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CONSEQUENCES OF THE SURGE OF NEW HOTELS ON LABOUR PRODUCTIVITY GROWTH IN THE SPANISH HOSPITALITY SECTOR

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Abstract

The purpose of this paper is to empirically analyze how different determining factors of economic growth may have influenced the evolution of regional labour productivity in the hospitality industry in Spain. With this aim, we propose to estimate an expanded production function which, in addition to labour, physical capital and human capital, includes other additional variables that could explain regional differentials in the aggregate development of productivity through their possible influence on technical progress. Among these, the following can be pointed out: degree of tourism intensity in the region, average size of hotel establishments and their number and distribution by category, as well as variables that relate to the utilisation of their productive capacity, such as clients' average length of stay, the average number of overnight stays per bed place and the seasonality of demand. The results obtained show that the factors which may have contributed most to the fall in productivity growth are the increase in the number of 3-star hotels and the reduction process in the stock of physical capital per worker. It is important to emphasise that increased regional tourism intensity has a relevant, positive impact on the growth of labour productivity. Nonetheless, demand-related factors, such as average length of stay and the seasonality of demand have not had a significant aggregate impact on the growth of labour productivity in the regions during this period.

Key words: Labour productivity, Regional analysis, Hospitality industry, Spain.

Classification JEL: O47, R11, L83.

Introduction.

In the last 20 years very important changes have taken place in the Spanish tourism markets. These transformations have especially affected the hospitality industry, a branch of activity that represents the nucleus of tourism activities and includes the accommodation and restaurant industry. Among these changes, the following can be pointed out (Moral Rincón, 2006):

- Firstly, there has been rapid growth in the opening of new hotel businesses. The result of this process has been a geographical and by-category restructuring of the hotel bed places supply, and a reduction in the average establishment size in each category. Furthermore, it has contributed to sustaining the high degree of atomisation of supply which characterises the overall sector in Spain. Since the end of the 1990's, the emergence of accommodation has occurred within a context in which new "actors" have appeared in the hotel sector (Suárez, 2007). Among these new participants in the market are property companies, construction companies, and investment funds, which invested in hotels because they were attracted by past profitability and, more specifically, sought synergies derived from the housing bubble and the appreciation of assets in the property market within a context of low interest rates and very easy access to loans. This process has also strengthened what is known as "residential tourism", lodging tourists in private residences as an alternative to hotel accommodation.
- From the demand perspective, moreover, there has been an increase in the level of competition from international tourism markets, particularly Mediterranean destinations specialised in low-cost mass tourism channelled through commercialisation by big tour operators. Thus, as a consequence of hotel demand's relatively high price elasticity, this change may have influenced the fact that companies, in general, are facing a stagnant or decreasing tourism demand, additionally characterised by a reduction in the average length of stay and in the average spending per tourist (Secretaría General de Turismo, 2006). Hence a new environment for international tourism has been configured which has been determined by the opening up of new tourism destinations, with lower costs and lower end prices, that are in direct competition with Spain.

As a result of these transformations, there is currently strong pressure in this sector on businesses to reduce prices and profit (WTTC, 2003), in a context in which hotels have begun to feel the consequences of a possibly over-capacity in the industry. Additionally, the distortion in supply caused by property sector expansion has significantly increased pressure to close down rooms, especially in those hotels that are strongly leveraged and unable to react to the rapid change that

has taken place in market conditions, as occurred in France and Australia in the past decade (King and McVey, 2006), and more recently in Ireland

These transformations have also affected the employment in the Spanish hospitality industry. Thus, since 1995 there has been a major increase in active population and employment in the sector –at an average growth rate of nearly 5% p.a. to 2005-, a rise in the average years of schooling of the workforce, and a growing participation of women into the sector (Campos-Soria, Ortega and Ropero-García, 2009). These changes in the labour market have had important consequences on the tourism growth pattern. In this regard, Capó, Riera y Rosselló (2007), point out that, for the Balearic Islands and the Canary Islands, the main source of economic growth in these activities for the 1995-2000 period was job creation. In the case of the Balearics, there was even a negative contribution of total factor productivity (TFP) growth to gross value added (GVA) growth in the hotel industry. Indeed, the statistical information available in National Accounts shows that since 1995 the level of labour productivity in the hospitality industry, measured as the quotient of the GVA at factor cost and the number of equivalent to full time jobs, has been reduced to a rate of approximately -2% p.a.. This fall in labour productivity levels is attributable, fundamentally, to the deterioration that hotel productivity has undergone. Thus, although the rate of job growth has been less than that recorded in the restaurant sector, the annual decline in productivity has been nearly 6 times greater than it was in the restaurant business. The deterioration of labour productivity levels in the hotel industry represents a loss of comparative advantages in costs, in the face of which companies either have to withstand reductions in their per-unit profit margins or increase prices by developing competitive mechanisms that are complementary to competition in price. In increasingly competitive markets, due to the appearance of new tourism destinations where productive factors are abundant and service costs are consequently low, the need to bring about economic growth based on productivity is of key importance. That is why it is relevant to analyse what factors have penalised productivity in the sector and to what extent the aforementioned transformations may contribute to explaining this evolution. To this end, in accordance with Sinclair (1998), Blake, Sinclair and Campos Soria (2006), Scaglione and Johnson (2007) and Smeral (2009), it is necessary to bear in mind that:

- The reduction process of the stock of physical capital per worker derived from the sector's strong job creation may have had productive consequences on hotels, given that in these activities service quality is very sensitive to processes of decline in capital

intensity, which could have contributed to the fall in labour productivity (Campos, González and Ropero, 2005; Orfila-Sintes, Crespí-Caldera and Martínez-Ros, 2005).

- The reducing effects that the drop in capital intensity have had on productivity growth may have partially compensated for the possible increase in workers' human capital (Capó, Riera y Rosselló, 2007). However, according to Marchante, Ortega and Pagán (2005, 2006 and 2007), the positive effects on productivity of this last variable could be weak as a consequence of the fact that the rapid growth of employment has meant hiring workers with relatively high educational levels but with scant professional experience and, consequently, a relatively low productivity level, at least in the short term. Furthermore, this process may have resulted in a relative increase in situations of educational mismatch in the job, with the subsequent negative effects on labour productivity (Marchante and Ortega, 2012).

In addition to the accumulation of inputs, regional differences in productivity growth rates at the aggregate level may be related to a set of determinants that, in the context of the hotel industry, could have a relevant contribution in the regional scope. Among others, these factors may be the following:

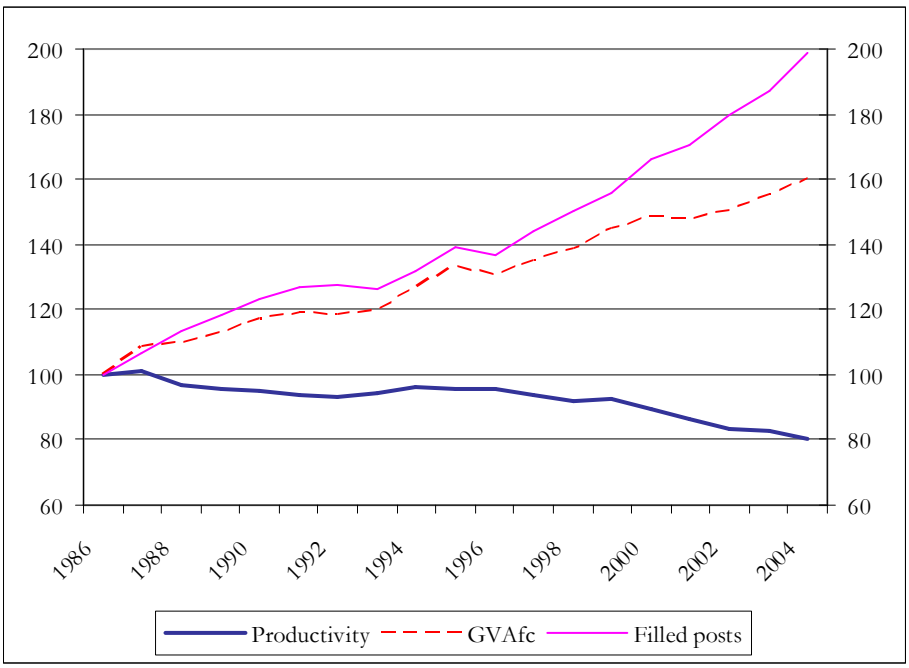
- Changes in the average hotel size and the number of establishments per category (Weng and Wang, 2006). In addition to commercial or technology-related reasons, it can be argued that smaller hotels generally have specific difficulties accessing outside financing with which to develop their investment plans for physical or human capital.
- Degree of tourism intensity of in the region (Smeral, 2007). Well-established tourist destinations show a greater capacity for product differentiation and superior rates of innovation (Kaniovski, Peneder and Smeral, 2008). That is why the competitive process in markets tends to be more intense in major tourist destinations, where there is a high volume of overnight stays, than in destinations with a reduced accommodation supply and a low number of clients.
- Moreover, according to Van der Hoeven and Thurik (1984), Butler (1994), Asworth and Thomas (1999) and Sharpley (2005), the effects of variables related to the degree of utilisation of installed capacity must be taken into account. These include the average length of stay for guests in the establishments, the average number of overnights stays per bed place and the degree of the seasonality of the demand.

Subsequently, at this point it is not possible to state the relative importance of the aforementioned determinants' effects on the regional labour productivity in the hospitality sector in Spain. To do so, an econometric analysis must be carried out in order to be able to evaluate the extent to which the restructuring of supply, which was brought about by the opening of new vacation hotels, may contribute to explaining the trend shown by the hotel industry's labour productivity over the past years. Also, this study would permit analyse whether differences in the regional labour productivity growth has been determined by changes in the composition of the supply by-category since 1995. The statistical information that has been used with this aim comes from the BBVA Foundation, "National Income in Spain and its Distribution by Provinces" and "Capital Stock in Spain and its Distribution by Regions" as well as the National Statistics Institute's "Spanish Regional Accounts" and "Spanish National Accounts".

Labour productivity in the Spanish hospitality industry.

Since the beginning of the 1990's, labour productivity in the hospitality industry has gone down in real terms in Spain, and this trend accelerated in the latter half of that decade. This is confirmed in Figure 1, created from the linked data of three different bases from Spanish Regional Accounts and information provided by the BBVA Foundation, which is necessary to attribute the industry's output and employment from the data provided by the 1986 base (see Appendix.).

Figure1. *Indexes of GVAfc, employment and labour productivity in the hospitality industry in Spain.*
(1986=100)

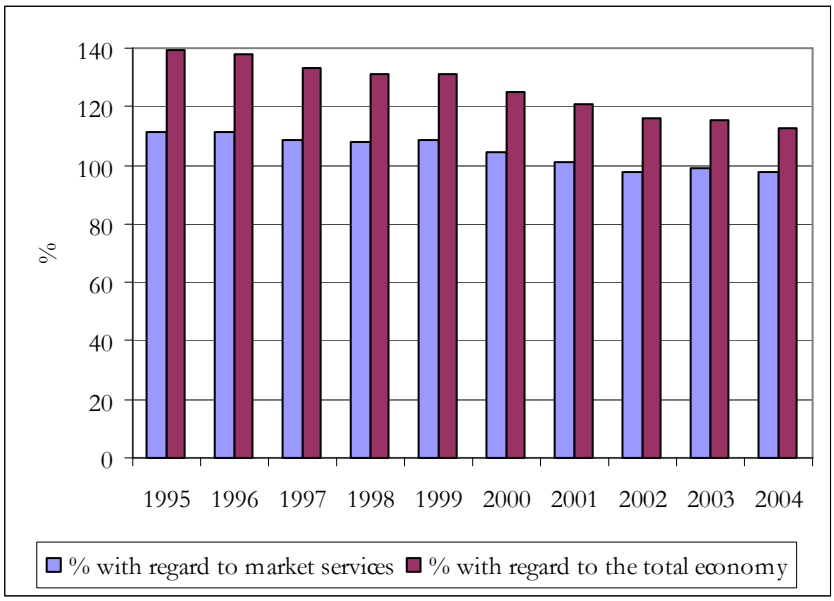


Source: Spanish National Accounts and Spanish Regional Accounts, bases 1986, 1995 and 2000, National Statistics Institute (INE); National Income in Spain and its Distribution by Provinces, BBVA Foundation.

This figure shows that as of 1988, GVAfc growth was lower than the growth in filled posts in the industry. Nonetheless, from 1996 it can be clearly seen that while GVAfc growth rate tended to hold steady, the rate corresponding to job creation speed up, so that, from that year to 2004, the productivity level fell steadily by approximately 18 percentage points. The series shown in Figure 1 specifically describe a labour productivity average annual growth rate for the 1986-2004 period of -1.19%, whereas that corresponding to employment is 3.90%.

However, from 1996 the negative variation of the productivity growth rate practically doubles (falling to -2.11% p.a.) whereas the rate of job creation speeds up to 4.79% p.a. Logically, in the face of such strong acceleration in employment over such a short time (8 years), it is very difficult that there be no adverse affect on the evolution of labour productivity.

Figure 2. *Labour productivity in the hospitality industry in relation to market services and the Spanish economy as a whole*
(Measured according to total filled jobs)



Source: Spanish National Accounts, bases 1995 and 2000, National Statistics Institute (INE).

Notwithstanding, if we observe Figure 2, it is clear that the hospitality sector in Spain cannot be catalogued as a low level productivity industry. In fact, in 2004, its level of labour productivity was still 12.7% greater than that corresponding to the economy as a whole (including non-market services), if productivity is measured in relation to total employment, and the difference is slightly greater if productivity is calculated in relation to equivalent full-time job posts. However, the data in Figure 2 shows that the positive contribution to the productivity level for the overall economy went down significantly after 1995. In fact, in 1995 the labour productivity level in the hospitality

industry was 40% greater than that corresponding to the national average, and, until 2001, this level was greater even than that corresponding to market services. As a consequence, these results depict negative progress in labour productivity for hospitality activities, which is even more important if we take into account that the Spanish economy's average productivity level went down significantly in this period as well.

It is important to point out that these results are the consequence of diverse regional realities within the context of Spain. Therefore, in order to analyse the evolution described from a regional perspective, an analysis of trends in employment and labour productivity in the regions was carried out for the sector. Table 1 shows the estimated levels for the first (1987) and last year (2004) of the constructed series of regional labour productivity (see Appendix).

Table 1. *Levels and average annual growth rates in labour productivity in the hospitality industry in the1987-2004 period*

	Productivity (GVAfc/Filled posts)		**Average annual growth rates (1987-2004)** (%)	
	1987	**2004**	**Productivity**	**Employment**
Andalusia AND	88.93	91.53	-1.17	5.36
Aragón ARA	88.40	108.47	-0.15	3.11
Asturias AST	65.69	86.23	0.25	3.16
Balearic Islands BAL	124.66	106.00	-2.28	3.47
Canary Islands CAN	125.68	106.57	-2.29	3.84
Cantabria CANT	80.96	90.10	-0.72	6.13
C- León CL	72.34	95.05	0.26	1.61
C- La Mancha CLM	72.86	81.56	-0.68	5.39
Catalonia CAT	105.26	101.70	-1.54	4.80
Valencian Community CVAL	128.12	97.42	-2.92	4.16
Extremadura EXT	66.77	81.81	-0.15	4.83
Galicia GAL	70.30	88.96	0.04	1.85
Aut. Region of Madrid MAD	97.87	110.72	-0.62	2.16
Murcia MUR	131.79	98.43	-3.02	5.69
Navarre NAV	136.75	117.86	-2.20	3.03
Basque Country PV	96.05	102.10	-0.98	3.43
La Rioja RIO	57.00	102.00	2.10	2.77
Spain	*100.00*	*100.00*	*-1.34*	*3.72*

Note: the shaded regions are those where tourism is well-established since the main national and international tourism destinations are in these territories.

Source: Spanish National Accounts and Spanish Regional Accounts, bases 1986, 1995 and 2000, National Statistics Institute (INE); National Income in Spain and its Distribution by Provinces, BBVA Foundation.

Firstly, it is evident that regional differences in levels of labour productivity went down remarkably in the period. Thus, in 1987 the level of labour productivity in Navarre (the region with the highest level) was 2.05 times the level corresponding to that of the region with the lowest level, Extremadura. In 2004, the ratio between Navarre's level, still the region with the

most productive hospitality industry, and that corresponding to Castilla-La Mancha decreased significantly, to a level of 1.44. Therefore the regional accounts estimates show that the reduction process of labour productivity undergone by the industry after 1987 resulted in a noticeable reduction in regional differences existing that year. All the regions with productivity levels that were higher than the Spanish average in 1987 show growth rates for this variable lower than the national average (-1.34% p.a.). In 2004, the regions with a level of labour productivity in the industry greater than the Spanish average were, in this order, Navarre, Madrid, Aragón, the Canary Islands, the Balearic Islands, the Basque Country, La Rioja and Catalonia. Below the national average were Murcia, the Valencian Community, Castilla-León, Andalusia, Cantabria, Galicia, Asturias, Extremadura and Castilla-La Mancha.

Obviously, from the perspective of the relative importance of tourism destinations, we must bear in mind that the relevant regions from the tourism point of view recording the highest productivity levels are Madrid and the archipelagos. Andalusia shows lower productivity levels, while Catalonia, Murcia and the Valencian Community's levels are similar to the national average.

Aggregate determinants in the evolution of labour productivity.

Econometric analysis: model specification.

We propose to now specify and estimate a function for labour productivity that is directly derived from an aggregate production model constructed on the assumption that technology is the same for all the regions in this period. It is assumed that said technology can be represented by the following production function (for each region *i* and period *t*):

$$Y_{it} = A_{it} \cdot N_{it}^{\alpha} \cdot K_{it}^{\beta} \cdot HK_{it}^{\gamma} \qquad [1]$$

In which *Y* represents the aggregate GVA, *N* effective labour, *K* stock of physical capital , *HK* stock of human capital and *A* an index of technical efficiency which summarises the current state of technology and includes omitted environmental and institutional factors. Taking logarithms in [1] and subtracting *ln N* from both sides of the equation, any possible fixed regional effects, that do not vary over time, can be eliminated if we express the equality resulting in first differences, that is, in growth rates of the variables. The following equation would result, after adding the term of the corresponding random disturbance, and assuming constant returns to scale in the utilisation of physical capital and of the effective labour (this is $\alpha + \beta = 1$):

$$\Delta\ (lnY_{it} - ln\ N_{it}) = \Delta\ ln\ A_{it} + \beta\ \Delta\ (ln\ K_{it} - ln\ N_{it}) + \gamma\ \Delta\ ln\ HK_{it} + \varepsilon_{it} \qquad [2]$$

Expression [2] contains terms that are not directly observable, in particular the growth rate of the technical efficiency index, *A,* and the stock of human capital, *HK*. Firstly, in line with de la Fuente (2004), it can be assumed that:

$$HK_{it} = f(S_{it}) = exp(\delta\ S_{it}) \qquad [3]$$

where *S* is the average number of years of schooling of the employees in the hospitality industry in each region and δ a parameter whose value is related to (Mincerian) returns to schooling. Also, if we assume that the technical efficiency level does not vary over time or space, then expression [2] can be directly estimated with a constant term. However, this assumption may be very restrictive, and it may well be that the rate of technical progress does vary over time and between regions. In fact, in the specific case of the hospitality industry, and at the aggregate level, a set of variables can be shown which may be related to the uneven evolution of technical progress in the Spanish regions. Among these, the following variables can be pointed out:

- Given that the competitive environment of firms plays a fundamental role in the capacity of regions to develop an effective innovation system (Tödtling and Kaufmann, 1999), the rate of technical progress may be related to an indicator of the degree of tourism intensity in the region *TI*, such as the number of overnight stays per inhabitant (Smeral, 2007).
- The average hotel size in the different regions, *AHS*, given that there is evidence showing that establishment size exerts a positive influence on the rate of innovation in the hotel industry (Capó Parrilla, Riera Font and Roselló Nadal, 2007). The corresponding indicator can be constructed in terms of the number of hotel bed places supplyed by each establishment in the various regions as a yearly average.
- The number of establishments in each category, *NE*, according to number of stars, is an additional factor which can explain the aggregate regional evolution of technical progress in the sector. According to Orfila-Sintes, Crespí-Caldera and Matínez-Ross (2005), the largest hotels in the highest categories are more innovative than those that are smaller and in lower categories.

Additionally, in line with Van der Hoeven and Thurik (1984), Butler (1994), Asworth and Thomas (1999) and Sharpley (2005), we must take into account the possible effects on

productivity of the variables related to the degree of utilisation of installed capacity, such as average length of stay in the establishment, *ALS,* and the seasonality of demand measured, for example, by calculating the Gini Index, *GI,* for the monthly series of overnight stays in each region and year (Sutcliffe and Sinclair, 1980). Thus, taking into account that the evolution of the regional TFP may be related to the three aforementioned variables, the empirical specification of the model to estimate is the following:

$$\Delta(lnY_{it} - ln\, N_{it}) = \eta_t + \lambda_{TI}\, \Delta ln\, TI_{it} + \lambda_{AHS}\, \Delta ln\, AHS_{it} + \lambda_{NE}\, \Delta ln\, NE_{it} + \lambda_{ALS}\, \Delta ln\, ALS_{it} + \lambda_{GI}\, \Delta ln\, GI_{it} + \beta\, \Delta(ln\, K_{it} - ln\, N_{it}) + \gamma\, \delta\, \Delta S_{it} + \mu\, \Delta ln\, H_{it} + \nu\, \Delta(ln\, GFCF_{it} - lnK_{it}) + \varepsilon_{it} \quad [4]$$

Also included in this specification are two variables related to the intensity of use of inputs. These variables also allow the cyclical component of labour productivity to be controlled. To a great extent, this cyclical component is a consequence of adjustment costs that exist in the use of inputs which result in their not being fully utilised throughout the cycle (OECD, 2001, p.119). Firstly, it means controlling the intensity in the utilisation of the labour input through the variable which measures the average hours worked per employee (per week) in each region, *H*. Secondly, the intensity in the utilisation of the physical capital is controlled through the variable *GFCF/K* which measures the quotient between investment (Gross Fixed Capital Formation, GFCF) and the stock of physical capital (K) in each region and year.

Descriptive analysis of the determinants of productivity.

Table 2 shows the information corresponding to the two principal theoretical determinants in the evolution of labour productivity: the stock of per-worker human capital, using the average years of schooling of those employed in the sector as a proxy variable, and the stock of per-worker productive physical capital, measured in thousands of 1990 Euros.

Table 2 shows that in 1996 the average number of years of education of the population employed in the hospitality industry in Spain was 7.33, with the highest average level in the Basque Country (8.63 years of schooling) and the lowest in Murcia (6.58 years). It can also be confirmed that in Spain in the 1996 to 2004 period there was a significant rise in the average number of years of education of those employed in this sector, from a level of 7.33 years to 8.75 years. All regions benefited from this increase, although it can be seen that, in general, the regions with lower levels in 1996 show greater growth rates in this period. Specifically, the value of the correlation

coefficient between the level of this variable in 1996 and the average growth rate in the 1996-2004 period was -0.76, negative and significant.

Table 2. *Relative levels and annual average growth rates in the period of 1996-2004 for the principal growth determinants of labour productivity.*

	Average no. of years of schooling of the employees			*Physical capital per worker (thousands of 1990 Euros)*		
	1996	*2004*	*Annual Δ %*	*1996*	*2004*	*Annual Δ %*
Andalusia AND	6.66	8.32	2.82	21.16	12.58	-6.29
Aragón ARA	8.27	9.66	1.97	16.13	9.79	-6.05
Asturias AST	7.79	8.41	0.97	25.20	17.17	-4.68
Balearic Islands BAL	7.1	8.60	2.43	29.86	30.06	0.08
Canary Islands CAN	6.88	8.31	2.39	20.80	14.29	-4.58
Cantabria CANT	8.35	9.79	2.01	30.98	14.05	-9.41
C- León CL	7.51	8.91	2.16	16.87	13.16	-3.06
C- La Mancha CLM	6.49	8.84	3.94	18.48	10.35	-6.99
Catalonia CAT	7.52	8.40	1.40	18.21	12.37	-4.72
Valencian Community CVAL	7.07	9.26	3.43	20.25	12.97	-5.41
Extremadura EXT	6.61	8.69	3.49	25.69	17.50	-4.68
Galicia GAL	6.99	8.72	2.81	24.66	16.12	-5.17
Aut. Region of Madrid MAD	8.15	8.75	0.89	12.23	7.05	-6.65
Murcia MUR	6.58	9.08	4.11	25.22	13.31	-7.68
Navarre NAV	8.33	9.96	2.26	11.20	7.59	-4.75
Basque Country PV	8.63	10.11	2.00	11.32	5.94	-7.76
La Rioja RIO	8.32	9.15	1.20	14.06	8.65	-5.89
Spain	7.33	8.75	2.23	19.50	13.08	-4.87
Correlation coefficient between Δ % and the 1996 level	-0.76			0.15		

Sources: Spanish National Accounts and Spanish Regional Accounts bases 1995 and 2000, National Statistics Institute (INE); Active Population Survey, INE; Capital stock in Spain and its regional distribution, and National Income in Spain and its provincial distribution, BBVA Foundation.

However, the behaviour of the stock of physical capital per worker (capital intensity) was opposite to that described for the variable related to the workers' human capital. If regional disparities were high in 1996, they increased in 2004: in 1996 the community with the lowest level of physical capital per worker in the industry was the Basque Country, with 11,320 Euros, compared to the Balearic Islands with 29,860 Euros; in 2004, the average levels corresponding to these regions are estimated to be 5,940 Euros and 30,060 Euros, respectively. Moreover, it is evident that, with the exception of the Balearic Islands, in all the regions there was a significant process of reduction of sector's capital intensity. In Spain as a whole, in 1996 the stock of physical capital per worker was estimated at 19,500 Euros. This level went down to 13,080 Euros in 2004. As mentioned earlier, to a great extent, this process was the result of the major increase in the hospitality industry workforce over those years.

In addition to the stock of human and physical capital, there are other variables which may have influenced the evolution of labour productivity in this period. Among these factors, the following can be pointed out, which are, as mentioned previously, those linked to characteristics of demand for the hotel services in the region. These include the average number of overnight stays per inhabitant, the average length of stay of clients in hotel establishments and an indicator of the degree of demand seasonality throughout the year, such as the Gini index corresponding to a region's monthly overnight stays.

Table 3. *Relative levels and annual average growth rates in the period of 1996-2004 for the principal growth determinants of labour productivity.*

	Gini Index of monthly overnight stays (%)			*No. of overnight stays per inhabitant*		
	1996	*2004*	*Annual Δ %*	*1996*	*2004*	*Annual Δ %*
Andalusia AND	16.31	17.39	0.80	3.34	5.14	5.53
Aragón ARA	15.16	11.28	-3.63	1.99	3.22	6.20
Asturias AST	27.96	28.25	0.13	0.95	2.52	13.01
Balearic Islands BAL	39.03	44.43	1.63	57.15	50.63	-1.50
Canary Islands CAN	4.54	6.18	3.94	15.28	20.14	3.52
Cantabria CANT	37.65	34.67	-1.02	2.12	4.22	8.99
C- León CL	17.31	15.34	-1.50	0.65	2.73	19.62
C- La Mancha CLM	10.32	11.91	1.82	2.08	1.74	-2.18
Catalonia CAT	37.57	30.23	-2.68	4.02	5.68	4.40
Valencian Community CVAL	15.91	15.65	-0.20	3.64	4.86	3.67
Extremadura EXT	12.22	11.77	-0.47	1.01	1.69	6.62
Galicia GAL	27.06	24.92	-1.02	1.30	2.91	10.62
Aut. Region of Madrid MAD	8.32	6.09	-3.81	1.74	2.33	3.75
Murcia MUR	18.51	13.71	-3.68	1.65	2.03	2.64
Navarre NAV	19.93	13.71	-4.57	1.05	2.13	9.27
Basque Country PV	14.11	14.22	0.10	0.89	1.57	7.33
La Rioja RIO	16.59	12.29	-3.68	1.75	2.79	5.98
Spain	22.40	21.54	-0.49	4.02	5.52	4.04
Coefficient of correlation between Δ % and the level of 1996	-0.09			-0.45		

Source: Annual Statistical Report, Inter-census Population Estimates 1991-2001, Estimations of Spanish Population from the 2001 census and Hotel Accommodation Survey, INE.

From this perspective, the information contained in Tables 3 and 4 shown below, leads us to conclude that:

- There are important regional disparities in the characteristics of demand for the hotel industry's services. Thus, for example, the Balearic Islands and the Canary Islands are characterised by showing a high tourism intensity (measured by number of overnight stays per inhabitant in the region) together with an average length of stay (in days) that is much higher than the national average. Compared to these, in inland regions such as Castilla-

León, Castilla-La Mancha and Extremadura, both the degree of tourism intensity in the region and the average stay are relatively limited when compared to the Spanish national average.However, if the Gini coefficients calculated to measure the degree of seasonality of overnight hotel stays are observed, it can be seen that there is a considerable difference in demand for these services between the Canary Islands and the Balearic Islands, two regions with practically equal levels of labour productivity in the sector and the highest in Spain. In the Canary Islands, the degree of demand seasonality is among the lowest in Spain, while in the Balearic Islands it is the opposite. Specifically, taking into account that the Gini coefficient would be 100 if all the year's demand was concentrated in a single month of the year and 0 if the overnight stays were evenly distributed over all the months of the year, for 2004 the value of this coefficient corresponding to the Balearic Islands is 44.43 (the highest out of all the regions) and for the Canary Islands it is 6.18 (after Madrid, the second lowest estimate for all Spanish regions).

- Nonetheless, the regional disparities in the number of overnight stays per inhabitant and in average length of stay went down considerably in the 1996-2004 period. In fact, in both cases the correlation coefficient calculated between the level of the variable in 1996 and the average growth rate for the 1996-2004 period is negative and significant (-0.45 and -0.68 respectively). On the other hand, regional disparities related to demand seasonality did not undergo a significant reduction over this period.

Some supply-side variables whose evolution could influence the growth of regional labour productivity have also been mentioned. Among these factors, Table 4 shows the evolution over the period of the average size of each region's hotels, measured by the number of bed places per hotel. It can be confirmed that:

- The average size of hotels in Spain decreased between 1996 and 2004. Specifically, the average size in 1996 is estimated at 108 bed places per hotel. This level went down to 87 bed places in 2004.
- There are very remarkable differences among the average size of hotels characterising each region. Thus, in 2004, the region with the greatest average hotel size was the Canary Islands (325 bed places per hotel) followed by the Balearic Islands whose hotels had an average capacity that year of 232 bed places. This characteristic is what was expected, given these regions' specialisation in mass tourism, channelled by large tour operators that demand a large average hotel size to guarantee business profitability. In contrast to these regions, we find the inland Spanish communities of the two Castillas, Extremadura,

Navarre, La Rioja and Aragón, with an accommodation supply characterised by small hotels (with an average capacity of between 33 and 50 bed places per establishment).

- It can even be pointed out that regional differences in this variable increased considerably over this period. In fact, the correlation coefficient calculated between the level corresponding to this variable in 1996 and its average growth rate in the 1996-2004 period is positive and significant (0.60). This result indicates that the reduction in the average size of establishments that took place over the period was more pronounced in the regions characterised by smaller average hotel size in 1996.

Table 4. *Relative levels and annual average growth rates in the period of 1996-2004 for the principal growth determinants of labour productivity.*

	Average length of stay in hotels (days)			*No. of bed places per establishment*		
	1996	*2004*	*Annual Δ %*	*1996*	*2004*	*Annual Δ %*
Andalusia AND	3.26	3.09	-0.68	118.20	90.16	-3.33
Aragón ARA	2.02	2.07	0.33	60.22	44.53	-3.70
Asturias AST	2.28	2.26	-0.09	40.09	32.66	-2.53
Balearic Islands BAL	9.01	6.97	-3.16	224.79	232.34	0.41
Canary Islands CAN	8.16	7.56	-0.95	347.94	325.10	-0.85
Cantabria CANT	2.18	2.45	1.47	52.47	40.93	-3.06
C- León CL	1.57	1.67	0.74	44.31	36.73	-2.32
C- La Mancha CLM	1.50	1.69	1.50	43.98	35.21	-2.74
Catalonia CAT	3.81	3.30	-1.78	123.94	104.42	-2.12
Valencian Community CVAL	4.98	3.69	-3.68	123.13	104.25	-2.06
Extremadura EXT	1.56	1.76	1.52	43.86	39.15	-1.41
Galicia GAL	2.23	2.14	-0.51	46.66	37.51	-2.69
Aut. Region of Madrid MAD	1.95	2.08	0.76	85.19	66.49	-3.05
Murcia MUR	3.78	2.81	-3.62	89.31	77.00	-1.84
Navarre NAV	1.80	1.96	1.05	54.48	36.08	-5.02
Basque Country PV	1.91	1.90	-0.04	65.00	50.71	-3.06
La Rioja RIO	1.93	1.85	-0.55	67.63	46.69	-4.53
Spain	4.09	3.51	-1.88	108.12	86.86	-2.70
Correlation coefficient between Δ % and the 1996 level	-0.68			0.60		

Source: Hotel Accommodation Survey, National Statistics Institute (INE).

This behaviour of the supply is also reflected in Table 5, which indicates the share of each region in total 3, 4 and 5-star establishments in Spain in the years between 1996 and 2004. This Table shows that the growth of the supply in the archipelagos was mainly fuelled by an increase in the number of 4 and 5-star establishments. In turn, in the inland regions of Spain, the growth in supply was dominated by the increase in the number of 3-star hotels. In all these regions, with the exception of Navarre, the average growth rate of 3-star hotels surpassed the national average (estimated at 4.76% p.a.).

This data depicts a panorama characterised by the existence of different models of regional tourism in Spain. This fact has been taken into account in the econometric analysis presented in the next section, to the extent that in the estimations they have been treated as a single region, the result of grouping different Autonomous Communities (administrative regions at NUTS 2 level) with important structural similarities in terms of market characteristics. Therefore, then, the result of grouping Castilla-La Mancha, Castilla-León and Extremadura, on the one hand, and the Basque Country, Navarre and La Rioja on the other, is going to be considered as a single region.. This grouping of regions is justified for both geographical reasons (those included in each group are regions with common border) and because Castilla-La Mancha and Navarre had no 5-star hotels in that period (as Table 5 confirms).

Table 5. *Share of each region in the hotels in Spain as a whole and average annual growth rates from 1996-2004.*

	*No. of 3 * establishments*			*No. of 4 * establishments*			*No. of 5 * establishments*		
	% 1996	*% 2004*	*Annual Δ %*	*% 1996*	*% 2004*	*Annual Δ %*	*% 1996*	*% 2004*	*Annual Δ %*
AND	14.55	15.90	5.93	20.90	21.04	10.18	20.00	24.00	13.58
ARA	3.07	3.64	7.03	1.40	1.16	7.46	1.54	2.00	14.72
AST	2.84	5.21	13.01	1.72	1.95	11.88	1.54	2.67	18.92
BAL	23.69	18.79	1.77	11.08	15.04	14.38	10.77	15.33	16.03
CAN	5.28	4.89	3.77	13.88	10.70	6.56	21.54	13.33	4.56
CANT	2.39	2.55	5.61	0.94	1.95	20.68	1.54	1.33	9.05
CL	4.43	5.56	7.78	4.37	5.78	14.02	3.08	4.00	14.72
CLM	2.22	2.58	6.80	1.87	1.95	10.67	-	-	-
CAT	20.06	18.01	3.36	18.72	15.33	7.37	12.31	10.00	8.17
CVAL	8.13	8.14	4.80	4.84	6.94	15.18	7.69	7.33	10.36
EXT	0.91	1.06	6.76	2.03	1.81	8.52	-	0.67	-
GAL	3.81	4.46	6.87	3.12	4.19	14.24	4.62	4.00	9.05
MAD	3.41	3.80	6.19	9.98	7.38	6.00	9.23	10.67	13.04
MUR	1.42	1.45	5.02	1.72	1.88	11.35	1.54	0.67	0.00
NAV	1.31	1.25	4.21	0.31	0.29	9.05	-	-	-
PV	1.88	1.84	4.52	2.34	1.81	6.59	4.62	3.33	6.59
RIO	0.63	0.86	9.05	0.78	0.80	10.36	-	0.67	-
Spain	100.00	100.00	4.76	100.00	100.00	10.09	100.00	100.00	11.02

Source: Annual Statistical Report and Hotel Accommodation Survey, National Statistics Institute (INE).

Additionally these groupings can also be justified because there are significant similarities in supply and demand for hotel services in these regions. Specifically, the three communities that make up the first group (Castilla-La Mancha, Castilla-León and Extremadura), are characterised by a hotel supply based on relatively small-sized establishments (with an average size of between 35 and 39 bed places per establishment), an average length of stay that is shorter than the

national average (around 1.7 days, on average) and low seasonality of the demand (the Gini Coefficient ranges between 11.8 and 15.3). Moreover, the level of labour productivity corresponding to these three regions is also relatively low, varying between 81% and 95% of the average level corresponding to Spain in 2004. On the other hand, the Basque Country, Navarre and La Rioja are characterised by recording labour productivity levels that are greater than the national average, by the average small size of their establishments (with values ranging between 36 and 51 bed places per hotel), short average stays (around 1.9 days) and low seasonality of the demand (with Gini coefficient values of between 12.29 and 14.22). Consequently, of the 17 regions considered in the descriptive analysis in this section, and corresponding to the EU level of NUTS 2, thirteen regions are going to be considered in the econometric analysis carried out below.

Econometric analysis: results of the estimations.

To estimate the equation [4], a panel data was constructed with observations of variables corresponding to the thirteen regions considered in the 1997-2004 period. The results of the estimation of the model are shown in Table 6. Column (1) presents the results of the OLS estimation. It can be confirmed that both the elasticity of labour productivity growth in relation to the growth in tourism intensity and the elasticity to the growth of the average size of 5-star hotels are positive and statistically significant. On the other hand, it is noteworthy that the estimated coefficient for the growth in the number of 3-star hotels is negative and significant, indicating that the increase in the growth rate of the number of 3-star hotels causes a reduction in the growth rate of labour productivity in the region. Furthermore, the estimated value of direct output elasticities in relation to physical and human capital are in line with those obtained in the empirical literature for the hotel industry sector (Marchante and Ortega, 2012): around 0.22 in the case of per-worker physical capital and statistically insignificant in the case of the variable related to human capital. In addition, the estimated coefficients for the variables related to the intensity in the use of factors, $GFCF/K$ and H, are not significant.

It is important to point out that autocorrelation tests do not reject the null hypothesis of absence of serial correlation and that the model's explanatory capacity is high. This is made clear by the calculated value for the adjusted coefficient of determination, which is 0.50 although the model is specified in first differences. Equally noteworthy is the fact that the coefficients estimated for the variable related to seasonality of demand (the Gini index of the monthly series of overnight stays in the region) and the average stay (in days) are not significant. Also remarkable is the fact that

the OLS estimation indicates that growth in the average size of 1- and 2-star hotels causes acceleration in regional growth of labour productivity in the industry.

Table 6. *Regional determinants of labour productivity in the hospitality industry. Results of the estimations of the model [4].*

Variables	**OLS (1)**		**IV (2)**	
	Coefficients	**t-Statistics**	**Coefficients**	**t-Statistics**
(1) Stock of physical capital (ln) - - No. of filled posts (ln) [Δ (ln K_{it} - ln N_{it})]	0.239	5.90	0.224	*4.36*
(2) Average years of schooling of workers [Δ S_{it}]	-0.006	-0.97	-0.033	*-0.42*
(3) No. of overnight stays per inhabitant (ln) [Δ ln TI_{it}]	0.171	4.02	0.147	*2.75*
(4) Gini index of the monthly series of overnight stays (ln) [Δ ln GI_{it}]	-0.034	-0.77	-0.047	*-0.87*
(5) Average length of stay (days) (ln) [Δ ln ALS_{it}]	-0.080	-0.98	0.003	*0.04*
(6) Gross fixed capital formation (ln) – Stock of physical capital (ln) [Δ(ln $GFCF_{it}$ - lnK_{it})]	-0.013	-0.87	0.003	*0.17*
(7) Average no. of work hours weekly (ln) [Δ ln H_{it}]	0.012	0.16	-0.136	*-1.42*
(8) No. of beds places per 1 and 2* establishment (ln)* [Δ ln AHS12*$_{it}$]	0.209	3.09	0.178	*0.93*
(9) No. of beds places per 3 establishment (ln)* [Δ ln AHS3*$_{it}$]	0.121	1.04	-0.001	*-0.00*
(10)) No. of beds places per 4 establishment (ln)* [Δ ln AHS4*$_{it}$]	0.010	0.17	-0.004	*-0.06*
(11)) No. of beds places per 5 establishment (ln)* [Δ ln AHS5*$_{it}$]	0.090	3.09	0.069	*2.95*
(12) No. of 1 and 2*establishments (ln)* [(ln) Δ ln NE12*$_{it}$]	0.073	1.65	0.110	*1.02*
*(13) No. of 3*establishments (ln)* [(ln) Δ ln NE3*$_{it}$]	-0.250	-3.79	-0.237	*-2.58*
*(14) No. of 4*establishments (ln)* [(ln) Δ ln NE4*$_{it}$]	-0.009	-0.23	-0.046	*-1.39*
*(15) No. of 5*establishments (ln)* [(ln) Δ ln NE5*$_{it}$]	0.026	1.09	0.024	*0.81*
Adjusted R^2	*0.50*		-	
Residual sum of squares	*0.0468*		*0.0177*	
Test F for overall significance of the model (p-Value)	*F(23,81)=26.75 (0.00)*		*F(20,45)=30.11 (0.00)*	
Hansen's J statistic of over-identifying restrictions (p-Value)	-		*Chi-sq(1)=0.18 (0.67)*	
Robust test for first order autocorrelation in the residuals (p-Value)	*Z=-0.32 (0.75)*		*Z=-1.41 (0.16)*	
Robust test for second order autocorrelation in the residuals (p-Value)	*Z=1.15 (0.25)*		*Z=-1.22 (0.22)*	
Number of regions	*13*		*13*	
Period	*1997-2004*		*2000-2004*	
Number of observations	*104*		*65*	

Note: the response variable is the ln of the quotient between GVAfc and the No. of filled posts Δ *(lnYit - ln Nit)*. The estimations were obtained using the *ivreg2* programme for Stata 11.2 by Baum, Schaffer and Stillman (2003). The standard errors and covariances are heteroskedasticity and autocorrelation consistent. Estimations include the corresponding period dummies. After applying the Durbin-Wu-Hausman test for regressor endogeneity (Table 7), the only variable for which this test is significant (at the 10%) is [Δ ln AHS12*$_{it}$] (p-Value = 0.059). As a result, this variable is considered endogenous in the estimation for instrumental variables (IV). The variables used to instrument this variable in first-differences are the 3rd and 4th lags of the variable in levels. Hansen's J statistic (test of overidentification for all instruments) is consistent in the presence of heteroskedasticity and autocorrelation. The autocorrelation tests were obtained by applying the *abar* command (Roodman, 2006).

However, we must bear in mind that these results may be affected by possible endogeneity and/or the existence of measurement errors in some regressors. One estimation procedure that provides consistent results in these cases can be obtained through the use of instrumental variable (IV) estimators (Griliches and Hausman, 1986).

Economic theory some times may suggest which explanatory variables in the model might be endogenous, but it cannot indicate whether the correlation with the error term is so large that it invalidates the OLS estimation of the model due to its inconsistency. In this study the possible endogeneity of the regressors has been analysed from an empirical perspective. To this end, a Durban-Wu-Hausman test were performed to test the null hypothesis of exogeneity of the regressors. The results of these tests applied to the regressors in the model specification [4] are shown in Table 7.

Table 7. *Durban-Wu-Hausman endogeneity tests for the variables in model [4].*

Variables	Chi-sq (1)	p-Value
(1) Δ (ln K_{it} - ln N_{it})	0.406	0.524
(2) Δ S_{it}	0.056	0.812
(3) Δ ln TI_{it}	0.312	0.576
(4) Δ ln GI_{i}	0.025	0.875
(5) Δ ln ALS_{it}	0.134	0.714
(6) Δ(ln $GFCF_{it}$ – lnK_{it})	0.447	0.504
(7) Δln H_{it}	1.217	0.270
(8) Δ ln AHS12*$_{it}$ (*)	3.557	0.059 (*)
(9) Δ ln AHS3*$_{it}$	1.199	0.274
(10) Δ ln AHS4*$_{it}$	0.257	0.612
(11) Δ ln AHS5*$_{it}$	0.013	0.909
(12) Δ ln NE12*$_{it}$	0.872	0.350
(13) Δ ln NE3*$_{it}$	0.477	0.489
(14) Δ ln NE4*$_{it}$	0.689	0.407
(15) Δ ln NE5*$_{it}$	1.539	0.215

Note: The Durbin-Wu-Hausman test was applied to contrast regressor endogeneity (utilising the *ivendog* routine of Baum, Schaffer and Stillman (2003) for Stata). The rejection of the null hypothesis means that the exogeneity hypothesis for the variable can be rejected. Hence, the variable marked with an asterisk was considered endogenous in the estimation for instrumental variables (IV).

These results let us conclude that the hypothesis of the exogeneity of the predetermined variables can be rejected only in the case of [Δ*ln DM12*$_{it}$*] (Average size of 1- and 2-star hotels). Consequently, in principle, the predetermined variables in first- differences themselves may be

valid instruments for IV estimation, except in the case of the variable considered endogenous. In that case, its levels lagged two periods are used as instruments (Arellano and Bover, 1990; Kiviet, 1995).

Column (2) of Table 6 presents the results of the IV estimation of the equation [4]. Hansen's J statistic does not reject the validity of the set of instruments used, nor is there evidence of the existence of autocorrelation in the residual, which is crucial in the IV estimations, given that, if the instruments selected are not orthogonal to the error term, the degree of inconsistency of the IV estimator may be greater than that of the OLS estimator (Nakamura and Nakamura, 1998). In light of the results obtained, the only noteworthy discrepancy of this estimation with regard to the OLS estimation specifically affects the coefficient of the variable *Average size of 1- and 2-star hotels*, which is not significant in the IV estimation.

Therefore, the results of the IV estimation indicates that, in addition to the growth in the stock of physical capital per worker, there are two variables that explain regional growth of labour productivity in the hospitality industry in this period. Firstly, it can be proven that a rise of 1 percentage point in the growth of overnight stays per inhabitant in the region results in an increase of 0.147 percentage points in the growth rate of labour productivity. This effect is minor but significant (and equal to 0.069 percentage points) if there is an increase of 1 percentage point in the average size of 5-star establishments. Nonetheless, the results obtained indicate that growth in the number of 3-star hotels has greatly penalized labour productivity growth in this period. Specifically, the IV estimation shows that a 1 percentage point increase in the number of 3-star hotels causes a fall in labour productivity growth rate of 0.237 percentage points.

Econometric analysis: decomposition of labour productivity growth.

To quantify the effects on productivity growth of the changes in in the shares of its determinants in the 1997-2004 period, in addition to the results of the estimations from Table 6 it is necessary to bear in mind the average annual growth rate of the variables in the period, exactly as shown in Table 8 below.

From the information contained in Table 8 it can be inferred that the principal factors contributing to the reduction in the growth rate of labour productivity in the period are the increase of 3-star hotels and the reduction of the stock of physical capital per worker. The only productivity driver which made a positive contribution to the growth of labour productivity is the

increase in the number of overnight stays per inhabitant (tourism intensity). Specifically, the following scenario can be proposed for the period: if the average annual growth rate of productivity in Spain in the period was -2.11%, *ceteris paribus*, it would have been equal to -2.683% (=-2,11 – 0.573) if the tourism intensity in Spanish regions had remained the same at its 1997 level.

Table 8. *Decomposition of labour productivity growth.*

Explicative variables	*Observed Δ % (annual average)*	*Estimated coefficient*	*Estimated contribution to growth (p.p.)*
(1) Δ (ln K_{it} - ln N_{it})	-4.796	0.224	-1.074
(3) Δ ln IT_{it}	3.896	0.147	0.573
(11) Δ ln $DM5^*_{it}$	-0.858	0.069	-0.059
(13) Δ ln $NE3^*_{it}$	4.782	-0.237	-1.133

Note: The percentages contributing to productivity growth were calculated taking into account the significant estimated coefficient values from Table 6 column (2) and the average annual growth rates for the 1997-2004 period. The independence of each variable's effects on productivity was assumed in order to carry out this decomposition.

As a result, it is evident that to explain the evolution of labour productivity in the hospitality industry in Spain in the 1997-2004 period, in addition to the evolution of capital deepening and employment, is crucial to control for the effect the simultaneous changes in the composition of the supply, related to the increase in new 3-star hotels, and in the demand for tourism, related to the increase in overnight stays per inhabitant in Spanish regions.

Final considerations.

Since 1995 in Spain there has been acceleration in the opening of new hotel establishments, to a great extent, a consequence of the bubble in property market. This process, which has altered the relative distribution of establishments in regions and categories, has had very significant consequences on the composition and characteristics of the supply and the functioning of regional labour markets in the hospitality industry. Moreover, it is generating strong pressure on companies in the hotel industry aimed at price and profit reduction, within a context of increased competition from international tourism markets. While the impact of investments in physical and human capital on the businesses' ability to compete is analysed in the literature, an aspect about which there is no evidence is the analysis of the relationships between levels or rates of labour productivity growth and the growth of hotel establishments and bed places by categories in the regions of Spain. Thus, it is pertinent to obtain evidence on the impact that the growing number of operators in the markets has had on labour productivity since the mid 90's. Additionally, inasmuch as sector policies are oriented towards promoting factors related to the increased

utilisation of installed capacity, such as increasing average length of stay in establishments, raising the number of overnight stays per bed place and reducing demand seasonality, it is of interest to obtain evidence of the effect of its evolution on regional differences in labour productivity in the hospitality industry at the aggregate level.

This paper confirms that since the beginning of the 90's labour productivity in the hospitality industry has gone down in real terms in Spain, a trend that accelerated in the second half of the 90's. In this respect, the estimations show the factors that may have most contributed to this result are the increase in 3-star hotels and the reduction process of the stock of physical capital per worker. It is important to emphasise that the increase in the regional tourism intensity has a positive and relevant impact on the growth of labour productivity. However, other factors of demand related to the utilisation of installed capacity such as average length of stay in establishments and seasonality did not have a significant aggregate impact on regional labour productivity growth in this period. Thus, this analysis may prove useful to design policy measures that could favour productivity growth in this key productive sector in the Spanish economy. In this respect, controlling the opening of new independent hotels, especially in the 3-star category, and implementing demand policies aimed at increasing the number of overnight stays in hotel establishments are measures that should be kept in mind in the design of a industrial policy for the regions of Spain. These results are especially relevant within the context of the "Tourism Plan Horizon 2020" recently designed by the Spanish Council of Tourism and the Spanish government's Secretary of State for Tourism and Commerce. Its objective is "by the year 2020, for the Spanish tourism system to be the most competitive and sustainable, providing a maximum of social welfare".

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Appendix.

A database for the Spanish regions and the period of 1987-2004 was built from available official statistics about the hospitality industry. Although the core activities within this sector are hotels and restaurants, it is also worthwhile to point out that the hospitality industry includes other productive activities. Specifically, the 1993 National Classification of Economic Activities (CNAE) recognizes the following activities within the the hospitality sector (55): Hotels (551), Camping and other types of short-term accommodation (552), Restaurants (553), Beverage establishments (554) and Collective dining rooms and supply of prepared meals (555). Normally, in the analysis of the hospitality industry, a difference is made between accommodation services (551 and 552) and food and drink services which include restaurants, bars and beverage establishments in general, as well as meal supplying services (catering).

Therefore, the series of Gross Value Added (GVA) at factor cost, Compensation of Employees, Gross Operating Surplus/Mixed Income and Employment are constructed from different bases of the Spanish Regional Accounts (CRE) for the industry, given that the information that corresponds to the different branches of the hospitality sector is not available in the CRE. To do so information from the 1986, 1995 and 2000 bases of Spanish Regional Accounts were linked. Nonetheless, in the 1986 base, data from the National Statistics Institute (INE) provides information for the activities "Recovery, repairs, commerce, hotel industry and restaurants". This is why statistical information from the BBVA Foundation "National Income in Spain and its Distribution by Provinces" is used, in order to estimate output and employment of the hospitality industry in the 1987-1995 period, by calculating the share of hospitality industry in each region with regard to the other services the CRE included in these activities. In addition, the GVA deflator used is the one provided by the Spanish National Accounts for the hospitality industry, linked for the three bases.

The data on physical capital stock is from the publication *Capital Stock in Spain and its Regional Distribution* by the BBVA Foundation. Since these series are available up until 2000, we employ information on Gross Fixed Capital Formation (GFCF) from the *Annual Survey of Services* (EAS) of the National Statistics Institute to estimate, according to the Perpetual Inventory Method, the evolution of regional physical capital stock until 2004.

The indicator for stock of human capital per worker that was used is the average number of years of schooling that those employed in the sector in each region have according to the microdata from the Active Population Survey (EPA). These years are estimated in function of the level of schooling completed, supposing that no additional time was needed to complete each year. To calculate this indicator, a number of years of schooling is assigned to each level of education, normally the number of years it takes to complete these studies. In this way, a value corresponding to the employed workers' average years of schooling may be obtained by calculating the average resulting from weighting the years of schooling in terms of the people who have this educational level and dividing by the total number of workers. This figure is the final indicator, frequently used to make international comparisons. The educational levels considered are those contained in the National Statistics Institute's EPA from 1996 to 2004. Since over this period the EPA utilised two different education classifications (1992-1999 and from 2000), the equivalents proposed by Serrano and Pastor (2002) were used. Once the equivalents between the two systems of educational levels included in the EPA were established, the corresponding years of schooling had to be assigned.

Furthermore, data was obtained on the evolution of establishments, the number of bed places and of overnight stays in each region from the National Statistics Institute.

Thus, the following statistical documents were used to construct the database:

1. *Spanish National Accounts. Base 1986 and Base 1995, Accounting Series 1995-2003* (National Statistics Institute-INE).
2. *Spanish Regional Accounts. Base 1986, Linked series 1986-1996, Base 1995, Series 1995-2004 and Base 2000* (INE).
3. *National Income in Spain and its Distribution by Provinces* (BBVA Foundation and Valencian Institute of Economics-IVIE).
4. *Active Population Surveys 1996-2000 (microdata)* (INE).
5. *Capital Stock in Spain and its Regional Dsitribution (1964-2002)*, (BBVA Foundation and IVIE).
6. *Hotel Occupancy Survey 1999-2004* (INE).
7. *Survey of Movement of Travellers in Hotel Establishments 1995-1999* (INE).
8. *Annual Survey of Services 1999-2004,* (INE).
9. *Annual Statistical Report 1996-2004* (INE).

10. *Inter-census Population Estimates. Estimates between 1981and 1991and 1991-2001 censuses* (INE).
11. *Estimations of the Spanish population calculated from the 2001 census* (INE).