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SOCIOECONOMIC AND TERRITORIAL IMPACT OF THE SKI INDUSTRY IN THE SPANISH PYRENEES: MOUNTAIN DEVELOPMENT AND LEISURE INDUCED URBANIZATION

Impactos socioeconómicos y territoriales de la industria del esquí en los Pirineos españoles: desarrollo de la montaña y urbanización inducida por el ocio

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ABSTRACT.– This article assesses the territorial impact of the ski industry in two areas of the Spanish Pyrenees (Aragon Pyrenees and the Catalan High Pyrenees). By analyzing the changes on demographic dynamics and structure, economic portfolio, and evolution of the built structure of these areas since the construction of the ski resorts, we, firstly, identify a trend towards urbanization emerging in these areas, and secondly, that this trend unfolds in two different models: around the ski resorts at the northern end of valleys in the Aragon study site, and in regional centers at the bottom of the main valleys in the Catalan High Pyrenees. In this fashion the ski industry, which offers seasonal services to a mostly urban clientele, contributes to the redefinition of peripheral rural areas taking into account urban needs. The towns, by the ski resorts in Aragon, and in the bottom of the valleys in Catalonia, have grown to become small nodes of a large network that expands the physical, economic and cultural influence of the low lands cities over the Spanish mountains.

Keywords: Leisure industry, mountains urbanization, territorial impacts of the ski, Pyrenees.

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RESUMEN.– Se evalúa el impacto territorial de la actividad del esquí en los Pirineos españoles (Pirineos Aragoneses y Alto Pirineo Catalán). A partir del análisis de los cambios registrados en la dinámica y estructura demográfica y de las prácticas económicas, desde la instalación de las estaciones de esquí, se identifica, en primer lugar, una tendencia urbanizadora emergente y, en segundo lugar, que dicha tendencia se manifiesta en dos modelos diferentes: en el Pirineo aragonés se limita a las cabeceras de los valles, mientras que en el Pirineo Catalán se expande a los fondos de valle y cabeceras comarcales. De esta manera, la actividad del esquí contribuye a redefinir las zonas rurales periféricas, teniendo en cuenta las necesidades urbanas. Los pueblos próximos a las estaciones de esquí en Aragón y de los fondos de valle en Cataluña han crecido hasta convertirse en pequeños núcleos de una gran red que expande la influencia física, económica y cultural de las ciudades de las tierras bajas hacia las montañas españolas.

Palabras clave: Industria del ocio, Urbanización de las montañas, impactos territoriales del esquí, Pirineos.

1. Introduction

Tourism grew rapidly in the Spanish Pyrenees during the closing decades of the twentieth century (Clarimont &Vlès, 2009; Vaccaro & Beltran, 2009). The tourism development model was mainly based on the construction of alpine ski resorts (Lasanta, Laguna & Vicente-Serrano, 2007). While access roads were widened, large hotels, apartments, weekend homes, sports complexes, restaurants, service shops, and entertainment venues were built as a consequence of these ski resorts (Campillo & Font, 2004; Walford, 2001). The ski industry, thus, is not only designed for the use of visiting urban populations, it also generates a process of urbanization amidst a peripheral rural context (Stoddart, 2012). This article assesses the impacts of ski development on the socioeconomic fabric of local communities in the Spanish Pyrenees by comparing the historical evolution of different social and economic indicators in municipalities with and without ski related developments. The analyzed impacts are indicators of the integration (the different modes of integration) of these valleys into metropolitan networks (Perlik, Messerli & Bätzing, 2001; Perlik, 2011); a true redefinition of the rural world (Vaccaro & Beltran, 2007; Woods, 2007).

In the Spanish mountains mass tourism took root quite suddenly and little time was spent on planning its development. Until the mid-twentieth century, the mountainous regions of Spain, in a similar way to other European mountain regions, were managed as farmland, and tourism was a relatively small phenomenon (MacDonald *et al.*, 2000; Mottet *et al.*, 2006; Nadal et al., 2009; Price, 1992) with early exceptions such as the French and

Spanish Cerdanya district (Bachimonet, Dérioz & Marc, 2009), or the religious tourism of Lourdes in the Hautes Pyrénées (Eade, 1992). However, the decline of the traditional economy, with mass migration, abandonment of farmland, transformations on the livestock local industries, and the under-use of forests, encouraged a search for development alternatives capable of maintaining its social fabric (Nogués-Bravo, 2006; Pinilla, Ayuda & Sáez, 2008). The arrival of the ski industry, as a modern economic strategy, however, was preceded by another modernizing land management approach that changed landscapes, resources distribution, and communities in many Pyrenean aquatic systems: the generation of hydroelectric power (Boneta, 2003). Large infrastructures, damns, canalizations, and roads were built during the first seventy years of the twentieth century (Herrera, 2002). In any case, the adoption of a new land management strategy based on ski resorts followed the path taken several decades earlier in the northern and central Alps (Ferrero, 1998; Godde, Price & Zimermann, 2000).

Tourism linked to ski resorts has become a major economic factor in several Spanish mountain municipalities. Some 29 alpine ski resorts were built since the 1960s and 18 of these resorts are in the Pyrenees (five in Aragon and 13 in Catalonia, three of which abandoned). More importantly, real estate management and value –and speculation– in a Pyrenees now characterized by major urbanization projects have become inextricably connected to the planning and development of –sometimes ephemeral– ski resorts.

This article provides data on the potential socioeconomic impacts that ski resorts have had on its neighboring areas. Later we contextualize these impacts on the generic historical developmental path of the area. The goal is to provide the grounds for and start a reflection on the ski industry in the Spanish Pyrenees in particular, and the industry in general, as well as its relevance to the deployment of a specific social and economic rural development model for this once peripheral area.

After more than forty-five years of operation, the historical path and characteristics of the Spanish Pyrenees ski industry can be analyzed. From a rural development perspective we ask, has ski acted as an economic engine for the revitalization of areas that were sinking demographically and had lost much of their productive capacity over recent decades? To what point do the ski resorts contribute to the development of the territory at a social or ecological level? Has there been integration between new and traditional economic activities?

The initial hypothesis was that ski resorts would have an immediate urbanizing effect on the municipalities where they had been built. Keeping this in mind, and focusing on two areas of the Spanish Pyrenees (the North of Huesca, in Aragon, and the Catalan High Pyrenees), this paper will provide

quantitative data on the correlation between alpine ski resorts and the evolution and structure of the population of the neighboring communities, as well as employment and simultaneous presence (or absence) of farming activities. The data provided by the two study areas showed significant differences that actually questioned the validity of our hypothesis. The data forced us to qualify our initial explanations by developing a double-pronged approach to the links between urbanization and ski resorts in the mountains. In Aragon the numbers indicate that the effect of the ski resorts is mainly felt in the immediate vicinity of the resorts, in the headwaters of the valleys. Urbanization trends have affected mostly the villages with ski resorts. The situation in the Catalan High Pyrenees is significantly different. Their districts had relatively large towns by the roads in the main valleys, and they seem to have attracted a large part of the urban growth generated by ski resorts that are placed in smaller municipalities on the slopes.

This paper, thus, present a discussion on the impacts of ski resorts on local communities that unfolds as the coexistence of two models based on the distribution of the local impact: a) the demographic increases and economic transformations brought about by ski resorts concentrated in the municipalities that sustain them, and b) the demographic increases and economic transformations generated by several resorts have had a concentrated effect on towns centrally located and of district importance.

Correlation, of course, does not immediately translate into causation. For instance, the concentration of the population of the Pyrenean districts in a few mid-size villages at the bottom of the main valleys is connected to the fact that these centers provide services to the ski resorts and customers, but also linked to a historical trend preceding the arrival of "white tourism" according to which the small villages without infrastructure or public services in the upper secondary valleys were being abandoned in favor of those villages with road, schools, police, shops and so on. In other words, ski resorts do not account for all the changes experienced by these areas during the last forty years (Vaccaro & Beltran, 2010). Its study must be inserted in the general historical dynamics of these valleys. Correlation, however, highlights interesting regional trends worthwhile exploring (Lazzeretti & Capone 2008).

2. The place and the industry

The study areas, North of Aragon (in the districts of Jacetania, Alto Gállego, Sobrarbe and Ribagorza) and the Catalan High Pyrenees (which comprise the districts of Alta Ribagorça, Pallars Sobirà and Val d'Aran), are located in the Spanish central Pyrenees (Figure 1.). A significant part of the

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study area is over 1,000m high and some of the ground is under snow between four and five months a year (López-Moreno & García-Ruiz, 2004).

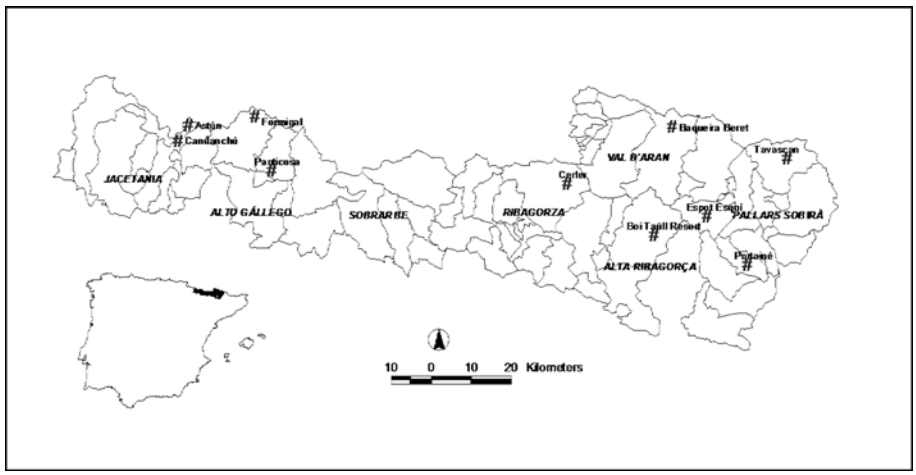

Figure 1. Study area.
Figura 1. Área de estudio.

Topographically speaking both areas are significantly different. The North Aragon is fairly homogeneous from a physical perspective. The area features a series of parallel valleys running North-South and which cross the mountain range running NW-SE. The landscape is rugged. The few flat areas are limited to the ends of the valleys and small plateaus on the slopes (García-Ruiz & Sala, 1984). The three districts of the Catalan High Pyrenees do not present these similar parallel North-South valleys. The Val d'Aran is a large wide valley on the northern side of the range. The Pallars Sobirà and the Alta Ribagorça follow two deep convoluted valleys, with several upper secondary valleys, that wind around the multitude of overlapping ranges that are covered by the Aigüestortes and Estany de Sant Maurici National Park. These topographical differences are not innocuous; they may have had an impact on the two models of ski based urbanization that emerge from our analysis.

The traditional model of land management was based on the use of lower slopes for cereal farming for human consumption, and the use of pastures, particularly the alpine and sub-alpine pastures, for sheep grazing. Both activities began to decline in the late nineteenth century, so that by the mid-twentieth century, 75% of agricultural land was abandoned and livestock numbers were greatly reduced (García-Ruiz & Lasanta, 1990). The deep crisis

in farming coincided with an intense process of urban industrialization of the low lands and this encouraged rural emigration to the cities (Caravaca & Méndez, 1994). The two study areas as a whole lost 28.6% of its population between 1950 and 1970, falling from 47,108 to 33,618 inhabitants. This depopulation was slightly less acute in places where hydroelectric projects were implemented.

Faced by this decline it was felt that the construction of alpine ski resorts could stop the fall and promote socio-economic growth in the Pyrenees. A legislative act (197/1963 of 28 December) regulating tourist centers and areas was passed in 1963 and with time this enabled the construction of five alpine ski resorts in the region of Aragon and seven (five active and two abandoned, Era Tuca and Llessui in the three districts of the Catalan High Pyrenees. In the whole of Catalonia there are 10 active alpine ski resorts. The Aragon resorts offer 261 runs that cover a total of 277 km. The resorts can handle 110,537 skiers per hour and within their area of influence there are some 38,320 beds – of which 13% are located in the resorts. The resorts of the Catalan High Pyrenees have now 181 runs covering a total of 278km, and with a capacity of 97,033 skiers per hour.

Table 1 points out the heterogeneity of the ski industry in the Spanish Pyrenees. In terms of scale, and this is important if we are interested on its socioeconomic impacts, there are three types of ski resorts: very large, medium, and small. Not all resorts are equal. Their size has had an influence on their development, specific dynamics, and even their actual survival.

In the very large category we only encounter two resorts, Baqueira, in Catalonia, with the capacity of moving 56,403 skiers per hour, and Formigal, in Aragon, handling 34,054 skiers per hour. Baqueira, for instance, in Pyrenean terms is extremely large, and it also presents the only very successful economic venture of this economic sector in the Catalan Pyrenees. In the other extreme end of the scale we have Tavascan managing 1,200 skiers per hour: a very small and fairly isolated resort. In between these two extremes one encounters 7 resorts presenting a wide variety of characteristics ranging from 9,740 (Espot Esquí) or 10,000 (Portainé) skiers per hour, to 24,920 (Cerler) or 21,300 (Candanchú). Scale is important as the social and economic footprint of each resort is largely proportional to its capacity. It is also important to understand its possibilities as an economic venture.

In any case, all resorts have acted as nodes of urban development, job creation, real estate appreciation (and speculation), and infrastructure growth. Even Llessui and Era Tuca, two currently defunct resorts, have had lasting effects on the infrastructure and tourism of the little Àssua valley in the Pallars Sobirà and of Vielha in Val d'Aran.

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Table 1. Basic characteristics of the alpine ski resorts.
Tabla 1. Características básicas de las estaciones de esquí alpino.

	Aragon Pyrenees					*Catalan Pyrenees*				
	Astún	*Candanchú*	*Cerler*	*Formigal*	*Panticosa*	*Baqueira Beret*	*Boí Taüll Resort*	*Espot Esquí*	*Portainé*	*Tavascan*
Municipality	*Jaca*	*Aísa*	*Benasque*	*Sallent*	*Panticosa*	*Naut Aran*	*Vall de Boí*	*Espot*	*Rialp*	*Lladorre*
Foundation year	1976	1965	1971	1965	1970	1964	1990	1967	1986	1991
Km available for skiing	41	59	60	83	34	120	46	49	58	5
Number of runs	48	53	51	71	38	72	49	22	33	5
Number of ski lifts	14	23	29	23	15	33	16	8	9	2
Skiers per hour	16,908	21,300	24,920	34,054	13,355	56,403	19,690	9,740	10,000	1,200
Snow canons	120	134	312	282	100	549	205	104	90	0
Highest point (m)	2,300	2,400	2,630	2,258	2,200	2,510	2,751	2,500	2,440	2,250
Lowest poin (m)	1,700	1,530	1,740	1,740	1,500	1,500	2,020	1,500	1,650	1,750
Drop range	600	870	890	518	700	1,010	731	1,000	790	500

3. Methods

To generate quantitative data on the possible social impacts of the ski resorts on attendant neighboring areas, information was taken from the official statistics (the national statistics agency, the regional governments of Aragon and Catalonia, and the Huesca and Lleida provincial administration) for each of the 63 municipalities in the study area. Specifically included was the number of inhabitants from 1950 to present; the composition of the population according to age, gender, origin, and work activity in 2010; the livestock census between 1972 and 2009 for the Aragon case and in 1982 and 2009 for the Catalan case; the number of farms from 1972 to 2009; a census of the age of buildings in 2001, the last available building census; the number of secondary residences between 1981 and 2001; and the amount of tourist accommodation from 1975 to 2010. This last indicator was calculated by summing the official statistics at municipal level for hotels, apartments, hostels, rural B&Bs, and camping grounds (0.1 beds per individual camping space). To compare tourist sector beds with second residences (for which we have one census every ten years) we should multiply the number by five (as we assume five beds per each second residence unit). Several demographic indices were calculated to determine the population structure at municipal level. These included the ratios of dependency (TD) and gender balance (TF). The following formulas were applied to achieve this:

TD = (population under 15 + population over 64 / population between 15 and 64) x 100.
TF = (total female population / total male population) x 100.

To analyze the changes we have divided, in both study areas, all municipalities in two groups. The two study areas include 63 municipalities. These can be divided into two groups according to their degree of involvement with the ski resorts. Group I includes the municipalities that are physically affected by the ski resorts: nine in Aragon and eight in the Catalan High Pyrenees. Group II includes the municipalities that are unaffected or little affected by ski resorts: 27 and 19 respectively (Table 2). In these pages we compare the above mentioned indicators between the municipalities in Groups I and II. There is a certain level of relativity related to the selection of immediate and secondary influence of the resorts on the surrounding municipalities. Although this was the only operational solution for a wide comparative study, some resorts may be at the edge of a municipality directly affecting the next one. One resort may be in one of those huge Pyrenean municipalities that resulted from the administrative aggregations of the twentieth century, effectively merging several villages under the same local

council (Arqué, García & Mateu, 1979). One resort may be located in a village in one district, but actually be better connected to the next village in another district because of topography or road connectivity. This approach, consequently, has its contextual problems, but has allowed us to compare a wide range of situations, and that was our goal. The second methodological problem has been associated with comparing both areas, Aragon and Catalonia, because of their different ways of collecting or grouping information and territory. In some cases we have had to use data sets with slightly different temporal frameworks.

Table 2. Distribution of municipalities according to degree of involvement with resorts.
Tabla 2. Distribución de los municipios de acuerdo con el nivel de conexión con las estaciones de esquí.

	Aragon Pyrenees	*Catalan Pyrenees*
Group I	Aísa, Benasque, Biescas, Canfranc, Castiello de Jaca, Panticosa, Sahún, Sallent de Gállego and Villanúa	Alt Àneu, Espot, Lladorre, Naut Aran, Rialp, Sort, la Vall de Boí and Vielha e Mijaran
Group II	Ansó, Aragüés, Bielsa, Bisaurri, Bonansa, Borau, Broto, Castejón de Sos, Chía, Fago, Fanlo, Gistaín, Hoz de Jaca, Jasa, Laspaúles, Laspuña, Montanuy, Plan, Puértolas, San Juan de Plan, Seira, Sesué, Tella-Sin, Torla, Valle de Hecho, Villanova and Yésero	Alins, Arres, Baix Pallars, Bausen, es Bòrdes, Bossòst, Canejan, Esterri d'Àneu, Esterri de Cardós, Farrera, la Guingueta d'Àneu, Les, Llavorsí, el Pont de Suert, Soriguera, Tírvia, Vall de Cardós, Vilaller and Vilamòs

4. Results and discussion

As introduced in the methods section, this paper groups and discusses the results around four categories in an attempt to identify the possible influence of ski resort construction on: a) the development of the tourism industry (assessing increase or decrease of accommodation available), b) demography (demographic evolution and population dynamics), c) the permanence, decay or expansion of traditional economic activities in the agro-ranching sector, and d) the construction activities of the area (by looking into building age construction).

A detailed analysis is done for the two study areas and for the above mentioned two groups of municipalities in each area: municipalities with a direct proximity to a ski resort (Group I) versus municipalities unaffected by ski resorts (Group II).

4.1. *Influence of ski resorts in the growth of tourist accommodation*

The ski industry is, inherently, a tourist centered activity that is at the center of a myriad of other associated activities all connected with the service –leisure oriented– economy. We will start our discussion by analysing a key indicator of tourism development: accommodation facilities evolution. In this case the chosen variables of reference is the historical evolution of beds available for visitors and the changes across time of the number of second residences in the four areas of reference (Group I in and Group II in Aragon, and Group I and Group II in Catalonia). Figure 2 offers a composite depiction of the evolution of the two variables in the four areas. It is immediately apparent that all these areas in the last 30 years have experienced a significant tourism development and that they have been integrated into larger leisure networks.

The very same figure, however, reflects an important scalar difference between the tourist offering the two studies areas (especially in reference to the second residences). In addition, although the two areas share similar general growth framework, the development patterns across time are not identical.

Before the studied period, in 1955, the Aragon area had 16 hotels with a total of 638 beds. Supply rose dramatically from 1975 until 2010, increasing from 3,102 to 14,104 beds (Figure 2.). The proportion remains fairly similar across Groups I and II. The former goes from 2,120 to 8,304 beds while the latter goes from 982 to 5,800. Both groups progress at a very similar rate but, evidently, Group I across the whole period always accumulates more than 60% of the beds of the area.

The Catalan side, however, shows different trends. Specific central municipalities have consolidated most of the accommodations of the area, some of them with resorts, some without. It seems to point to a different model from the one emerging in Aragon. The municipality of Naut Aran, for instance, has more beds than the 19 municipalities of Group II combined. The villages less affected by the ski industry have, proportionally, larger camping and rural tourism beds. Some municipalities, not directly sustaining resorts, such as Vall de Cardós, Esterri d'Àneu or Pont de Suert, have attracted accommodations destined to cover the demand generated by neighboring ski resorts not absorbed by small or remote municipalities like Lladorre, Espot and Vall de Boí with ski resorts. In any case, Group I has accumulated most of the growth going from 3,181 beds in 1975 to 10,406 beds in 2010. Group II also presents some growth, but in this case the presence of the municipalities of Vall de Cardós, Esterri d'Àneu o Pont de Suert, distorts the generic trend. Most of the other villages of that group have little or no increases on beds availability.

Both study areas present similar trends for the second residences. Since the eighties the two groups of municipalities present growth, but the increase

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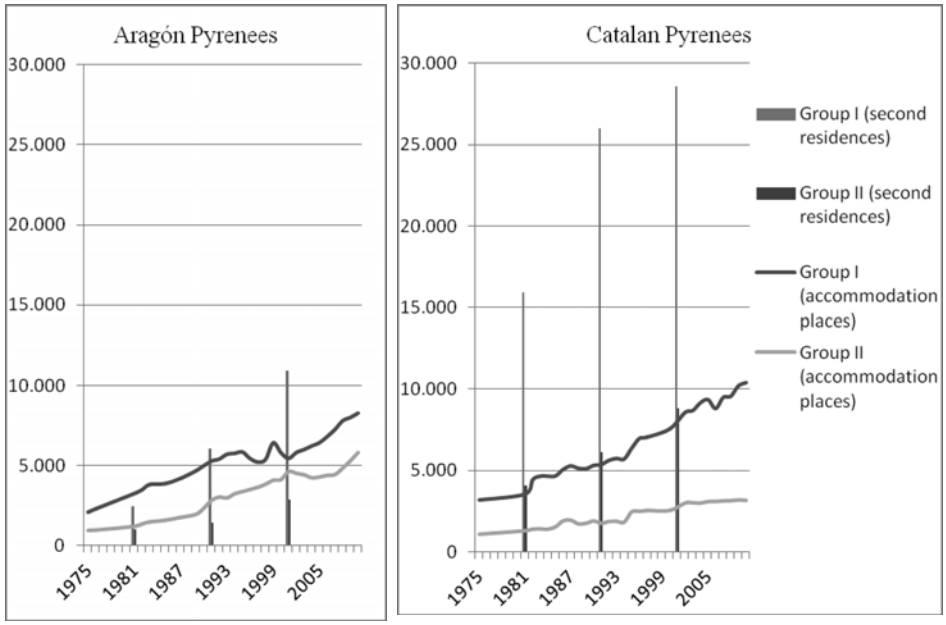

Figure 2. Accomodation places and second residences (1975-2010).
Figura 2. Plazas de alojamiento y segundas residencies (1975-2010).

is much more accelerated in Group I. The Aragon municipalities of the Group I go from 2,469 in 1981, to 6,073 in 1991, and 10,946 in 2001. The Catalan case is even more exacerbated from 15,890 in 1981, to 25,980 in 1991, and 28,610 in 2001. The positive side of these changes includes increased economic activity, construction, and jobs. On the other side, the economy of the area starts to be connected to external seasonal behaviors and, consequently, with high levels of dependence. Some of these villages, bursting with activity during the tourist season, are empty towns off season.

4.2 The effects of ski resorts on the population

A common theme when researchers have analyzed the demographic history of the Pyrenees is its depopulation. This trend, however, is by no means homogenous across its territory. The scale of the analysis has a significant impact on the interpretation of the raw demographic data. Trends for full districts are different from the observable tendencies when, in the same district, small, upper range communities and midsize valley towns are

analyzed separately. For the purpose of this article we must, therefore, follow and analyze three specific demographic trends: a) global processes in both study areas, b) demographic evolution in the Group I and II municipalities, and c) district population tendencies.

a) Since the 1950s in the Aragon Pyrenees and the 1960s in the Catalan, a significant depopulation trend dominates the general demographic evolution. Both areas present important differences. While Aragon has a generic decline across the whole period (25,034 inhabitants in 1950, 16,273 in 1970 and 15,423 in 2010), the Catalan High Pyrenees start to recover population in the 1990s and overcome the initial numbers in 2010 (22,074 inhabitants in 1950 and 22,130 in 2010).

b) The story, however, is significantly different if we change the focus of our analysis from the whole area to the differences between municipalities with more or less resort influence. Figure 3 shows that in Aragon the municipalities most affected by the ski resorts lost population during the early decades, but this was followed by growth starting in 1981 - increasing from 5,141 to 8,308 in 2010. The Group II municipalities, however, recorded their lowest value in 1991 (6,756 inhabitants) and then the population began to stabilize (6,888 inhabitants in 2001). Recent years have seen a slow increase and 7,115 inhabitants were recorded in 2010. Group II, thus, gradually lost demographic specific weight. It now accounts for just 46.1% of the population in the study area, while in 1950 it contained 65.9%.

The Catalan High Pyrenees present a slightly different story. The numbers of the two groups as aggregated categories are somewhat similar to the Aragon data. Group I shows a decrease in the 1970s and 1980s but in the early 1990s they quickly bounce back to reach and, coinciding with the general trend of the area, even overcome pre-1960s numbers (the growth of Sort, the district's capital, keeps the district evolution on the rise during the 1960s even if most villages are losing people). In Group II the decline started in the 1960s is deeper and longer, and it does not stop until the 1990s. A recovery ensues but the numbers are still below 1950s levels.

Individual municipal history matters. Growth is not necessarily connected to the direct presence of ski industry in the municipality. Vielha e Mijaran, Sort, Esterri d'Àneu or Pont de Suert, major demographic municipal contributors, have grown as service centers for large areas (some with ski resorts in their jurisdiction, some without them). Also, communities such as Lladorre, Rialp, Llavorsí, or Pont de Suert were gaining population during the 1960s due to massive hydroelectric construction and they did not lose population until the 1970s.

c) The analysis per district also shows distinct trajectories. In Aragon since the 1950s, while Jacetania, Sobrarbe, and Ribagorza present a similar acute depopulation trend, the Alto Gállego maintain the same population levels

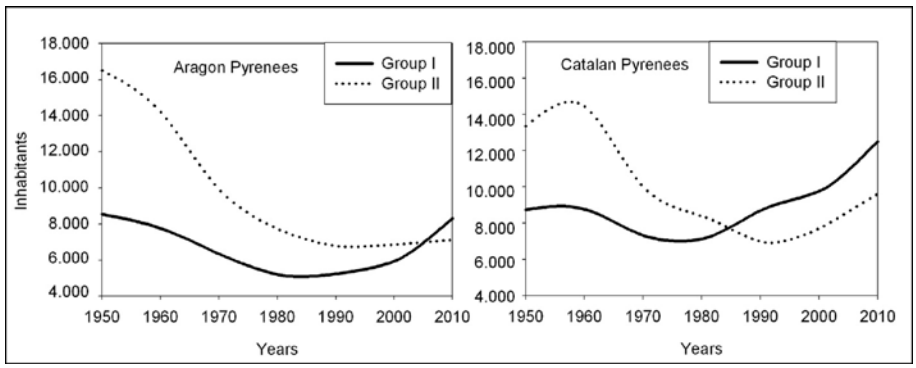

Figure 3. Demographic evolution (1970-2010).
Figura 3. Evolución demográfica (1970-2010).

(probably sustained by the localized growth of Sallent de Gállego and Panticosa each one with a ski resort inside its municipal limits). In Catalonia the Pallars Sobirà and Alta Ribagorça have not recovered from the high levels of depopulation but the Val d'Aran has actually surpassed by far the 1950s demographic values.

Demographically speaking topography and road connectivity seems to explain some of the demographic trends of the Catalan High Pyrenees better than the direct presence of ski resorts. In the 1950s in the Pallars Sobirà district, for instance, 75.6% of the population lived in the upper secondary valleys while 24.4% lived in the main lower valley. In 2001 this relation had shifted to 48.6% and 51.4% respectively.

Figure 4 shows that in Aragon Pyrenees the variable range between 1970 and 2010 is greater in Group I than in Group II, because some municipalities increased their population very considerably (Benasque: 738 inhabitants in 1970 and 2,219 in 2010; Panticosa: 537 and 819, respectively); while other municipalities showed a slight decrease (Sahún: 379 inhabitants in 1970 and 360 in 2010). In Group II, the variance is much smaller, but there are municipalities that increased population and others that lost inhabitants. The most interesting aspect is that the number of inhabitants in Group I increased on average by 30.8% and that most municipalities grew. In contrast, Group II suffered an average loss of 28.9% and just two municipalities avoided falls in population.

The variability in Catalonia is much higher due to the above mentioned heterogeneity of both groups. Group I has relatively large towns. Places like Sort or Vielha have grown (a 21.6% and a 163.1% respectively) because of the ski resorts but also because they are service centers of the districts. Group I

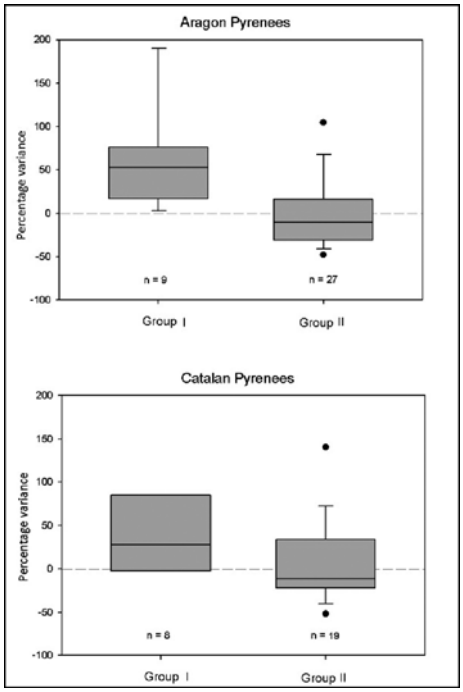

Figure 4. Demographic evolution (1970-2010) in percentage variance. The whiskers indicate 10 and 90 percentiles. The extremes of the box plot indicate 25 and 75 percentiles. The interior line of the box is the median.

Figura 4. Porcentaje de varianza (1970-2010) de la evolución demográfica. Las barras indican los centiles 10 y 90. Los extremos de la caja los centiles 25 y 74. La línea interior de la caja es la mediana.

also has la Vall de Boí, Lladorre, or Espot, smaller villages that have ski resorts but little or no demographic expansion. Group II presents even more variability with large towns and very small villages. Places have grown (Bossòst: 687 inhabitants in 1970, 1,184 in 2010) and places have dwindled in population (Baix Pallars: 622 and 406 respectively).

Despite the differences between the Aragon and Catalonia mainly associated with the different composition of the groups in both areas which translate in higher variability rates in the Catalan case, Figure 4 shows similar generic demographic trends in both areas.

Table 3 shows that in Aragon the population is much older in Group II than in Group I. There are 1,893 elderly people in Group II (26.6% of the total population) while in Group I the total is 1,230 (14.8%). Further analysis reveals that all the municipalities affected by the ski resorts (except Aísa) have

Table 3. Indicators of population structure (2010).
Tabla 3. Indicadores de la estructura de la población (2010).

	Municipalities	*% of population over 64*	*Average age*	*Dependency ratio*	*Sex ratio*	*% of foreigners*
Aragon Pyrenees	Group I	14.8	41.7	37.4	89.2	12.7
	Group II	26.6	48.8	59.1	86.2	5.9
Catalan Pyrenees	Group I	12.4	38.9	35.9	91.8	20.0
	Group II	18.0	43.2	44.1	88.7	17.7

a proportion of older people below 20%, while most of the unaffected municipalities exceed 20% or 30%, and even reaching 40.7% in Chía. Moreover, the average age in Group I is 41.7, while in Group II the average is 48.8. The dependency ratio, people under 15 and over 64, also shows that Group I has a better population balance than Group II with a value of 37.4 compared to 59.1. Both groups had a similar ratio of women (89.2 and 86.2% respectively) –although there was significant variability between municipalities. The number of foreign residents in Group I was 1,055 (12.7% of the population), twice that of Group II (5.9%).

Also in the Catalan case the municipalities of the Group I present a younger age structure than the ones of Group II, a 38.9 age average versus 43.2 (not as extreme as the Aragon Pyrenees). Group II has 1,737 individuals over 64 years old (18% of the total population) while Group I has 1,551 individuals (12.4%). With the only exception of Lladorre (the smallest ski resort), all the municipalities that have a resort in their territory or nearby, have a population over 64 years old (under 20%). In Group II we encounter extreme cases in Bausen with 44.3% and Canejan with 31.1% of the population over 64. The dependence rate is significantly lower in Group I (35.9%) than in Group II (44.1%). Sex ratio (Group I with a 91.8% and Group II with a 88.7%), and foreigner's presence (20% and 17.7% respectively) do not present significant differences. Group II in the Catalan High Pyrenees, however, presents significant analytical difficulties. It is so diverse, that averages can be misleading as the data per municipality present extreme variance.

Figure 5 shows the distribution of the workforce in both groups of municipalities in the two study areas. In Aragon Pyrenees it is immediately noticeable that Group I has more than twice as many individuals in the workforce (3,949 or 47.5% of the total) as Group II (1,905 or 26.8% of the total). The distribution of workers by sector shows a serious imbalance in Group I with 85.8% of workers employed in the service sector and 10.2% in construction (closely linked to tourism with the construction of second

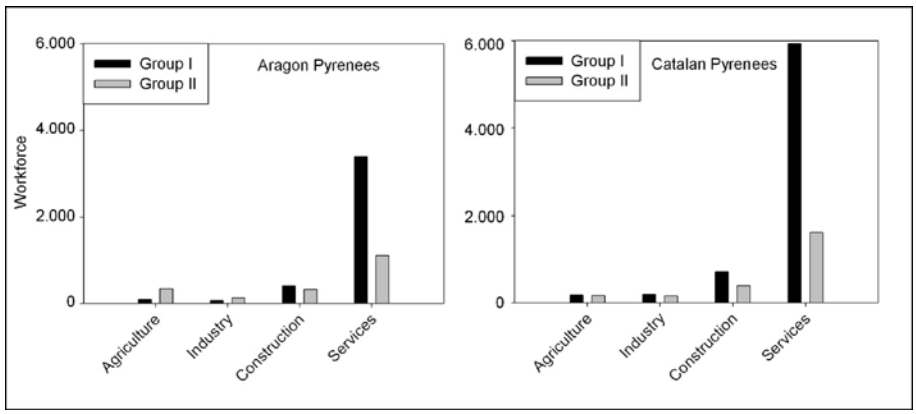

Figure 5. Occupation of workforce (2010).
Figura 5. Distribución de la población activa.

residences, hotels, sports complexes, etc.). Only 2.3% of workers were employed in farming and 1.7% in industry. Group II has a better balance between economic sectors as the farming sector has been maintained (employing 17.8% of workers) and there is some industry (6.6% of workers). Overall, the services sector clearly dominates (58.5%), followed by construction (17.1%).

Even the Catalan case shows a higher presence of active population in the Group I municipalities (6,999 individuals, 55.9% of the total population) than in the Group II (2,331 individuals, 24.3%). Group I, thus, triples Group II's active population. In Group I 84.9% of the active population works in the service industry, 10% in construction, and only 2.4% and 2.6% in agriculture and secondary sector, respectively. The Group II municipalities present slightly smaller differences between sectors: 69.5% in services, 16.8% in construction, 7.2% in agriculture, and 6.5% in industry. The presence of big towns in both groups seems to make this indicator not relevant for the Catalan case.

4.3 The effects of ski resorts on traditional activities

To discuss the potential impact of ski on economic traditional activities, we have collected data on agrarian operations'evolution, and changes in the number of ranching units present in the area across time.

The evolution of the number of farms is presented in Figure 6. Across all groups in both areas, every municipality has lost some or lots of agrarian operations (except four municipalities of Group II of Aragon). This trend coincides with the general historic tendency of rural Spain, with or without the ski industry. Between 1972 and 2009 Aragon Group I goes from 683 operations to 356, and Group II goes from 1,534 to 957. In Catalonia between 1972 and 2009 Group I goes from 959 to 380, while Group II goes from 1,260 to 332.

The median in both areas indicates that the decrease in agrarian operations is always higher in Group II. This reduction of the number of farms, however, cannot be unequivocally connected to ski resorts. It might be relevant but, again, the proximity of urban services, or the lack of road connectivity, among others, might have been important variables too. The fact that some of the current Pyrenean municipalities are the result of several

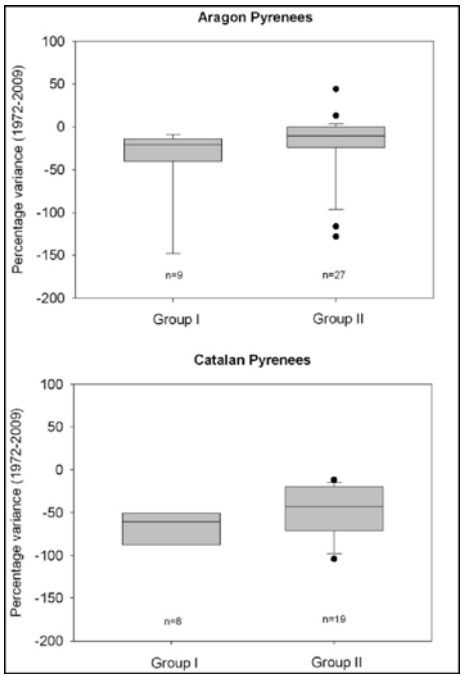

Figure 6. Ranching units (1972-2009) in percentage variance. The whiskers indicate 10 and 90 percentiles. The extremes of the box plot indicate 25 and 75 percentiles. The interior line of the box in the median.

Figura 6. Porcentaje de varianza (1972-2009) del número de explotaciones. Las barras indican los centiles 10 y 90. Los extremos de la caja los centiles 25 y 74. La línea interior de la caja es la mediana.

municipal fusions cannot be ignored. These fusions have created large territorial units that, sometimes, are socially unbalanced administrative units with severely depopulated corners cohabiting with burgeoning service towns inside the borders of the same municipality. This is also especially relevant in the Catalan case where, again, not all urban development directly associated to ski resorts is near the runs, but in relatively distant district centers.

The trend, however, is completely different if we look at livestock numbers (Figure 7). Only the Group I of Aragon loses ranching units, from 9,789 LSU (livestock units) in 1972 to 6,183 in 2009. In the rest of the municipalities although there are less operations, less herds, the numbers of animals go up: Group II Aragon goes from 18,116 LSU in 1972 to 30,459 in 2009. Although for the Catalan Pyrenees we have a shorter well documented dataset, the records indicate an increase of the number of ranching units occurring at the same time that a decrease of farms is taking place. During this period, thus, Group I in Catalonia goes from 7,337 ranching units in 1982 to 20,924 in 2009, and the Catalan Group II goes from 8,329 ranching units to 15,113. In any case, the small size of the plot boxes indicates high levels of internal homogeneity in this ranching unit evolution for all the groups except the Catalan Group I.

In Catalonia the trend differs from Aragon. For the period 1972-2009, Group II of municipalities lose more agrarian operations (73.5%) than Group I (60.4%). This result might be a consequence of the highest levels of depopulation occurring in non-tourist communities. In this case the retention effect of the ski resorts may have helped some operations to survive. Each community responded differently. In some cases we are talking about abandonment and ranching collapse, in others we encounter consolidation of herds (numerous small herds becoming a few big herds) that may even result in an increase on the number of animal heads in a municipality.

In Aragon Group I lost an average of 36.9% of its livestock – falling from 9,789 LSU in 1972 to 6,183 LSU in 2009. In some municipalities the falls were very sharp: for example, in Biescas (2,307 LSU in 1972 and 1,227 in 2009); Panticosa (1,109 LSU and 618); and Sallent (3,331 LSU and 1,038). Group II, by contrast, increased its livestock count by 68.1% from 18,116 LSU in 1972 to 30,459 in 2009. Some municipalities recorded large increases: Bisaurri (1,112 LSU in 1972 and 3,749 in 2009); Chía (250 LSU and 615); Laspaúles (1,494 LSU and 2,021); Montanuy (2,356 LSU and 7,494); Valle de Plan (1,598 LSU and 2,574); Broto (1,048 LSU and 2,254); Hecho (1,952 LSU and 2,695); and Puértolas (409 LSU and 1,194). This seems to point to a shift in ranching strategies to a decrease in number of herds but an increase of their size. Most municipalities in Group I registered falls in the numbers associated with livestock farms; the graphic shows a negative sign. However, the opposite

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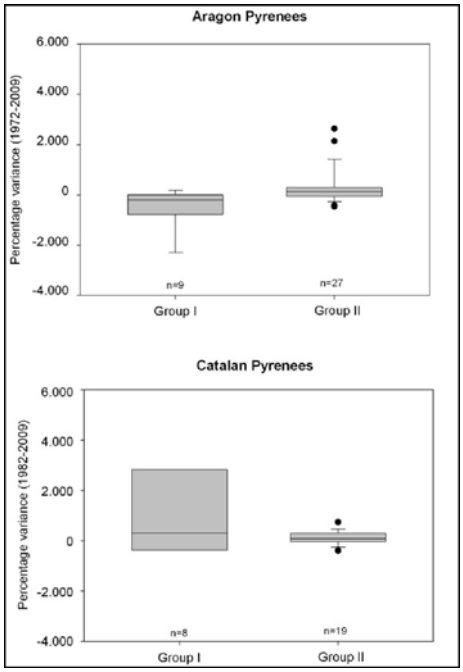

Figure 7. Livestock numbers in percentage variance. The whiskers indicate 10 and 90 percentiles. The extremes of the box plot indicate 25 and 75 percentiles. The interior line of the box in the median.

Figura 7. Porcentaje de varianza del número de explotaciones. Las barras indican los centiles 10 y 90. Los extremos de la caja los centiles 25 y 74. La línea interior de la caja es la mediana.

occurred in Group II and the graphic shows a positive sign as few municipalities suffered declines.

We have already noted that in the Aragon study case, in municipalities with ski resorts only 2.6% of the population works in farming, compared to 19.5% in those areas unaffected by ski resorts. This was studied in detail in the Alto Esera area, where the Cerler resort is located. Laguna and Lasanta (2003) found that in Benasque and Sahún there was a larger transfer of population from farming to services than in the rest of the municipalities in the valley. As a result, in Benasque only 14% of the farms that existed in 1965 survived to 2000, while in Sesué (with hardly any tourism) 46% of farms survived. Similarly, in Benasque 37% of workers in the farming sector in 1965 worked in tourist activities in 2000 while in Sesué only 16% had transferred to tourism.

Here the Catalan story does not parallel the Aragon trend (perhaps due to the different periodization of data in Aragon 1972-2009, and 1982-2009 in Catalonia). Both Group I and II experience in Catalonia significant increases (185.2% in Group I and 81.4% in Group II) which differs from the Aragon case. In both groups there are villages that experience an extraordinary increase of ranching units, villages that remain more or less stable, and villages that lose animals. The data seems to point out to a reduction of herds with an increase of its size (allowed by depopulation and underutilization of pastures, capitalistic competition, and, specially, public subsidies to husbandry connected to animal head counts and not to household integrity). In any case, again, the Catalan side, with its heterogeneous group composition does not seem to offer recognizable developmental patterns that could differentiate group I from II.

4.4. Effects of ski resorts on building construction

In order to understand the effects of the ski industry on the urbanization of the rural areas we assess, as a proxy, the impact of the presence of resorts on building construction by analyzing the year of construction of dwellings of the studied areas in 2001 (Figure 8).

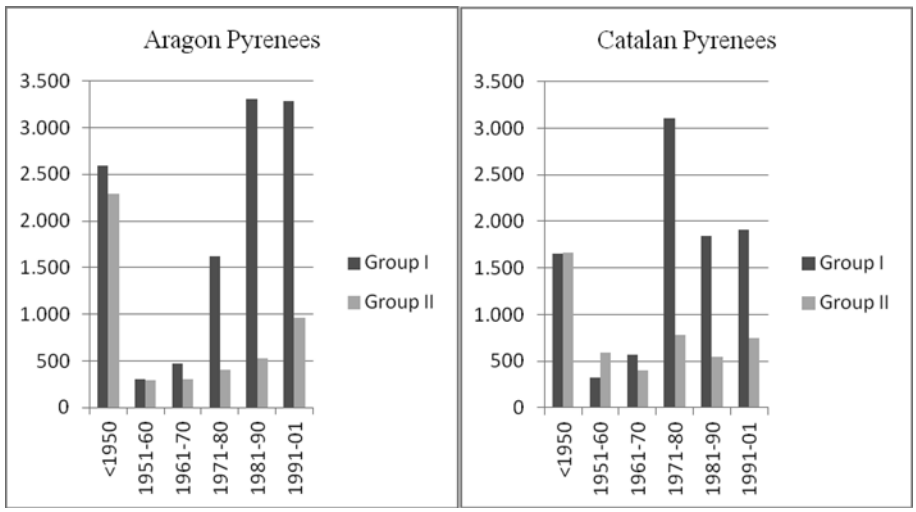

Figure 8. Age of residential dwellings (2001).
Figura 8. Antigüedad de las viviendas familiares.

For the old buildings, constructed before the 1950s, we have a situation of virtual equilibrium between Group I (2,595 in Aragon and 1,653 in Catalonia) and Group II (2,293 and 1,664 respectively). Starting in the 1970s, in both areas in Group I, depending on the decade, triples, quadruples or even quintuples Group II in terms of number of buildings constructed. In the High Pyrenees there is an important sudden increase in the 1970s, while the Aragonian Pyrenees present a progressive increase that reaches maximum values two decades later. The municipalities with ski resorts have reached a total of 8,212 dwellings in Aragon and 6,860 in Catalonia. By contrast, the municipalities that are little or unaffected by ski resorts have grown more moderately and reached a total of 1,898 and 2,080 dwellings respectively.

In any case it is important to point out that in both areas the presence of ski resorts have resulted in increases of real estate value, and, especially, the number of second residences (Overvag & Gunnerud Berg, 2011). In other words, these areas, marked by the Winter ski period and the Summer holiday term, have also high levels of seasonal gentrification, which implies that entire villages or town neighborhoods are empty for most of the year (Lindberg, Anderson & Dellaert, 2001; Perlik, 2011; Pignatti, 1993). The cohabitation of locals, farmers or not, with seasonal or relocated outsiders has not been easy as the expectations of normality do not always coincide (Jamal & Ges, 1999; Perramond, 2010; Weaver & Lawton, 2001).

5. Discussion and conclusions

Since the 1960s, the Spanish Pyrenees has sought to develop by encouraging tourism. The traditional agro-ranching system of land management had entered a deep crisis. The selected strategy gave ski resorts the task of leading development - following the model pursued in the Alps (Barrère, 1981; Godde, Price & Zimmermann, 2000; Messerli, 1987). This transformation occurred concomitantly with a process of urbanization of these peripheral mountain areas.

More than twenty years after the inauguration of the last resorts, it is worthwhile to study the effect they have had on socio-economic development in their areas of influence. Here we have correlated ski resort construction with depopulation or population retention, and with presence or absence of determined economic activities. As we have pointed out during the presentation of the results, these correlations, although significant in some cases need to be understood on the framework of multicausal and complex social processes. In other words, even in the presence of consistent trends we cannot ignore the influence of other factors. In any case this study has found

positive correlation in both study areas with regard to population. There is fundamental difference, however, associated with the localization of this impact: while the changes in the Aragon Pyrenees are localized around the ski resorts, these transformations are concentrated in a few relatively large and centrally located towns in the Catalan Pyrenees. The analytical strategy used here, to divide the mountain municipalities in two groups (in the area of direct influence of a ski resort versus outside of this influence) quickly unveils these differences. While Aragon offers a certain level of internal homogeneity in both groups, Catalonia has two very heterogeneous groups with relatively large towns, and very small villages in both. In other words, while the ski industry seems to have an immediate structuring effect in the first case, there seem to be other issues (administrative centrality, public policies, infrastructures, topography, or local history) in the second that have helped reshape the late twentieth century urbanization of the mountains.

There was no consistency in the correlation between ski resorts and farming between both areas. The presence (or absence) of agrarian operations followed different trends and, consequently, their relation to ski resorts remains complex. Do resorts foster agrarian collapse and shifts towards tourism economies (as the Aragon numbers seems to point out to) or do they foster agrarian survival by providing a diversification of income (via tourism) to the surviving agrarian households (as suggested by the Catalan numbers)? The development of the farming sector shows clear differences between the two groups of municipalities. Both groups have fewer farms and this is in line with the general trend in rural Spain, which since the mid-twentieth century has suffered a marked loss of farms during the transition from a rural to an industrial society (Pérez-Yruela, 1995) but, at least in the Catalan case, higher number of heads per farm (Barrachina, 2011; Estrada, Nadal & Iglesias, 2010; Nadal, Iglesias & Estrada, 2010).

Our study seems to uncover a two model approach to the ski generated urban development in the Pyrenees. The current population increase is a combination of slight natural growth, an increased level of youth retention, return of retirees born in the area, and migration (Buckley, Pickering & Warnken, 2000; Pechlaner & Tschurtschenthaler, 2003). The fact that immigrants tend to be of working age and often accompanied by children explains why the municipalities most affected by tourism now have a more balanced demographic structure: with a lower percentage of elderly, lower dependency ratio, and lower average age. In this aspect, the both Pyrenean cases follow the same trend as other mountainous areas with a large tourist industry.

In any case this demographic recovery is also attached to seasonal economies and consequently it has a high level of dependence (as most tourism dependent localities, coastal or interior).

The change in the working population also reflects the contrast between the municipalities that benefit from the ski resorts and the unaffected. The number of workers in the service sector is very high in the first group (around 85% of the workforce) and the farming sector barely exists (employing just 2.3-2.4%). On the contrary, municipalities that are unaffected by the ski resorts show a more balanced distribution between sectors, and a more active farming sector (employing 17.8% of workers in Aragon and 7.2% in Catalonia). These shifts on the employment structure and composition of the community raise questions about the average salary shifts associated to a collective move from owning your own means of production (cows, sheep and land) to work as a waiter. The contrast in the distribution of the workforce is because new arrivals have come to work in the service sector or construction. Laguna & Lasanta (2003) noted that in Benasque (the town where the Cerler ski resort is located) there were 42 farms in 1965. By 2000, 14% of the owners or their descendants had kept their farms running, 41% worked in tourism-related activities, 21% had moved away, and 24% of the farms had disappeared due to a lack of continuity. Lluelles (1991) and Preau (1984) confirm this trend for Andorra and the French Alps where most of the farming sector has disappeared replaced by tourism.

To conclude, ski resorts have had a socioeconomic impact on the areas where they have been implemented. This impact however has materialized differently in different areas. Any effort to plan rural development via tourism industry in general, or ski resorts in particular, must take first into account the consequences for the competing local economic activities, which is extremely important when a leisure economy is associated with high levels of seasonality (dependence), and the fact that ski resorts become nodes of urbanizing networks that will reshape the territorial structure of the affected area (Butler, 2000). Finally, to re-emphasize, ski resorts have a certain gentrifying effect that must be taken into account as they highly increase real estate value.

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