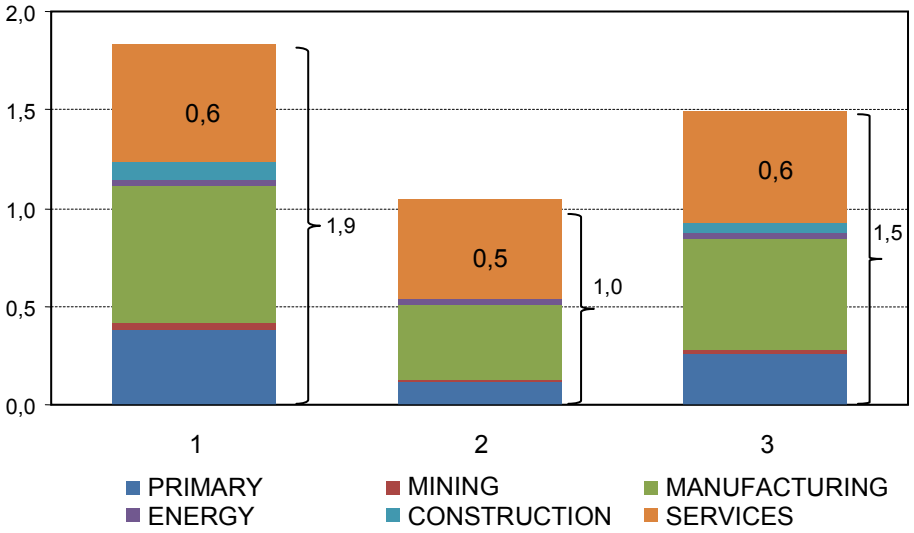
According to the sectoral estimations for the contributions to productivity growth in the Table 5, Figure 3 shows that more than 60% of the overall productivity growth was accounted by non tertiary sectors, such as agriculture (17%) and manufacturing (37%). Service sector represents approximately 40% of the overall productivity growth from 1980 onwards. Additionally, the service contribution has notably grown since the mid 90s (surpassing 50% since 1995).

Table 5. Production, Employment, and Labour Productivity in Service Industries in the EU 15, 1980-2005

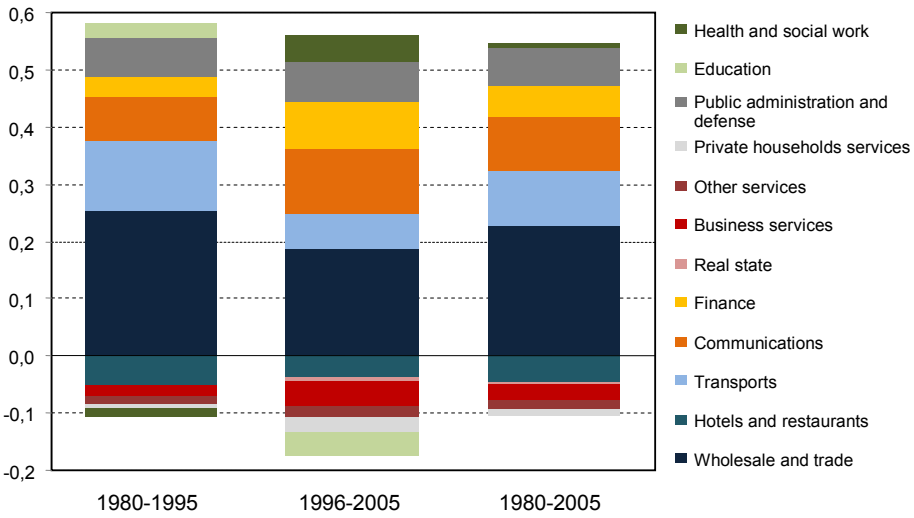
	Annual average growth rate (%)					Weight (employ-ment)	Weight (hours)	Contribution to the PL growth[1]	Contribution to the PH growth[1]
	GVA	Employ-ment	Hours worked	Labour productivity (LP)	Hourly productivity (HP)				
TOTAL ECONOMY	4.2	0.6	0.2	1.5	2.0	100.0	100.0	1.5	2.0
SERVICES	**4.9**	**1.8**	**1.3**	**0.9**	**1.3**	**64.7**	**62.7**	**0.6**	**0.8**
PRIVATE SERVICES	**5.3**	**1.9**	**1.5**	**1.1**	**1.6**	**42.8**	**42.5**	**0.5**	**0.6**
Wholesale and retail trade	4.1	0.8	0.4	1.5	2.0	15.0	15.4	0.2	0.3
Hotels and restaurants	5.7	2.5	1.8	-1.2	-0.6	4.0	4.4	-0.0	-0.0
Transports	4.2	0.6	0.3	2.3	2.6	4.2	4.8	0.1	0.1
Communications	4.9	0.1	-0.2	5.8	6.1	1.6	1.5	0.1	0.1
Finance	5.7	1.0	0.7	1.8	2.1	3.0	3.0	0.1	0.1
Real estate	5.2	3.2	2.7	-0.2	0.2	0.8	0.8	0.0	0.0
Business services	7.3	4.7	4.4	-0.3	-0.1	8.1	8.0	-0.0	-0.0
Other private services	5.5	2.5	2.2	-0.4	-0.1	4.0	3.8	-0.0	0.0
Private household services	5.6	2.7	2.8	-0.6	-0.7	2.0	1.5	-0.0	-0.0
PUBLIC SERVICES	**4.1**	**1.4**	**1.1**	**0.6**	**1.0**	**21.9**	**20.2**	**0.1**	**0.2**
Public Administration and defense	3.1	0.4	0.1	0.9	1.3	7.3	7.0	0.1	0.1
Education	4.3	1.4	1.1	0.0	0.2	6.3	4.9	0.0	0.0
Health and social work	5.2	2.3	1.8	0.1	0.6	8.3	7.4	0.0	0.1

Note: [1] The contribution of each activity to the growth in labour productivity (hourly) has been calculated multiplying the growth of labour productivity (hourly) in each activity by the weight over the total employment (hours worked) of each sector.

Source: Own elaboration. Data EUKLEMS.



(a) Main Economic Sectors

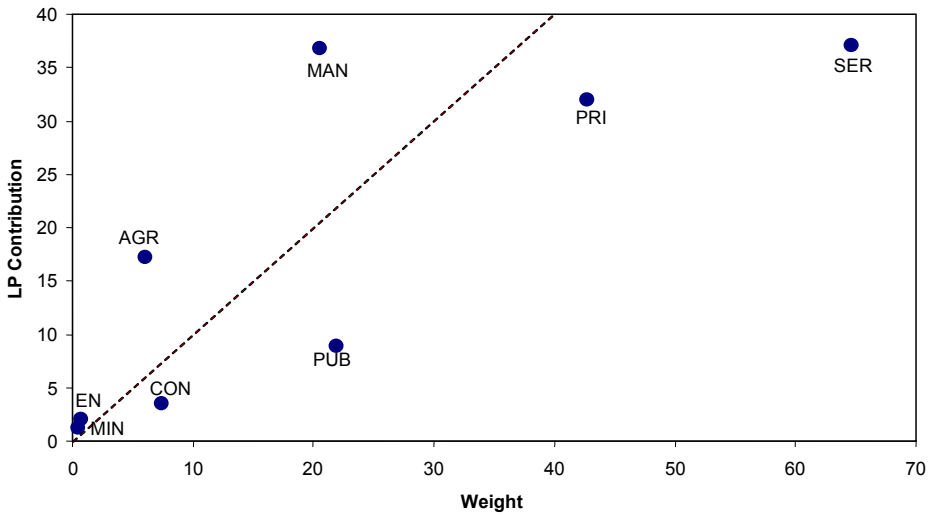


(b) Service Industries

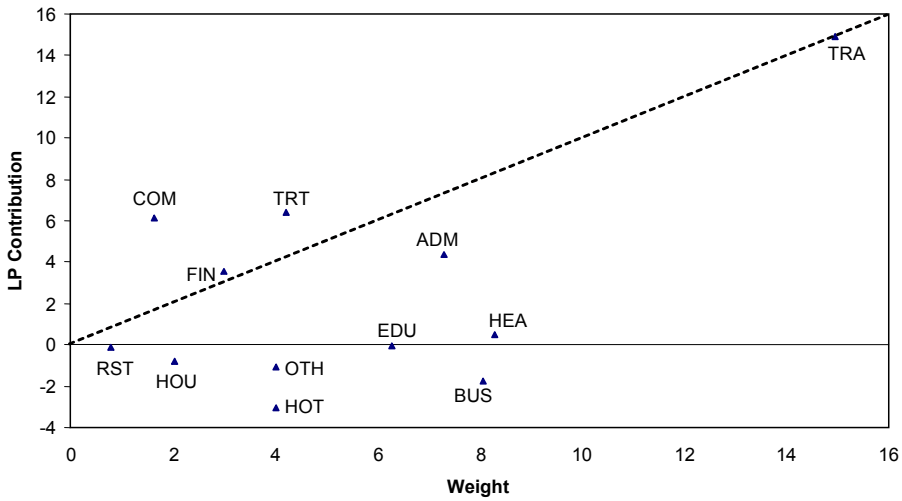
Figure 3. Sectoral Contribution to the Productivity Growth in the EU, 1980-2005(%)

Private services have accounted one third of the overall labour productivity growth in the European Union since 1980 (approximately the 75-80% of the service sector as a whole). Public services added other 10% to the overall labour productivity growth during these years (20-25% of the aggregate tertiary contribution). Analysis of the service sector reveals that the wholesale & retail trade contributed around 15% to the overall productivity growth; each of transports and communications 6%, public administrations and defence 5%, and financial

services 4%. However, hotels & restaurants, business services, private household activities, and the other communitarian, social, & personal services did not contribute to the overall productivity growth and their growth since 1980 has been negative.



(a) Main Economic Sectors



(b) Service Industries

Note: AGR = Agriculture; MIN = Mining; MAN = Manufacturing; ENE = Energy; CON = Construction; SER = Services; PRI = Private services; and PUB = Public services; TRA = Trade; HOT = hotels and restaurants; TRT = Transports; COM = Communications; FIN = Financial and insurance services; RST = Real Estate; BUS = Business services; ADM = Public Administration and Defence; EDU = Education; HEA = Health Care; OTH = Other Social, Personal and Community Services; and HOU = Private Households Services.

Figure 4. Employment and Productivity Contribution in the Service Industries in the European Union 15, 1980-2005

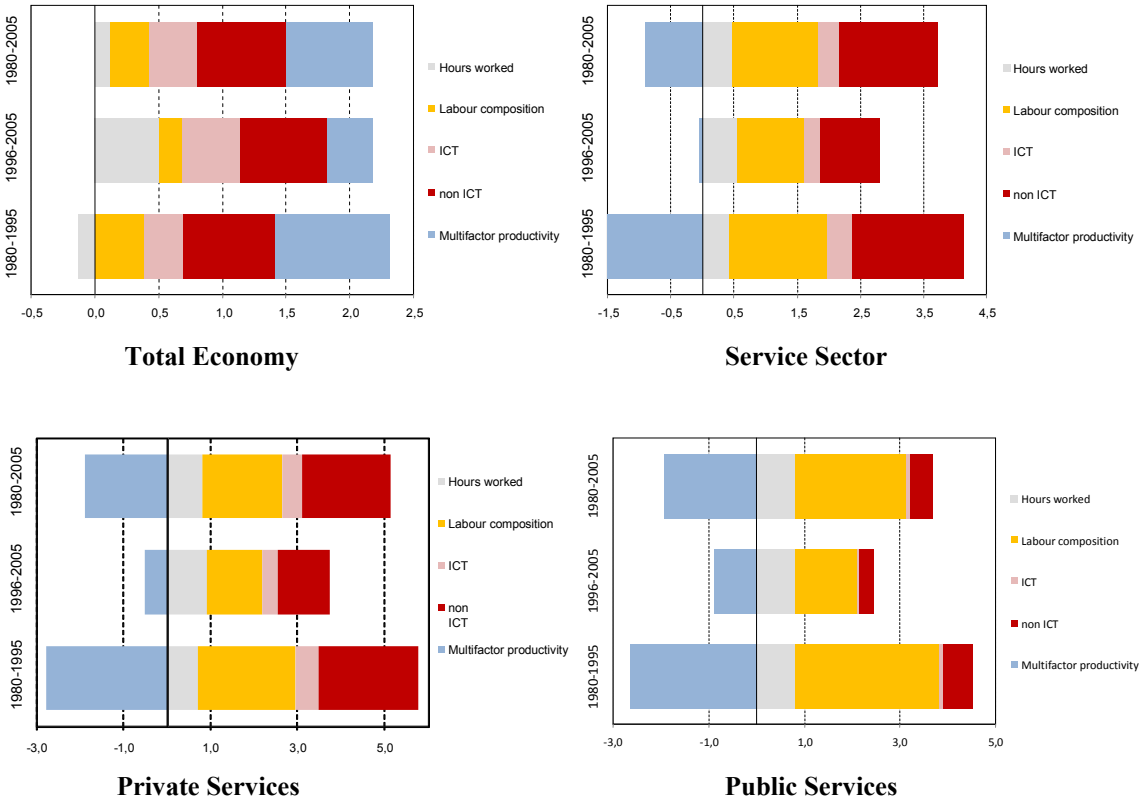
Productivity growth in the European services has been closely related to the evolution of employment and labour utilization (with only a few exceptions to this rule). Thus, the highest growth rates in productivity during recent years have occurred in those industries characterized by strong processes of labour destruction, capitalization practices, and technological investment, whereas the poorest paths have happened to labour intensive areas. Nevertheless, there are certain service areas that break this relationship between labour use and productivity. They display dynamic behaviours despite good figures in terms of employment creation.

In order to contrast this fact, Figure 4 shows annual average contributions to the employment and labour productivity in the European Union between 1980 and 2005. The red line indicates those locations where the contribution to overall productivity growth approximately corresponds to their contribution or weight in total employment. Industries over the line contribute more to productivity growth than employment and vice versa. Figure 4.A shows that only the construction and the service sectors (both private and public activities) stand below the line. However, there are some tertiary industries with higher contributions to productivity than employment (see Figure 4.B). Concretely, only some private services, such as communications, finance, and transport, are located clearly above the red line, whereas wholesale & retail trade presents approximately identical contributions to employment and productivity. The rest of private services and all public services show high weights over total employment and hours worked in the European economies but their contributions to productivity growth are pretty small or even negative.

4. ECONOMIC GROWTH AND PRODUCTIVITY IN THE EU: FACTORIAL CONTRIBUTIONS AND MULTIFACTOR PRODUCTIVITY (1980-2005)

In the previous section, some evidences about productivity levels and growth patterns within service industries have been displayed. Additionally, it has been demonstrated that not all services behave negatively in terms of productivity, but there is a couple of dynamic activities in the period. Following these ideas, it would be interesting to see how those dynamic services grow. For this purpose, the present section analyzes the factorial contributions to economic and productivity growth in the European Union. Particularly, the

contributions of each production factor (labour, capital, and multifactor productivity-MFP) to the value added growth will be estimated. Moreover, labour contributions are decomposed into hours and labour composition, while capital contributions are decomposed into technological and non technological capital contributions.



Note: [1] The 'EU 15 ex' country-cluster consists on Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Spain and the United Kingdom (only countries which EUKLEMS database allow to approximate growth accounting estimates).

Figure 5. Factorial Contributions to the Economic Growth in the European Union, 1980-2005 (EU15 ex[1], Contributions in %)

Figure 5 shows these factorial contributions to the gross value added in the European Union.[10] Four distinctions (whole economy, service sector, private, and public services) have been made and graphs also distinguish between 1980-1995 and 1996-2005 subperiods. The 2.2% growth of aggregate GVA between 1980 and 2005 in European countries has essen-

[10] Figures and percentages of these contributions are displayed in Table A.3-Table A.5 in the Appendix.

tially been due to the capital contribution (50%), whereas labour has contributed 20% and the other 30% has been originated by other sources (MFP). More concretely, most of capital and labour contributions arise from the non ICT capital and the labour composition. However, during latest years the labour contribution (especially that coming from the total number of hours worked) has grown while MFP has lost weight in the production growth.

The factorial sharing out within the service sector notably differs from the aggregate case. The main factor in the tertiary GVA growth is the labour force (70%), especially the genre and age composition (50%). Secondly, capital contributes other 65%, whereas MFP presents a negative contribution in the analysis period due to its worst behaviour during the 80s and the first half of 90s. Figures about private services approximately replicate those for services as a whole (see left bottom graph in Figure 5), although negative contribution of MFP is even higher in private services. High but negative contributions also appear in the case of public services, where the labour contribution (especially the quality and labour composition effects) accounts for almost all the growth.

Figure 6 and Figure 7 present those factorial contributions within private and public services, respectively. Inside private sphere, Figure 6 shows two clusters of industries. One cluster includes hotels & restaurants, business services, and other private services, previously characterized as displaying below average productivity levels and growth rates. Three key aspects arise when the factorial contributions are analyzed within these industries. Firstly, MFP has a significant negative contribution (see yellow areas). Secondly, they are characterized by a strong role of labour, essentially of the quantity or volume. And, finally, capital effects provide almost exclusively from non technological assets.

The other cluster includes private services such as communications, transport, wholesale & trade, and financial activities. These services have displayed high growth rates of labour productivity during recent decades and, as well, their contribution to overall productivity growth has been quite significant. Additionally, according to evidence shown in Figure 6, their growths of MFP are the leading contribution to the growth of value added (especially since the mid 90s). The second remarkable fact is the contribution of technological capital in this kind of services (see light blue areas) is significantly higher than the contribution of other types of capital.

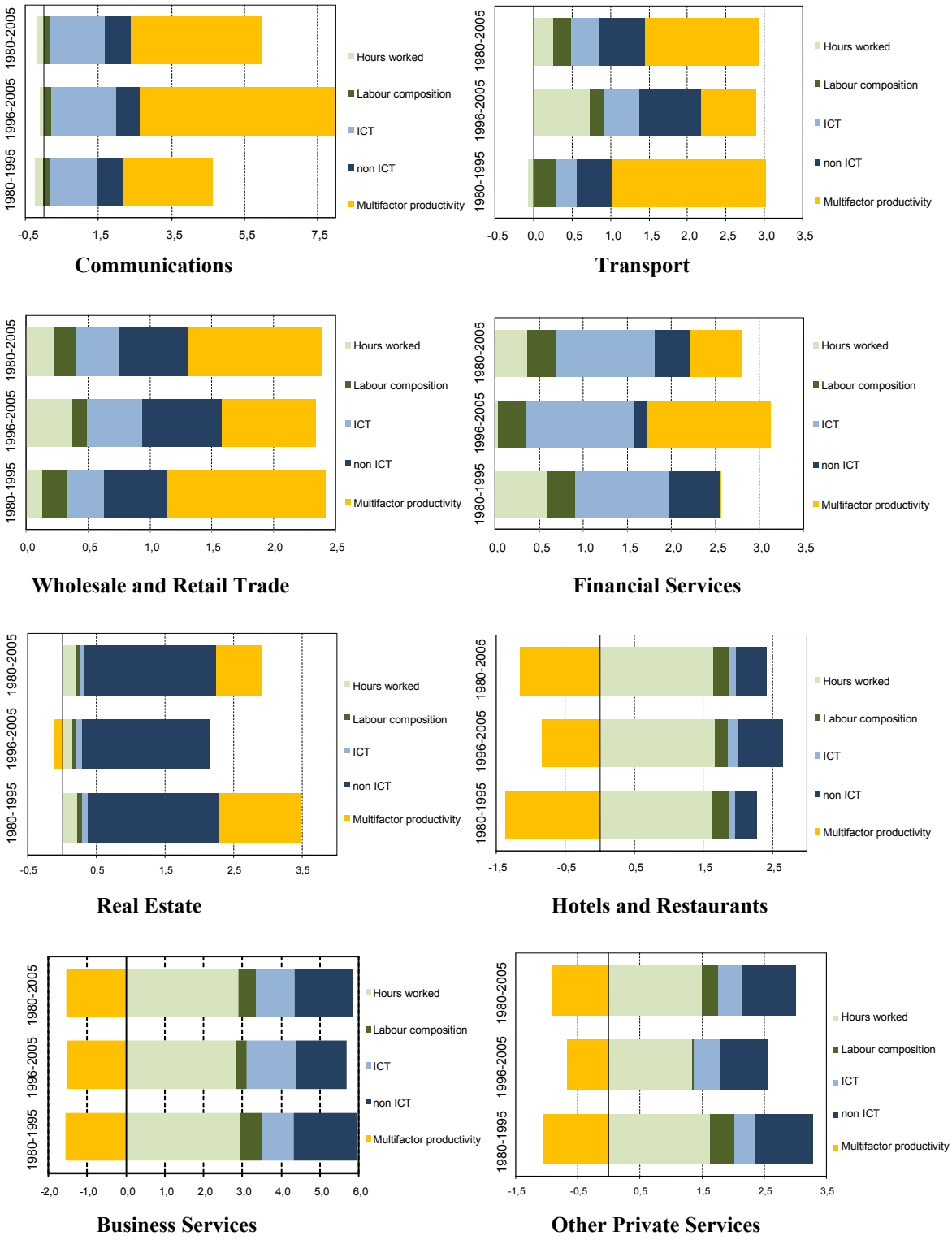


Figure 6. Factorial Contributions to the Economic Growth in Private Services in the European Union, 1980-2005(%)

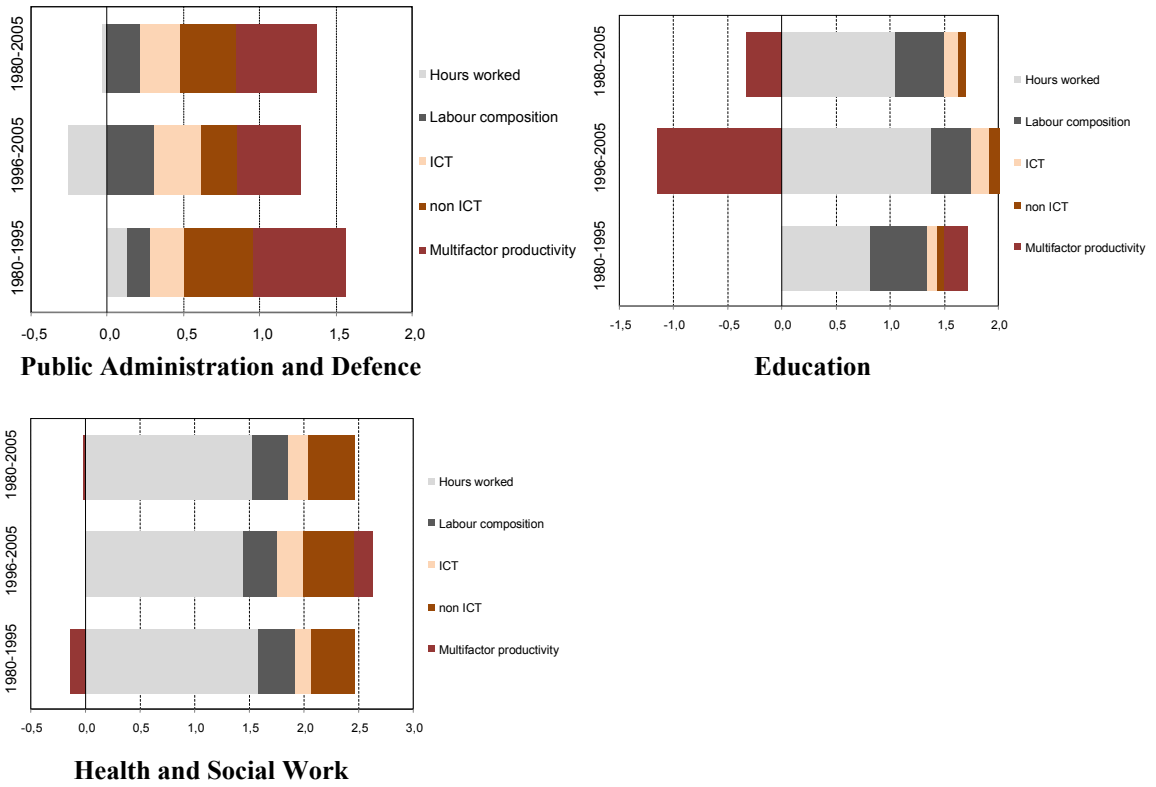


Figure 7. Factorial Contributions to the Economic Growth in Public Services in the European Union, 1980-2005(%)

Figure 7 presents the factorial contributions within public services. Regarding to MFP contributions, public administrations have undergone positive growth rates during the whole period. In health and social services, MFP contributes positively since 1995 although in the previous period the behaviour was the opposite. And the MFP in educational activities has experienced negative growth rates since 1995. Another characteristic in education and health & social services is the leading role of the level of employment. They are clearly labour intensive services, where the relationship between provision of service and employment volume is directly evident. Finally, regarding to capital, most of its contribution comes from non technological investments.

5. CONCLUSION

The processes of structural change in recent decades have turned developed economies into

services economies. Literature confirms the multiplicity of explanatory factors of services growth. Traditional ideas associate services growth with both their lower apparent relative productivity and higher levels of income. Nevertheless, current evidence and recent data reveal other underlying elements that act as driving forces on services: changes related to factors such as information and communication society, globalization and demographical and territorial changes, integration between goods and services, the interrelation between new technologies, innovation and services; the importance of human capital and qualifications (particularly in advanced services) and specialization; the role of international trade and investment; and finally, through its regulations and institutional changes, the role of the State in the economy.

On the other hand, productivity is, probably, one of the most popular topics among the economists, as well as other non-economic scholars. The service sector plays a key role when there are debates on productivity issues in theory, practice, or politics. Additionally, its influence is incessantly growing up because a service sector in stagnation or an unproductive service sector might be a major source of slowdown in the economy as a whole. From the beginning of the 21st century, the famous 'cost disease', introduced by Baumol at the end of the 60s, has been criticized and reviewed by many papers and works. These new approaches are based on issues such as the vertical relationships or outsourcing processes, the role of the ICTs, the issues related to the definition and measurement of productivity, or the multi-dimensional and multi-output nature of the majority of services. Lack of data and information could also be included as a conceptual problem in the analysis of the production and the productivity within the service sector.

Since the mid 90s, there has been a debate about the negative patterns of European productivity, in contrast to better figures shown by the United States. One of the reasons used to explain this fact is the sectoral structure of our growth path. Our analysis of the productivity within the service sector, as a whole, supports the traditional or conventional theories, emphasizing its relatively low growth. Nevertheless, our in-depth analysis reveals that significant differences exist among subsectors of the service sector. Our conclusion is that services are not unproductive ex ante. On one hand, it is undeniable that the level and the growth of the productivity within the service sector is generally below those experienced in

other economic sectors, such as manufacturing or agriculture. Yet, very noteworthy differences among service industries are observed.

Many services are showing growth rates comparable to or even above those by more dynamic manufacturing industries. Additionally, some of these service industries, such as communications, transports, certain business and professional services, or financial intermediation, show relatively high productivity growths and create employment simultaneously. Moreover, these industries display considerable capitalization processes and prominent multifactor productivity contributions.

This is, however, just a starting point. Not only political-economic authorities, but also service market protagonists themselves (companies and public organizations) have a wide area in which to act and achieve improvements in their respective productivity growth rates. For this very reason, many countries are now developing policies and studies aimed at the improvement of these aspects, and international organizations are working together with national offices in order to improve the information and its analysis in numerous areas. Budget pressures derived from actual crisis have introduced similar incentives to improve efficiency and productivity in public services too. This is the way to better measure the productivity of services and to extend the knowledge regarding growth factors and international differences that underlie the operation and growth of productivity.

ACKNOWLEDGEMENT

The author gratefully acknowledges funding through the ServPPIN project: The Contribution of Public and Private Services to European Growth and Welfare, and the Role of Public-Private Innovation Networks, Socio-Economic Sciences and Humanities Programme of the EU 7th Framework by the EUROPEAN COMMISSION.

REFERENCES

Ahmad N, Lequiller F, Marianna P, Pilat D, Schreyer P, & Wölfl A (2003) Comparing labour productivity growth in the OECD area: The role of measurement. STI Working Paper Series 14, OECD, Paris.

Akehurst G (2008) What do we really know about services? Service Business 2(1):1-15.

Baumol W (1967) Macroeconomics of unbalanced growth: The anatomy of urban crisis. American Economic Review 57(3):416-26.

Baumol W (1985) Productivity policy in the service sector. In Inman (ed.) Managing the service economy. Cambridge University Press.

Baumol W (1989) Productivity and American Leadership. The long view. MIT Press, London.

Baumol W (2001) Paradox of the services: exploding costs, persistent demand. In Raa & Schettkat (eds.) The growth of service industries: The paradox of exploding costs and persistent demand. Edward Elgar, Cheltenham, 3-28.

Baumol W (2002) Services as leaders and the leader of the services. In Gadrey & Gallouj (eds.) Productivity, innovation and knowledge in services. Edward Elgar, 147-163.

Baumol, Blackman, & Wolff (1985) Unbalanced growth revisited: Asymptotic stagnancy and new evidence. American Economic Review 75(4):806-17.

Baumol W, Bowen W (1966) Performing Arts: The Economic Dilemma. Twentieth Century Fund, New York.

Baumol W, Wolff EN (1984) Unbalanced growth revisited: Asymptotic stagnancy and new evidence. American Economic Review 75(4):806-817.

Bell D (1974) The coming of Post Industrial society. Heinemann, London.

Bosworth B, Triplett J (2007) The early 21st century US productivity expansion is still in services. International Productivity Monitor 14(1):3-19.

Camagni R, Capellin R (1985) La productivité sectorielle et la politique régionale, European Commission, Brussels.

Clark C (1940) The conditions of economic progress. MacMillan, London.

Crespi G, Criscuole C, Haskel J, & Hawkes D (2006) Measuring and understanding productivity in UK market services. Oxford Review of Economic Policy 22(2):186-202.

European Commission (2004) European Competitiveness Report 2003. Brussels.

European Commission (2005) European Competitiveness Report 2004. Brussels.

Fisher AGB (1935) The clash of progress and security. Le Seuil, París.

Fixler D, Siegel D (1999) Outsourcing and productivity growth in services. Structural Change and Economic Dynamics 10(2):174-194.

Foster L, Haltiwanger JC, & Krizan CJ (1998) Aggregate productivity growth: lessons from

microeconomic evidence. NBER Working Paper, 6803.

Fourastié P (1949) Le grand espoir du XXeme siecle. Progrés technique, progrés économique, progrés social. Presses Universitaries de France, París.

Fuchs V (1968) The service economy. Columbia University Press, New York.

Gadrey J, Gallouj F (2002) Productivity, innovation and knowledge in services. Edward Elgar, Cheltenham.

Griliches Z (1992) Output measurement in the service sector. University of Chicago Press for NBER, Chicago.

Illeris S (1996) The service economy: A geographical approach. John Wiley, Chichester UK.

Inklaar R, Timmer M (2008) Accounting for Growth in Retail Trade: An International Productivity Comparison. Journal of Productivity Analysis 29(1):23-31.

Kox H (2002) Growth challenges for the Dutch business services industry: International comparison and policy issues. CPB Netherlands Bureau for Economic Policy Analysis, The Hague.

Kuznets S (1966) Modern Economic Growth. Oxford University Press, Oxford.

Maroto A (2010) Growth and productivity in the service sector: The state of the art. Working Papers Series 07-10. IAES, University of Alcala, Madrid.

Maroto A, Cuadrado JR (2007) Productivity and tertiarization in industrialized countries: A comparative analysis. Efficiency Working Series, University of Oviedo.

Maroto A, Cuadrado JR (2009): Is growth of services an obstacle to productivity growth? A comparative analysis. Structural Change and Economic Dynamics 20(4):254-265.

Maroto A, Rubalcaba L (2008) Services productivity revisited. The Service Industries Journal 28(3):337-53.

McLachlan R, Clark C, & Monday I (2002) Australia's service sector: A study in diversity. Productivity Commission Staff Research Paper, AUSINFO, Canberra.

O'Mahony M, Van Ark B (2003) EU productivity and competitiveness: An industry perspective Can Europe resume the catching-up process?. Enterprise publications, European Commission, Brussels.

Oulton N (2001) Must the growth rate decline? Baumol's unbalanced growth revisited. Oxford Economic Papers 53:605-627.

Pilat D (2000) Innovation and Productivity in Services: State of the Art. In OECD (DSTI) Innovation and Productivity in Services. OECD, Paris.

Rubalcaba, L (2007) The new service economy: Challenges and policy implications for Europe. Edward Elgar, Cheltenham.

Rubalcaba L, Maroto A (2007): Productivity in services. In Rubalcaba (ed.) Services in European Economy: Challenges and implications for economic policy. Edward Elgar, Cheltenham, 80-95.

Schreyer P (1996) Quality-adjustment of price indices in ICT industries: Simulation of effects on measured real output in 5 OECD countries. In OECD: Industry productivity: international comparisons and measurement issues, 7-16, OECD, París.

Stiroh K (2001) Information technology and the US productivity revival: What do the industry data say. Federal Reserve Bank of New York, New York.

Timmer M, O'Mahony M, & Van Ark B (2007) EU KLEMS growth and productivity accounts: An overview. International Productivity Monitor 14(1):71-85.

Triplett J, Bosworth B (2004) Productivity in the US Services Sector: New Sources of Economic Growth. Brookings Institute, Washington DC.

Van Ark B, O'Mahony M, & Ypma G (2007) The EU KLEMS Productivity Report: An overview of results from the EU KLEMS growth and productivity accounts for the European Union, EU Member states and major other countries in the world. Issue 1, March.

Van Ark B, Piatkowski M (2004) Productivity, innovation and ICT in old and new Europe. Research Memorandum GD-69. GGDC, Groningen.

Wolfe M (1955) The concept of economic sectors. Quarterly Journal of Economics 69(3): 402-420.

Wolff EN (1999) The productivity paradox: evidence from indirect indicators of service sector productivity growth. Canadian Journal of Economics 32(2):281-308.

Wölfl A (2003) Productivity growth in service industries: An assessment of recent patterns and the role of measurement. STI Working Papers 2003/7. OECD, Paris.

Wölfl A (2005) The service economy in OECD countries. STI Working Paper 2005/3. OECD, Paris.

AUTHOR BIOGRAPHY

ANDRÉS MAROTO-SÁNCHEZ, Madrid (1979). Ph. D. in Applied Econo-mics and Master in Applied Statistics and Public Sector Statistics (University of Alcalá, Spain). Actually assistant professor in the Autonomous University of Madrid (Spain) and senior researcher in the University Institute of Economic and Social Analysis (IAES, University of Alcalá, Spain). His main research fields are productivity and efficiency, services sector economics, innovation theory, transport economics, and competitiveness and growth. Member of the European Network of Services Research (RESER) and European Regional Science Association (ERSA). He have written some books on productivity and services (2006, 2009) and other academic papers in Health Policy (2007), The Service Industries Journal (2008, 2010), Struc-tural Change and Economic Dynamics (2009) and Global Economy Journal (2010), among others.