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Services productivity revisited

Andrés Maroto [a] & Luis Rubalcaba [a]

[a] University of Alcalá, Institute of Economic and Social
Analysis (Servilab), Alcalá de Henares, Madrid, Spain
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Andrés Maroto* and Luis Rubalcaba

University of Alcalá, Institute of Economic and Social Analysis (Servilab), Alcalá de Henares, Madrid, Spain

This paper revisits the recent debate and evidence on productivity in services. Firstly, it discusses the main works analysing developments and impacts of services productivity in growth and overall productivity. Secondly, new data is presented concerning Baumol's 'cost disease' and the recent evolution of services productivity growth by main service branches. Decomposition of trends and cycles is also addressed to capture structural trends in isolation. Results confirm the continuing validity of such disease at aggregate level to a certain extent, but different subsectors show uneven patterns. Nevertheless, other complementary approaches and further research are needed to capture in a more comprehensive way the new developments and impacts of services productivity.

Keywords: Baumol's disease; productivity; services

1. Introduction

Within service research, productivity has been one of the most important issues from an economic point of view. The reasons for why service productivity is important are easy to understand. The concept becomes a key player in the economic growth of developed economies, which as a whole have shown a progressive intensification of the service sector reaching figures of approximately 75% of the economy. For this reason, in the long term, and given the growing service participation in total production and employment, the total overall productivity should converge with growth rates similar to productivity rates in the service sectors. Hence, they affect the living standards of the population. In addition, income from work and workers' salaries tend to follow labour productivity, and thus have a direct influence on most employees in developed economies (Kendrick, 1985). In addition, the productivity of services is not only important in itself, but also because services influence the productivity of other economic sectors. This is particularly important in the case of business services, the most dynamic sector in advanced economics (Rubalcaba & Kox, 2007) used as intermediate inputs to increase productivity in any economic sector. All these factors help services to play a key role in fulfilling the competitiveness of ambitious objectives, full employment and social cohesion and environmental sustainability – as recalled in the European Union Lisbon Strategy in 2000 and 2004.

This paper revisits the analytical framework and theories concerning service productivity. The traditional assumption of services as stagnant or slowly growing productivity sectors

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*Corresponding author. Email: andres.maroto@uah.es

of the economy compared to manufacturing industry will be revisited in light of recent contributions and empirical evidence. The first section presents and discusses the so-called 'Baumol's disease', surveying some key contributions of recent literature. Particular attention will be devoted to the role of service productivity in the productivity paradox (Section 2). This debate raises some important issues regarding measurement and conceptual problems approaching service productivity. The recent evidence on the Baumol's disease is presented in Section 3 and recent 1979–2003 data is analysed. In the framework of the contribution of services to aggregate growth and employment, intra-sectorial differences are explored in Section 4. Finally, Section 5 of the paper presents some new evidence in service productivity when cycle and trends are analysed in a separate way. Inspite of the several existing methodologies for approaching service productivity, the empirical sections of this paper revisit and focus on the results based on traditional direct macroeconomic date on apparent labour productivity.

2. Baumol's theories and his 'cost disease'[1]

With regard to the relationship between the progressive growth of services in the economy and their low productivity, the most important advances are due to three works written by Baumol (1967, 1985, 1989). Baumol showed the differences in productivity as a result of the role played by the labour force in each of the activities. In '*progressive*' sectors (which Baumol identified in principle with manufacturing), work is a means, while in '*stagnant*' sectors (identified as a part of services) work is used as an end. At times, quality is highly important, which leaves only a small gap for the introduction of technological innovations and extreme productivity gains. Therefore, in an economy where wages are established according to the growth of productivity (mainly in the manufacturing sector), costs in these less dynamic sectors are relatively higher over time. If the demand in these sectors is not affected by their relatively higher prices (low elasticity demand price), a continuous flow of labour force will move towards these activities. However, in the stagnant sectors, where demand is affected by price increases, the possibilities of new jobs will tend to disappear. In this way, Baumol explains the gradual disappearance (except for subsidies) of sectors such as theatre, handicraft, haute cuisine, and so on. He also explains the pressing problem of public services (sectors that are clearly stagnant) with respect to predicted growing deficits 'which no one should be responsible for, as they are part of a trend that nobody can stop' (Baumol, 1967, p. 423). The well-known Baumol's 'disease' brings about a decrease in economic growth due to its influence on productivity, while at the same time prices in services increase.

The persistence of this dynamism and the increasing weight of the services sector within economic activity lead to the idea of a decrease in the general growth rate. This decrease is mostly due to the slow growth of productivity in the services sector and its influence on the total productivity of factors. This relies on the hypothesis of the low growth of productivity in the services sector or, at least, on the fact that traditional measures of productivity are suitable for the services sector.

Many recent empirical works (see Oulton, 2001; Wölfl, 2003, 2005, 2006; or Cuadrado & Maroto, 2006, among others) have tried to provide a contrast to this series of relationships in the services sector. The aggregate evidence for the majority of developed countries suggests a negative relationship between the growth of aggregate productivity and the weight of the tertiary sector, not only in terms of production but also in terms of employment. Some economies (such

as Korea or Ireland, which have registered the highest growth in productivity in recent years) are also those where services activities represent a lower percentage over the total. In contrast, countries with high percentages of services over total production and employment, such as the United States or France, show lower growth rates in productivity. This same trend can also be observed in a wide group of the most developed economies. Obviously, the different ways in which services may be incorporated into production processes may bias these results. In any case, the argument is usually based on the traditional idea that services are characterised by a low productivity growth in comparison with other productive sectors. However, as we will consider below, this hypothesis has been recently refuted by numerous authors, and mainly by the empirical evidence itself.

In recent years, as other authors have criticised or have even contemplated that Baumol's disease has been 'cured', Baumol has corrected and redefined his positions[2] by distinguishing between types of services. In general, criticism and reviews are based on the following points:

(1) The need to take the indirect effects, measures and indicators of services productivity into consideration (Rubalcaba, 1999; Wolff, 1999; Rubalcaba & Kox, 2007), as a result of the conceptual and statistical debate arising over the last 10 years, from the works by Gadrey (1996) and other French authors, and up until the most recent works developed by the Organization for Economic Cooperation and Development (OECD) and other international organisations.

(2) The need to take into consideration the role of other elements – not just the labour force – to explain the growth of services and conditioning their productivity. These theories, which currently include the explanation for the growth of services, are very broad and cover many factors. This is true for factors connected to the nature of services, the organisation and segmentation of their markets, or the peculiar substitution relationships between work and capital (De Bandt, 1989; Kox, 2002).

(3) The need to limit the application of Baumol's theories solely to end-use services and not to those assigned to intermediate use: although the same services industries have stagnant productivities, the movement of resources towards them must be interpreted not as the result of a fall, but as an increase in productivity (Oulton, 2001). On the other hand, a lower services productivity can be a reflection of the higher productivity generated in the companies using services as intermediate inputs (Fixler & Siegel, 1999; Kox & Rubalcaba, 2007; Raa & Wolff, 1996).[3]

(4) And finally, recent empirical approaches highlight the role of the strong productivity in some services branches, especially those related to information and communication technology (ICT) in Europe (O'Mahony & van Ark, 2003; van Ark & Piatkowski, 2004) and in the United States (Stiroh, 2001; Triplett & Bosworth, 2002). In the latter case, strong productivity is due to an unprecedented expansion of the total productivity of factors. One possible explanation is the presence of growing returns of scale in these kinds of tertiary activities, which would contradict Baumol's initial theses (Wölfl, 2003).

With the availability of sectoral estimates regarding productivity, the analysis of relationships between manufacturing and services is quite interesting, as well as its effect on the productivity growth observed. Some recent studies ascribe the recovery of productivity growth in manufacturing and the relative productivity stagnation in services in the last two decades partly to the increasing integration of services and manufacturing into the growth process.

Hence, Raa and Wolff (1996) consider that about one quarter of the growth observed in manufacturing productivity in the United States can be explained by means of the externalisation of activities related to services which are relatively 'stuck' in terms of productivity, services which were previously performed in-house. Besides, Fixler and Siegel (1999) point out the existence of a short-term negative correlation between the productivity growth of manufacturing and services. These studies focus on the static aspect of the externalisation of services activities, which is just part of a more complex phenomenon. While the externalisation process of services activities can explain the higher growth registered in manufacturing productivity in the short term, and a decrease in services productivity in the long term, the dynamic effect of this rising specialisation can also have positive consequences for the productivity of both sectors. Therefore, the following step in the analysis of interrelations between productivity growth in manufacturing and services needs to include a division between short and long term.

3. The paradox of productivity and ICT in services

Paradoxically, and despite the strong investment carried out in ICT, another relevant aspect regarding the concept of technological change and services innovation is that several empirical studies have pointed out that investing effort is out of synchronisation with results achieved in terms of productivity. This phenomenon is known as the 'paradox of productivity'. There have been numerous explanations of this apparent lack of concordance between both variables. Roach (1991), one of the first to discuss this phenomenon, focused on the differential features of the market structure of the services sector activities as an explanatory element. Indeed, the tertiary sector has traditionally been connected with closed markets, which have abundant regulations, are not very flexible and are exposed to a lower level of competition than in the industrial sector. Therefore, the strong investment of the sector in ICT has not resulted in productivity gains to the extent that there are no sufficient incentives to increase efficiency, given their protection which moved them away from the competitive reality. The heritage of the past represents a burden hindering the breakthrough of this event, although we will need to wait for recent changes in the services markets to be translated into a productivity improvement.

Other authors have basically interpreted this phenomenon as a measurement problem (Ahmad et al., 2003; Pilat, Lee, & van Ark, 2002; Schreyer, 1998, 2001; Siegel, 1994) with two different issues. With the first, the traditional perspective (Griliches, 1992) detects a clear disability to measure the output in the services activities, due to a high level of intangibility of many products and the disability to include those qualitative improvements or those derived from the higher election possibilities of the consumer in the productivity statistics. This problem regarding output measurement is now more pronounced due to the influence of new technologies, as these have modified the nature of services activities. As previously seen, new technologies have boosted the creation of new services or the addition of new varieties of existing services, thus extending the problem of how these changes can be measured.

The second issue of the measurement problem, as we will see in greater detail in the next section, is the inadequate use of price deflators when capturing the real value of ICT investment (Berndt et al., 1998; Elderidge, 1999; Lebow & Ruud, 2001). In fact, the use of traditional methods of price measurement does not capture the extraordinary qualitative changes – basically related to the capacity and velocity increases – undertaken by the hardware and software components of new technologies. Recent studies controlling these qualitative effects

(Berndt & Griliches, 1993; Berndt, Griliches, & Rappaport, 1995; Nelson, Tanguay, & Patterson, 1994) have found some price falls in the field of personal computers which amount to an annual 25–30%, notably over the figure derived from applying a traditional deflator.

Other explanations have focused on the aggregate nature of the studies carried out, which show the correlation levels between ICT and productivity investment, so that the microeconomic – rather than the macroeconomic – analysis approach seems the most appropriate (Brynjolfsson & Hitt, 1993; Lichtenberg, 1995; Pilat, 2004). Another idea has also been suggested regarding the fact that substantial growth in productivity levels never takes place in the short term, but instead a more or less reduced period of time is necessary before the beneficial effects start to be noted. A final consideration is finally, the high levels of complementarity and synergy between the different ICT infrastructures, which are not taken into consideration in traditional research (David, 1990). Consequently, the productivity results measured are lower than they would really be in the case when such external effects were considered.

Moreover, the importance of the productivity paradox is far from homogeneous in all services areas, as this phenomenon is associated, to a large extent, with some difficulty when considering the measurement of the output. Due to this difficulty, there are few works comparing sectoral productivity levels and growths at an international level. However, this issue has increasingly drawn the attention of the economists over the last few years. Therefore, since the 1990s, many studies have tackled international comparisons regarding the sectoral growth of productivity in different countries by means of traditional indicators, such as total productivity of factors (Costello, 1993; Daveri, 2003; European Commission, 2004; OECD, 2004; Scarpetta, Bassinini, Pilat, & Schreyer, 2000), gross value added per employee (van Ark, 1995; van Ark, Broersma, & de Jong, 1999; van Ark, Frankema, & Duteweer, 2004; van Ark, Inklaar, & McGuckin, 2003a; van Ark, Melka, Mulder, Timmer, & Ypma, 2003b), frontier analysis (Fuentes, Grifell-Tatjé, & Perelman, 2001; Gouyette & Perelman, 1997) or indirect measures (Wolff, 1999).

Although the intuitive understanding of these types of measurement biases or errors is not very complex, the undertaking of accurate analyses regarding the dimension and direction of these measurement errors is much more complicated. The impact of the use of inappropriate deflators or incorrect production measures, for example, depends to a large extent on the models and data used at a sub-sectoral level. For this reason, the majority of studies carried out until now concentrated on specific activities within services, and thus their conclusions cannot necessarily be generalised for the rest of the service industries. Hence, national statistics offices and the OECD have tried to face the problem of production and productivity measurement in the services sector since the 1990s, carrying out tasks related to all the possible errors previously described (OECD, 2001a, 2001b, 2002a, 2002b).

4. Recent evidence on Baumol's disease

The results of the above-mentioned 'Baumol disease' would consist of a decreasing path of economic growth and aggregate productivity growth in advanced economies. Taking account of the increasing role of service activities within the economic structure of these countries, the aggregate productivity growth would slow due to the less dynamic behaviour of productivity within tertiary branches and its contribution to the evolution of total factor productivity.
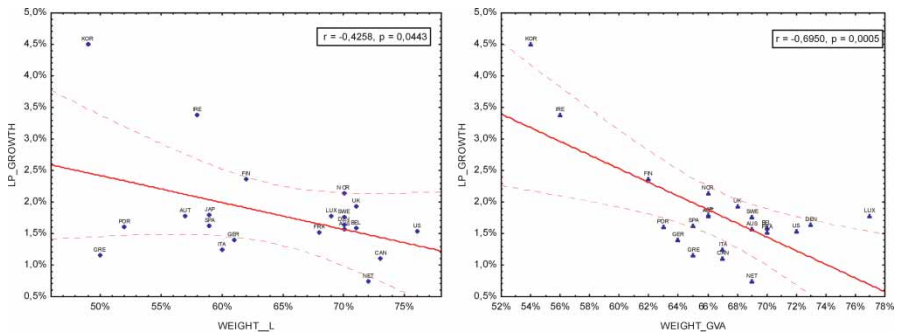
Figure 1. Relationship between weight of services and productivity growth, 1979–2003.
Source: Based on GGDC.

Figure 1, where productivity growth and the percentage of service activities on economic struc-
ture are related, shows this aggregate evidence over a sample of OECD countries.

A negative relationship between aggregate productivity growth and the percentage of service
activities over the total economy (both in terms of employment and value added) seems
to appear. More precisely, the correlation coefficient in terms of employment is -0.426
(p-value $= 0.0443$), while in terms of value added would be -0.695 (p-value $= 0.0005$);
both are statistically significant (at 5% and 1%, respectively). Thus, economies with higher pro-
ductivity growth, such as Korea, Ireland or Finland, are those whose service sectors play a minor
role in their economic structure. On the contrary, clearly service economies, such as the United
States, Australia, Canada, France or the Netherlands, registered slower productivity growth rates
during the period 1979–2003.

One way to check Baumol's disease, as did Wölfl (2005), is to compare the productivity pat-
terns in manufacturing and services, thus demonstrating lower growth in services productivity
(this growth being only half that of manufacturing) and higher growth in employment. Accord-
ing to the latest data available, labour productivity in the agricultural and manufacturing sector
increased 3.1% and 3% correspondingly in the EU15 during the period 1993 to 2003, while such
a growth in services increased by 1.1%. During the same period, employment registered nega-
tive growth rates in the primary and secondary sectors (2.4% and 0.4%, respectively), while
services showed an employment growth of 1.8% over the increase of total employment (1%).
Thus, the comparison between the evolution of productivity in manufacturing and in services
as an aggregate sector provides support to the most traditional theories emphasising the low
growth of productivity in this latter sector.

However, when analysing the evolution of services by activity sectors, a clear dualism can be
seen. Some activity areas register the same, or even higher, productivity growth rates than the
average rates registered in the manufacturing sector and in its most dynamic sub-sectors.
Evidently, some services – particularly those related to final demand consumption and the majority
of non-market services – still offer very low productivity growth rates. However, others behave
very differently, with high productivity growth rates (some transport, communications and
business services, and financial activities) that even create employment at the same time.

For that reason, another method for verifying Baumol's thesis might be to compare directly
the employment and productivity growth rates of intra- and inter-sectors. The relationship
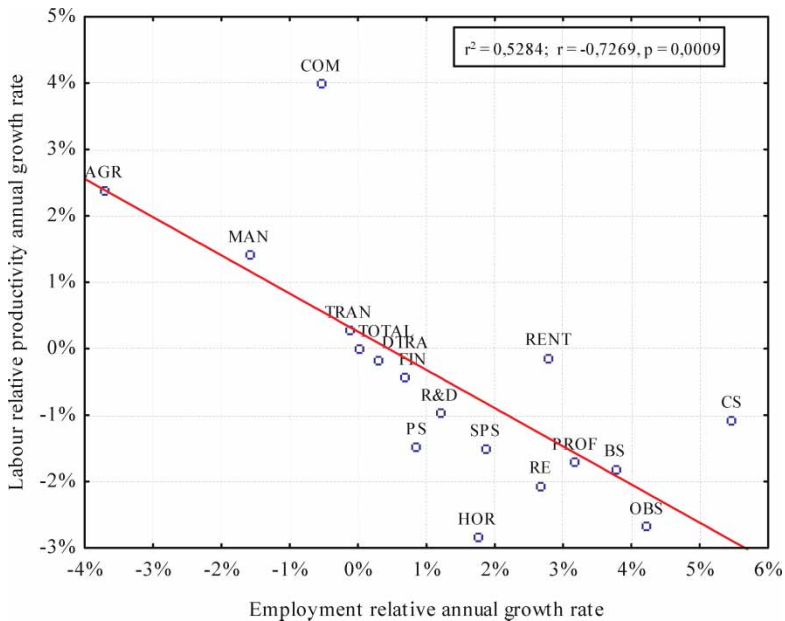
Figure 2. Relationship between relative productivity growth and relative employment growth, EU15, 1979–2003.
Note: See Table 1 for abbreviations of sectors and see Note 5.
Source: Based on OECD National Accounts Data and GGCD.

between employment and productivity growths is shown in Figure 2, where the evolution of different sectors between 1979 and 2003 can be observed. The productivity rate seems to explain 53% of the employment rate in a highly significant correlation of −0.7. Computer and related activities, communications and renting have grown to a larger extent in terms of employment than would correspond to them by the productivity growth rate. In the case of hotels and restaurants, the opposite occurs. These results, together with those previously discussed, highlight the validity and limits of the productivity theory concerning the sectors and indicators analysed.

5. Services and growth: do services hold back economic growth?

The services sector currently accounts for more than 70% of productivity and employment in advanced economies. Despite this increasingly important role, however, services growth in productivity has been slow in the majority of these economies, resulting in a need to achieve higher dynamics and more power in the sector. If the objective is to increase the use of this sector's labour force and produce a higher growth in productivity, services will need to contribute to a larger extent than in recent years. Such has been the case with the United States, Australia, Canada and Luxemburg, but in other countries such as Italy, France, Holland or Spain, the contribution of the services sector to the growth of productivity has been low (Wölfl, 2005).

Productivity and the use of the labour force are the two key elements when explaining the differences of per capita income at an international level. The interest taken by many developed

countries regarding these aspects in recent years is, at least partially, due to the strong growth of the US economy from the mid-1990s and the stagnation of the convergence process of the other developed economies. Most research shows that productivity is the main element determining the gap of gross domestic product per capita between the USA and other advanced economies, which include the majority of the European economies (European Commission, 2004). The results show that the growth in productivity accelerated in the second half of the 1990s in countries such as the USA, Greece and Ireland. In contrast, productivity growth slowed over the same period in the other European countries, Japan and Korea. If we analyse the productivity growth in the services sector, we can observe that, again, the USA and Ireland register an increase in their growth rates at the end of the 1990s. In this case, however, other European countries such as the United Kingdom, Italy and Spain, also registered a rise in their growth rates per employee in the services sector. As indicated in the previous section, although empirical studies at a global level have pointed out the existence of an unbalanced growth between manufacturing and services as a sectoral aggregate, this statement is not as univocal when different services sectors are analysed.

The direct contribution of the services sectors to productivity growth in the European Union is illustrated in Table 1. Productivity growth is defined as the increase in the value added per unit of employment used. Given that the direct contribution of some services activities to the growth of the value added was considerably lower than their contribution to growth in employment, we can deduce that the direct contribution of some services sectors such as social and personal

Table 1. Sectoral contribution to the productivity growth, EU-15 1979–2003.

	Productivity level 1979*	Productivity level 2003*	Annual cumulative growth rate** (%)	Contribution of the sector to aggregate growth[a] (over total sectors)	Relative contribution to aggregate growth[a] (%)
Agriculture	5.09	23.05	4.15	0.219	9.64
Manufacturing	14.96	59.48	5.93	1.331	58.75
Energy	34.50	166.76	3.71	0.062	2.73
Construction	13.23	51.48	0.87	0.059	2.61
Services	**15.50**	**56.11**	**0.84**	**0.595**	**26.27**
Distributive trade	10.41	36.10	1.47	0.105	4.66
Hotels and restaurants	7.28	27.49	−1.26	−0.074	−3.30
Transport	16.95	63.33	2.01	0.101	4.50
Communications	19.50	94.40	5.84	0.145	6.44
Financial services	26.09	106.90	1.23	0.105	4.65
Real estate activities	183.11	601.19	−0.59	0.229	10.17
Business services	17.98	54.85	−0.12	0.018	0.78
Public services	43.19	160.42	1.67	0.067	2.96
Social and personal services	21.79	74.57	0.58	−0.113	−5.02
Total sectors	14.35	55.74	1.64	1.648	100.00

Notes: *Thousands of euros per employee (at current prices).
**Based on constant prices of 1995.
[a] $S_{VA}^j \cdot V\,A_j - S_L^j \cdot L_j$
where S_{VA}^j is the average for the period under analysis of the weight of sector j in the VAB at current prices, S_L^j is the average for the period under analysis of the weight of sector j in the total employment, and the points over VA_j and L_j mean the average annual growth rate of the constant VAB and average annual employment rate for each sector j between 1979 and 2003.
Source: Authors' calculations based on GGCD data.

services, hotels and restaurants and business-related services, to the growth of the aggregate productivity should have been relatively poor. Superficially, this could have a reducing impact on the growth of the aggregate productivity, which has led some researchers to conclude that the growth of these tertiary activities contributes to the stagnation of growth in the long term (Baumol's disease), the limits of which have already been mentioned.[4] Nevertheless, despite these decreasing trends, it is worth highlighting that a high level of relative productivity still persists in some services branches such as communications, financial services and public administration services.

This table suggests that the direct contribution of the services sector to the growth of aggregate productivity in the European Union has increased during recent years, reaching almost one third of the total growth (26.27%), although this is still far from the contribution of manufacturing (61.48%, including energy sectors) over the period analysed. However, this phenomenon is not homogeneous in all the European economies. The experience of many developed countries, such as Luxembourg, Greece, the United Kingdom or the USA, shows how the services sector has contributed substantially to the growth of aggregate productivity and employment. In contrast, the contribution of services to the productivity growth has been lower in countries such as France, Italy, Holland or Spain (Pilat, 2007).

Within services, most of the contribution to the growth of the aggregate productivity in the 15 old member states of the EU (EU15) corresponds to the areas related to real estate activities (10.17%), communications (6.44%), distributive trade services (4.66%), financial services (4.65%) and transport (4.50%). On the other hand, the areas related to hotels and restaurants (−3.30%), social and personal services (−5.02%) and some business services (all those included in the branch number 749) have contributed in a negative way to the growth of the aggregate productivity over recent years. The relatively low, or even negative, contribution of these activities counteracts the strong productivity growth in the rest of the market services.
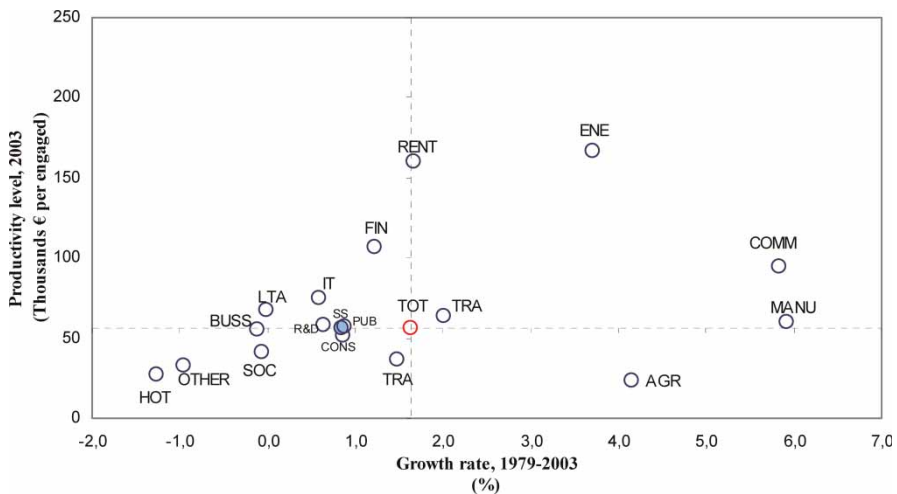

Figure 3. Relationship between productivity levels and annual growth, 1979–2003.
Note: See Table 1 for abbreviations of sectors or endnote 5.
Source: Based on GGCD data.

Figure 3 shows a joint image of the current level and growth of labour productivity between 1979 and 2003 for all productive areas under analysis,[5] compared to the level and growth of the aggregate economy. Therefore, in the top right-hand quadrant we can observe that the manufacturing and energy industries, with productivity levels above the average, have also registered higher growth. The same occurs with some services activities such as those related to equipment rental, transport, and mainly communications. In the opposite quadrant, with growth levels and rates below that of the whole economy, we can find distributive trades, social and personal services, hotels and restaurants and other business services (all these sectors with negative growth rates during the period under analysis). Finally, some business services [information technology (IT), legal, technical, advertising and research and development (R&D) services], public administration services and financial services are located in the same region as the aggregate of the services sector, with a productivity level in the year 2003 over that of the total economy, although with lower growth rates.

Over time, the contribution of services will have to increase in many developed countries, while that of manufacturing companies will fall and manufacturing companies will turn progressively into services companies (Pilat, 2005). Moreover, a more productive and competitive services sector is also important to complement the operation of the manufacturing sector, due to the increasingly important outsourcing and globalisation processes, as mentioned in the first section of this paper. This rising role of services highlights the implementation of policies that take into consideration this growing contribution of services to the aggregate economic operation. Therefore, the regulatory reforms and the openness towards commerce and foreign direct investment in services are important in this respect, as this sector has traditionally been less exposed to the competitive pressure exerted by manufacturing industries.

The comparison between the evolution of productivity in manufacturing and in services as an aggregate sector provides support to the most traditional theories emphasising the low growth of productivity in this latter sector. However, when analysing the evolution of services by activity sectors, a clear dualism can be seen. The empirical evidence shown is far removed from the theses that have been accepted for many years when examining the role of services in the most advanced economies. The conclusion reached is that services themselves are not unproductive. On the one hand, we cannot deny that the productivity of the sector as an aggregate offers results that are almost always lower than those of the total economy. On the other hand, however, significant differences are observed depending on the areas analysed.

Some activity areas register the same, or even higher, productivity growth rates than the average rates registered in the manufacturing sector and in its most dynamic sub-sectors. Evidently, some services – particularly those related to final demand consumption and the majority of non-market services – still offer very low productivity growth rates. However, others behave very differently, with high productivity growth rates (some transport, communications and business services, and financial activities) that even create employment at the same time.

Moreover, and beyond the statistical and measurement limits described in the previous section, the empirical evidence regarding services productivity highlights the need to improve those policies associated with it (OECD, 2005). Services are generally characterised by an intensive use of the labour force, which can reduce their growth potential. Differences regarding the innovation capacity of sectors and countries are linked to certain innovation obstacles that emerge particularly in services. Likewise, many activities in this sector are characterised by the low intensity of competition, not only in local, but also in international markets, highlighting the regulating

environment as another possible area for improvement. It is also worth mentioning the comparatively smaller size of services companies, which also reduces their growth possibilities. Finally, the inherent differences of the labour market also appear to be relevant, as services are generally characterised by a higher amount of temporary and part-time jobs, a lower qualified labour force required for many activities and higher labour regulations.

All these factors show the need for a strong services policy that take into consideration the long term, based on measures such as, among others: opening the services markets to create more labour opportunities and to promote innovation and productivity; reforming labour markets; adapting education and training policies to the changes in the demand for qualifications; reducing the barriers and obstacles restricting entrepreneurial spirit and the possibility of enjoying the potential of new technologies and the services related to them; and creating a tax framework favourable to the sector dynamics. However, these measures must not be implemented separately from the rest of the sectors, due to the interdependence of many services (business services, financial activities, transport and communications) with manufacturing industries, and the benefits arising from this connection in terms of aggregate growth.

6. Evidence regarding the cycle and trend of services productivity

An aspect not studied in depth in literature on productivity is the influence of the economic cycle on the explanation or refutation of Baumol's disease and its paradoxes. O'Mahony and van Ark (2003) carried out the first analysis of manufacturing industries and three types of services and considered their technological intensity in Europe and the United States. The results confirm the strength of the European productivity trend in technology-producing services – which increasingly surpasses the trend (also positive) in the United States. With technology-using services, on the other hand, the reverse occurs: while there are rising trends in the United States, these are on the decrease in Europe, but at much lower levels. However, there are other aspects related to this cycle and trend which have not been studied in great detail but will be mentioned briefly in this section.

The interesting point of this exercise stems from the fact that services are gradually overcoming their insensitive character regarding the economic cycle and are turning increasingly into more cyclical activities, which could possibly suppress the long-term structural trends. This could be extreme when considering some service activities such as businesses services, where the productivity cycle has a certain asymmetry and is highly volatile in response to a relatively higher flexibility of the labour market or to the prominent disappearing actions of companies in the recessive stages of the cycle (the so-called 'lame duck'; Caballero & Hammour, 1994).

Moreover, the majority of indicators regarding productivity are pro-cyclical, that is, they accelerate in the expansive periods and slow down in the recessive ones (Basu and Fernald, 2000). This is partly due to measurement errors: although output cyclical changes are usually measured quite precisely in official statistics, the same does not occur in the case of cyclical changes of the usage rate of productive factors (in particular, that of the capital and the labour factor, when the latter is measured in number of employees). As a consequence, the increases in the rates of usage of these factors during expansive periods would result in the output indicators showing rapid growths, although input indicators would remain stable or

grow more slowly. The final result regarding productivity would be an increase in the growth rate observed, while the opposite phenomenon would occur in recessive periods (Schreyer & Pilat, 2001). Even in the case that the usage of factors would be properly measured, we would keep on finding the problem of combining the traditional productivity model (based on long-term balance relationships) with the reality of economic cycles. This is the reason why we prefer to analyse the productivity growth rates for long periods of time or by adjusting the estimates through filters in order to isolate the trend (for further information, see Scarpetta et al., 2000). In this paper we carry out a Hodrick–Prescott filter[6] (Hodrick & Prescott, 1997) – the most frequently used in literature and successfully followed in works with the same database.

A broad picture emerges when we depict volatility for the productivity in service industries. Volatility in services employment is higher in the most innovative activities, such as R&D, IT services and equipment rental. Similar results are found for value added. These empirical results show that the sector exerts a strong pro-cyclical influence on employment, with much more volatility than the average in the economy. The high integration with industry and labour flexibility could be, among others, two explanatory and determining causes.[7] The cyclical performance of some services cannot explain the continuous growth of the sector in absolute and relative terms during the last 25 years. The growth of these activities is mainly explained on the basis of structural factors, absorbing most of the recession effects. This explains how only a few countries and a few recessions in some sub-sectors have a negative influence in absolute terms.

Within this context, the cycle and trend of services productivity are analysed. With regards to the cycle, significant differences exist between services themselves. There are services such as trades which are clearly volatile, depending on the development of productivity in general, and others, such as business services, which show their asymmetrical nature, as seen in previous studies (Rubalcaba, 1999, 2007). Relevant to the study in hand is the fact that the structural trend continues with its declining character confirmed by the descriptive data – especially from the mid-1990s – although Figure 4 illustrates how this movement relates not just to services, but
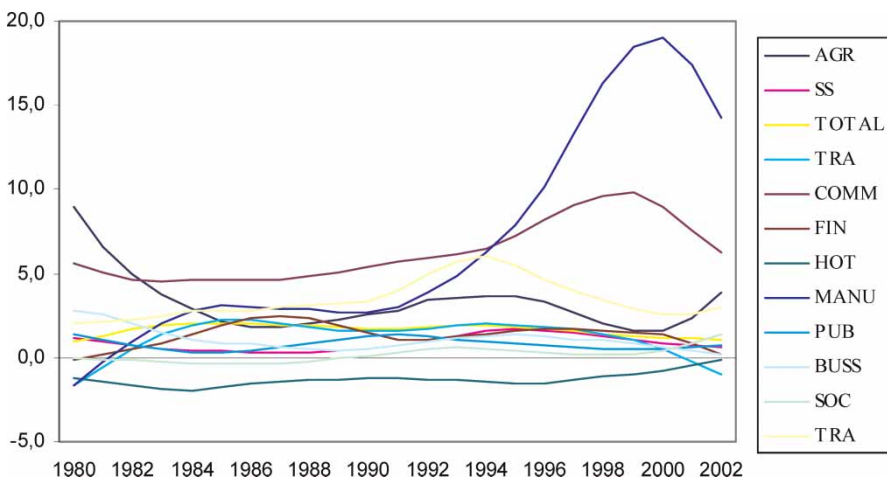

Figure 4. Trends in productivity growth (EU15, 1979–2002).
Source: HP filter based on GGDC data.

encompasses the whole economy. The escalation of the trend of some services such as transport and communications has largely exceeded that experienced by agricultural and manufacturing goods, although a strong deceleration has occurred in recent years.

7. Conclusions

The debate around service productivity is very important, both in academic and in policy debates. It is a matter of great concern when stagnant or slow productivity in services may slow the entire economic growth due to a major participation of services in total economy. Since 2001, the so-called 'Baumol's disease' has been submitted to criticism in some important works. Major revisions of his ideas has been made when inter-sectoral relationships are taken into account, the role of ICT has been revised, measuring and conceptual factors are pointed out, and finally, when a set of explanatory factors for services is identified, productivity is just one dimension of the complex service growth.

Beyond different statistical and measurement problems, existing data for 1979–2003 allows us to present some new evidence. On one hand, relative employment share growth and relative productivity growth seem to be correlated for the case of services, which may confirm the continuing validity of some of the traditional assumptions about service productivity. In addition, the comparison between the evolution of productivity in manufacturing and in services as an aggregate sector provides support to the most traditional theories emphasising the low growth of productivity in this latter sector. On the other hand, with regard to the question of whether the growth in services productivity could hold back the aggregate growth of developed economies, a brief and univocal answer cannot be given. Most countries show difference between some 'dynamic' sectors and some other 'stagnant' sectors but overall results do not confirm the validity of Baumol's disease. Productivity growth in sectors such as transport, and communication of financial services is highly significant and some other business-related services produce indirect effects in those services using them as intermediate inputs.

The paper has also analysed the dynamism of services productivity when cycles and trends are considered in isolation. With regards to the cycle, significant differences appear within service industries. On the other hand, the structural trend follows its declining pattern confirmed by descriptive data, particularly from the mid-1990s, although some European service activities, such as transport or communications, have largely exceeded the growth trend experienced by agricultural and manufacturing goods.

Moreover, and beyond the commonly accepted statistical and measurement limits, the empirical evidence regarding services productivity highlights the need to improve those policies associated with this sector. Internal characteristics, such as the intensive utilisation of the labour force, innovation barriers, low competition, the smaller size of enterprises or differences within labour market conditions, which shape service industries show the need for a strong services policy that takes into consideration the long term. Service productivity policies need to be understood in a framework where policies address innovation, employment, competitiveness or regulations (Rubalcaba, 2007).

Service-related policies should not be implemented separately from the rest of the sectors, due to the interdependence of many services such as business services, financial activities,

transport and communications with manufacturing industries, and the benefits arising form this connection in terms of aggregate growth. For example, Kox and Rubalcaba (2007) present good reasons – their work includes a survey of the main key findings on this – to assume that the poor productivity performance of the business services industry will at least to some extent be compensated for by the indirect growth contributions originating from this industry. Of particular importance are three forms of spillover effects – in the form of original innovations, knowledge diffusion, and the reduction of human capital indivisibilities at the firm's level – that have a positive impact on productivity in other industries.

Further research is envisaged in several key areas: conceptual and measurement issues, determinant of services productivity growth, inter-sectoral links between services and goods, and the framework conditions to boost service productivity growth in related domains such as innovation, competition or market regulations. This final research area is essential to shape service-related policies in order to progress the development of services as a way to improve the performance of the entire economy.

Notes

1. A previous version of this section has been published in Rubalcaba (2007), which also includes complementary aspects to the ones presented in this paper.
2. Baumol himself (1989) configures a new classification of services, according to productivity, where sectors with a low productivity growth coexist with services registering productive growth that is equal to or higher than that of manufactured products. Along the same lines, more recent studies show that only one-third of the services sector can be identified as low productivity growth activities, while the rest includes sectors registering similar growth rates (transport and storage) or even higher (telecommunications) than the manufacturing sector. More recently, Baumol draws conclusions that highlight the importance of services and their innovation to economic growth (Baumol, 2000).
3. These results force us to reconsider previous literature on this subject. While the manufactured goods sector has increased – primarily due to improvements in technical and technological efficiency (productivity gains that will be translated into higher wage increments, and consequently, into increases of costs related to less progressive sectors of the economy) – the rapid growth registered in the services sector can be explained by the increase of capital and labour factors.
4. Regarding some specific services branches, such as business services, Baumol's limits of original interpretation are even more important than in other services sectors, as shown in the works by Oulton (2001) and Wölfl (2003) and Kox (2002, 2004). Baumol's model focuses on consumer services, while business services are intermediate inputs for other industries. Also, the possibility exists that the business services industry indirectly increases the productivity of other industries. This may be a consequence of the knowledge generated, and the possibility that underestimation problems are overlooked.
5. Real estate services are not included in this figure due to their huge productivity level (601.2 thousand euros per employee), which is mainly caused by the peculiar estimate of their production, which is conventionally carried out through the inclusion of a cost allocation when buildings and land are owned. For this reason, and despite the fact that their levels are considerably higher than the rest of services, the growth rates during the period analysed have been negative (−0.59 per cent per year).
   Total economy (TOT); Agriculture (AGR); Manufacturing (MANU); Energy (ENE); Construction (CONS); Services (SS); Distributive trade (TRA); Hotels and restaurants (HOT); Transport (TRA); Communications (COMM); Financial services and insurances (FIN); Business services (BUSS) – Equipment renting (REN); IT services (IT); R&D (R&D); Legal, technical and advertising services (LTA); and other business services (OTHER); Services provided by Public administrations (PUB); and Social and personal services (SOC). Real estate activities (REAL) are not included in the figure since their productivity level is much higher than the other areas.
6. From the lambda value suggested by the authors in the four-month series (1600), the Ravn and Uhlig (2001) formula is used, which leads to a value of 6.25 for the annual series. In the work performed by O'Mahony and van Ark (2003), the differences are shown with other values, such as the 6400 used by Gordon (2003), which only affects 4% of the growth observed.

7. Hence, it is not surprising that business services volatility is consistently higher from the 1980s onwards. From then, the processes of market flexibility and inter-industrial integration have taken place, which have had a very strong influence on business services.

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