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SPANISH AGRICULTURAL PRODUCTION AND PRODUCTIVITY 1890-1936

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Abstract

In the first section new estimates for final agricultural output between 1892 and 1936 are presented. These indicate that only from 1909/13 did land and labour productivity start to increase. In the second section estimates for 1929/33 are provided on a provincial basis, and reasons why some of the major local differences occurred are suggested. Finally, the changes in regional productivity between 1909/13 and 1929/33 are shown, shedding light especially on the poor performance of Andalusian agriculture.

Key words

Land and labour productivity, regional agriculture, resource endowments.

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The large size of the agricultural sector, both in terms of its contribution to gross domestic output and its use of resources, makes a knowledge of productivity changes crucial to our understanding of Spain's antebellum economy. If the poor quality of official statistics implies that measuring change in nineteenth century agricultural output will always be controversial, this is not so true from the turn of the century, when abundant and reasonably accurate estimates of the area cultivated, production and product prices are available. In the first section of this paper we present new estimates of the extent of changes in output and labour productivity in Spanish agriculture in the half century prior to the Civil War. Our conclusions suggest that land and labour productivity only really increased significantly from the second decade of the twentieth century. In the second and third sections we present for the first time detailed estimates of provincial and regional output and productivity. These calculations allow us to identify a number of highly distinctive agricultural economies, suggesting that the relative international backwardness of Spanish agriculture recently noted by O'Brien and Prados de la Escosura is complex, and cannot be attributed to any single cause ¹.

1. THE GROWTH IN AGRICULTURAL OUTPUT AND PRODUCTIVITY, 1891-1936².

The introduction of annual reporting of crop area and harvest size for wheat from the 1880s, other cereals, legumes, olives, and vines from 1891, and most other crops from the turn of the century, allows detailed comments on trends in agricultural output and productivity to be made from the late nineteenth century ³. However, for the early years the existence of greater statistical information has not clarified the debate on the movement of agricultural output, as the sources themselves can lead to conflicting interpretations. In particular, the apparent increase in official figures of the area of cultivation and production of wheat from 1891, the year when a new protective cereal tariff became operational, can be explained as a recovery from the "Great Depression", or as an improvement in statistical gathering by the government agencies, or as a combination of both. If certain contemporaries did not have much faith in the official statistics, the depth, length and nature of the "Great Depression" in Spanish agriculture amongst

¹ The causes of agricultural backwardness in Spain are discussed in Simpson, forthcoming.

² Any work of this type is indebted to the pioneering paper of the Grupo de Estudios de Historia Rural (GEHR), presented at the II Congreso de Historia Económica, and published in 1983.

³ For sources, see GEHR, 1983 and 1991, Sanz, 1981, and Simpson, 1989.

Spanish historians remains unsolved ⁴.

Although still leaving much to be desired, official production statistics from the turn of the twentieth century are significantly better, both in quality and in detail, making it much easier to determine the general trends in output ⁵. Based on these GEHR suggest that agricultural output grew by an annual 1.8 per cent between 1900 and 1931 ⁶. This figure however, is not without its own deficiencies. First, it refers to gross output, and no attempt is made by the GHER to calculate output net of recycled items. Second, constant prices have been obtained by applying a general figure of inflation for the economy as a whole, rather than a constant unit price for each individual product and, finally, the contribution of livestock is probably underestimated for 1891, thus exaggerating the rate of growth in the half century prior to the Civil War. The first two problems are relatively easy to correct, although the use of suitable coefficients in estimating recycled items has its own problems (see Appendix 1 for methods followed here). The question of livestock output is now examined.

The best livestock census figures are for the years 1750 (the Crown of Castile only), 1865, 1917, 1929 and 1933 ⁷. Perhaps surprising, a rough estimate suggests that there was very little change in the total numbers between the different censuses, thus implying a significant decline in per capita production of meat, milk and wool ⁸. Other census figures exist for years such as 1799, 1859, 1891, 1905 etc., but these give much less information on how the figures were collected, there is no breakdown by municipality (which might allow more vigorous checking), and they are generally regarded as having been collected by less scientific means than for those years mentioned

⁴ See especially Sanz, 1981, Garrabou and Sanz, 1985, Garrabou (et al) 1988, and Simpson, 1992a.

⁵ GEHR, 1991. However, in his estimates of agricultural productivity in southern and eastern Europe for the League of Nations during the period 1931-5, Moore writes that an "overvaluation of Spanish production appears consistently in the national comparisons", which he suggests may be attributable partly to an underestimation of feed disappearances of crops, and partly to "exaggerated production statistics", Moore, 1945, p.37. A recent study, using different feed disappearances, reduces somewhat the relatively high (male) labour productivity figures given by Moore. See O'Brien and Prados de la Escosura, 1992a, Table 6.

⁶ GEHR, 1983, p.229.

⁷ For general description of the census figures see GEHR, 1978-9 and 1991, Zapata, 1986, and Simpson, 1989.

⁸ Zapata, 1986, p.624 and Simpson, 1989.

above. They also tend to give much lower estimates. Table 1 highlights this problem, and suggests two alternatives. The first column refers to the work of GEHR, and shows a fall in livestock production from the already low figure of 1891 to a new low in 1900; the recovery is then rapid, some 2.6 per cent annually between 1910 and 1931. The second column has been calculated using the same figures as GEHR and with roughly similar methods, although constant prices have been estimated using unit prices of 1909/13 for meat, milk, and wool. These figures indicate a fall of 2.1 per cent annually between 1865 and 1900, and then a recovery of 3.0 per cent between 1900 and 1931. Finally, important changes have been made for the years 1891, 1900 and 1910 in column 3. First, for 1900 and 1910 herd size of cattle, sheep, goats and pigs are taken from the 1917 census, rather than the less reliable ones of 1905 and 1908/12 as used by GEHR⁹. Second, the 1891 figure has been calculated assuming the decline in the value of output between 1865 and this new figure for 1900 was constant. Output therefore now shows a slower decline between 1865-1900 (an annual 0.7 per cent), and consequently a slower recovery after 1900 (1.5 per cent).

TABLE 1

PRODUCTION OF LIVESTOCK PRODUCTS 1865-1929/33.
(Constant prices of 1910, millions of pesetas)

	(1)	(2)	(3)
1865	---	1,156	1,156
1891	736	716	953
1900	589	562	891
1910	883	888	1,090
1921	1,190	---	---
1931	1,311	1,426	1,426

(1) GEHR, 1983, Apendice 6.

(2) and (3) See text and Appendix 1.

What is the evidence to substantiate these new figures? In the important region of Galicia, Carmona and de la Puente have convincingly argued that it is extremely unlikely that there was a decline in cattle numbers

⁹ The 1905 census in particular seems low, and probably reflects the abnormal weather conditions of that period, a factor which was absent in 1900. Coefficients for milking cows have been calculated on the 1865 - 1929/33 census material as noted in the Appendix. Prices are those for 1900 and 1910.

between 1865 and 1891, as suggested in the census figures ¹⁰. Elsewhere in the country, the ploughing up of communal land and rough pasture perhaps did reduce livestock numbers, although a fall greater than 18 per cent as given in column 3 of Table 1 seems inconceivable. For the period 1891/5 - 1897/01, the cultivation statistics suggest that the fall in livestock probably was minimal. Between these two dates, the area devoted to oats, barley and maize increased by 426 thousand hectares, which more than compensated the decline of 679 thousand of poor quality pasture ¹¹. Conversely, if there is an underestimation of the 1891/5 crops area, then the slower growth in the area dedicated to fodder crops and bread grains would imply a reduction in the destruction of natural pasture. Only a significant fall in the production of fodder, the presence of abnormal cattle diseases, or a significant decline in demand for animal products as a result of changes in incomes, could justify a fall in the order of 20 per cent as suggested by the census figures in column 1 during the last "decade" of the century ¹². This does not appear to have been the case, and figures in column 3, which show a fall of 6.5 per cent, will be used for our calculation.

With the new figures for livestock products, an estimate of agricultural growth can be made. The variable chosen to measure these changes is gross agricultural output, net of intermediate products ¹³. The results show that during the first third of the twentieth century a marked increase in output occurred, from 3,308 million pesetas in 1897/01, to 4,741 in 1929/33 (Table 2). This represents an annual increase of 1.13 per cent, with the livestock sector growing appreciably faster than crop production (1.48 per cent against 0.99 per cent). Growth of total output was faster between 1909/13 and 1929/33 (1.29 per cent) than that achieved prior to the First World War (0.87 per cent), and was roughly equally divided between crop and animal products ¹⁴. Perhaps surprisingly, the relative importance of traditional Mediterranean

¹⁰ Carmona and de la Puente, 1988, p.195.

¹¹ These 676 thousand hectares belong to the category prados, dehesas y montes, which include significant areas of forestry. As suggested below, perhaps only a third of this figures can be regarded as pasture.

¹² In reality, fourteen years as the 1891 and 1905 census figures are the ones used. Prices refer to 1893 and 1900. See GEHR, 1983.

¹³ Essentially total output, net of seed corn and fodder. See Appendix 1.E for the methods used.

¹⁴ 1897/01-1909/13 -crop production 0.54%, animal products 1.69, total 0.87%; 1909/13-1929/33 -crops 1.26%, animal products 1.35%, total 1.29%. Calculated from Table 2.

TABLE 2

GROSS AGRICULTURAL OUTPUT IN SPAIN 1891/5 - 1929/33.
net of recycled products.

	in millions of pesetas of 1909/13				% of the total		
	1891/5	1897/01	1909/13	1929/33	1897/01	1909/13	1929/33
Cereals	788	964	1,139	1,303			
Legumes	103	104	107	124			
sub-total	891	1,068	1,246	1,427	32.3%	33.9%	30.1%
Vines	525	435	323	484	13.1%	8.8%	10.2%
Olives	270	270	254	409	8.2%	6.9%	8.6%
Fruit		167	200	250	5.0%	5.4%	5.3%
Vegetables		392	462	610	11.9%	12.6%	12.9%
Raw Materials		85	104	135	2.6%	2.8%	2.8%
sub-total		2,417	2,589	3,315	73.1%	70.4%	69.9%
Livestock products	953	891	1,090	1,426	26.9%	29.6%	30.1%
TOTAL		3,308	3,679	4,741	100.0	100.0	100.0

Source: Appendix 1.E.

crops (cereal legume-fallow rotations, vines and olives), declined only slowly. From a combined total of 53.6 per cent of output in 1897/01, they were still responsible for some 48.9 per cent just over thirty years later. "Other crops", -namely fruit, vegetables and raw materials, saw their combined total remain at roughly a fifth, whilst livestock products increased to just over 30 per cent ¹⁵.

The growth in agricultural output can be achieved in two ways, through an increase in the area cultivated, or by obtaining greater production per unit of land, either through improving crop yields, or by changing the crop mix from lower, to higher valued products. Table 3 suggests that the increase in production was obtained partly through a growth in the area cultivated, accounting for 28.7 per cent of the total. In fact, part of this figure hides an improvement in productivity, as Spain did not have elastic supplies of land of equal quality to that cropped in 1897/01. The rest of the growth is accounted for by changes in crop mix and production methods. To a major extent, Spanish farmers increased output by increasing the area sown (75.9 per cent), which not only involved bringing new land under the plough, but also a reduction in unsown fallow, which fell from 44.5 per cent of the cereal rotation in 1897/01, to 41 per cent in 1929/33 ¹⁶. This greater intensity of cultivation was obtained, partly at least, through the greater use of fertilisers and better farm equipment. Finally, the remaining 24.1 per cent is accounted for by other factors, such as better farming methods in increasing output, or switching to more valuable crops.

The major difficulties in estimating total land productivity is the problem of estimating what area should be included, as it is likely that almost every hectare of Spain's soil had some economic value, even if it only provided a solitary goat with a single meal a year. In concrete, the problem revolves on how to interpret the category prados, dehesas y montes, which reached 21,976 thousand hectares in 1929/33, or 43.5 per cent of Spain's total area. For 1973, when more detailed figures become first available, this category is divided into pastizales (29.5 per cent), monte maderable (29.8 per

¹⁵ If intermediate products are included, the distribution is:

1897/01	traditional crops	60.7%	1929/33	55.6%
	other crops	18.8%		22.4%
	livestock	20.5%		21.9%

Source: Appendix 1.C. Rough pasture and forestry have been excluded.

¹⁶ The accuracy of these figures has to be questioned as in the 1960 the figure was still 41 per cent. Ministerio de Agricultura, Pesca y Alimentación, 1980, p.27.

TABLE 3

CAUSES OF INCREASE IN OUTPUT.

	area cultivated thousands of hectares			annual rates of growth		
	1897/01	1909/13	1929/33	1897/01- 1929/33	1909/33	1929/33
sown	11,724	12,903	15,385	0.85	0.80	0.88
fallow	6,101	6,247	6,591	0.24		
pasture	8,073	7,683	6,591	- 0.64	-0.41	-0.77
total	25,898	26,832	28,567	0.31	0.30	0.31

	changes in gross output millions of pesetas (1910 prices)		
sown	3,764	4,229	5,314
fallow	17	17	18
total	4,672	5,336	6,758

1897/01 - 1929/33:

1. Growth in area cultivated 27.6%
2. Growth in area sown 75.9%
3. Other factors 24.1%

Source: Calculated from Appendix 1.A and 1.C. For pasture, see below.

cent), monte abierto (22.1 per cent) and monte leñoso (18.5 per cent) and here it has been assumed that a similar proportion was dedicated to pastizales in earlier periods, which allows us to calculate the total agricultural area ¹⁷.

Likewise, figures for active population in Spain, as in most countries in this period, cause problems in interpretation which almost certainly introduce errors when attempting to measure labour productivity. The first difficulty is caused by the need to classify each person employed in a single economic activity, when a major feature of a less developed country is the low level of labour specialization. In theory at least, a major decline in labour in agriculture (say a fall from two thirds to one third of the total labour force) might in reality be significantly less if, at the outset, labour was using (say) 45 per cent of its time in other sectors (transportation, rural industry, mines) whilst at the end, the labour supposedly found in other sectors actually worked a significant number of days in agriculture (especially the harvest). The possibility that this could happen does not imply it actually did in Spain during our period, but a reflection on the census material suggests that some unanswered questions exist. According to these, the number of males employed in agriculture grew slowly from 4.0 to 4.7 millions between 1887 and 1910, although in both dates this accounted for 72 per cent of the male labour force. Between 1910 and 1930 the numbers fell in absolute terms by 18 per cent, and by the later date the sector accounted for only 51 per cent of active labour ¹⁸. The question is whether these figures accurately reflect what was happening in the countryside? Two pieces of evidence suggest that the speed of decline is perhaps exaggerated, and that this will distort our labour productivity figures given below.

First, if the share of active population in agriculture remains unchanged over the nineteenth century as is generally believed, we might expect urban growth to be slow ¹⁹. However, Reher notes that whereas in 1787 only 13 per cent of the country's population lived in cities, by 1910 the

¹⁷ Ibid., p.27. Even this underestimates the total area as the montes, or forestry, often included some areas of temporary pasture. However, the most important agricultural land is included, and it provides a better contrast with other countries than simply including the whole national surface, net of obviously non agricultural land, such as urban area, rivers etc.

¹⁸ Calculated from Nicolau, 1989, p.78.

¹⁹ For a constant share of the labour force in nineteenth agriculture, see Pérez Moreda, 1985, pp.56-9. In the absence of census figures, some historians have turned to the use of urbanization to illustrate inter-sectorial changes in labour force composition, most notably Wrigley, 1985 and Persson, 1991.

figure had risen to 24 per cent, with urban population growing two and half times faster than in the countryside between these years ²⁰. Either the occupational structure of cities was changing and including more agricultural labour, or there was in fact a slow decline in the active population in agriculture over this period.

A second possible error is found in the 1930 census, which is considerably more detailed than earlier censuses, giving a total of 129 different occupations and activities. It is precisely this greater detail which gives cause for concern, as sub-group XV, "industrias varias", accounts for over a million male workers, or a seventh of the total. This seems to have been a category which collected unknown or undefinable occupations, some of which almost certainly were agricultural.

There are two further interrelated problems. The first concerns the female labour force, a group which, for example, apparently represented only seven per cent of those employed in the sector in the 1930 Census. Strong regional differences would suggest at first sight that female participation was determined by the size of holding (small), type of agriculture (dairying) and climate (high rainfall). However, it is clear from many sources that women played a vital role in agriculture over most of the country, allowing a significant increase in the labour supply in periods of peak demand, such as the harvest. Second, there is the question of underemployment and surplus labour in the sector, as agricultural workers were more fully occupied in some regions or years than in others. In general, labour inputs per hectare were greatest when family labour was used as opposed to waged labour, and thus if labour productivity is to measure output per hour worked, some adjustment needs to be made to the official statistics ²¹. This has been rejected here because of difficulties in calculation. To name just one measurement problem, if day workers on the large estates in the south were employed less during the year than family labour elsewhere, the farms in the south were also much more prone to significant influxes of harvest labour, which are also unrecorded in the statistics. Therefore convention has been followed here, and only male employment figures have been used.

²⁰ 1.04 per cent compared with 0.42 per cent per year in the countryside - calculated from Reher, 1989, p.196. Cities taken as the provincial capitals together with urban centres of more than 20,000 inhabitants.

²¹ For an attempt to measure "labour equivalents" for the United Kingdom and Italy, see O'Brien and Toniolo, 1991.

The results shown in Table 4 illustrate once again the difficulties in interpreting Spanish agricultural growth prior to the First World War. The small decline in both land and labour productivity between 1891/5 and 1897/01 would be even larger if, as suggested above, the published figures of the early 1890s are underestimated. The cause of this decline can be attributed to the growing area of unproductive vines on account of disease (phylloxera), and a small decline in livestock production (Appendix 1.A and 1.E). Some, although not all of this decline, is recovered between 1897/01 and 1909/13. The overall picture of the period 1891/5 and 1909/13 therefore is stagnation in both land and labour productivity ²². Between 1909/13 and 1929/33 there is a growth in both land and labour productivity, with the latter increasing almost twice as fast as the former ²³. However, once again caution has to be used in the timing of this growth, as exactly half is caused by the fall in the number of agricultural labourers between 1910 and 1930. If the fall in the agricultural labour force was more gentle than actually occurred, say at the rate of urbanisation, then the increase in labour productivity would have started slightly earlier, and the fall between 1891/5 and 1897/01 is negligible ²⁴.

2. REGIONAL OUTPUT AND PRODUCTIVITY.

The difficulties in reconstructing regional or provincial series are even greater than those at the national level ²⁵. Yet the fact that sufficient statistical information exists for the early twentieth century for

²² This is in agreement with GEHR, although the methods to arrive at the figures are very different (1983, cuadro 15). They estimate an annual growth in production (which includes intermediate products) of 0.2%, of changes in area cultivated 0.1%, and agricultural labour force 0.8%; here output (net of intermediate products) is 0.6%, area cultivated 0.6%, and labour 0.8%. Gallego (1986, 1041-2) suggests a figure for the increase in agricultural output, at constant prices of 1910, of 28% between 1891/5 and 1910, and Prados de la Escosura (1988, 127-8) 24% between 1886/95 and 1903/12. In these cases, Appendix 1.C shows a growth of 9.5% between 1891/5 and 1909/13.

²³ Both figures are slightly below those of GEHR.

²⁴ Taking labour in productivity in 1897/01 as 100, the respective index figures are 102 for 1891/95, 112 for 1909/13 and 155 1929/33. The size of the agricultural labour force is taken as having changed between 1887 and 1930 at the same rate as the growth in urbanisation, measured as towns of 10,000 inhabitants or more. Calculated from Luna, G. 1988.

²⁵ For example, in his study of the 1931-5 period of European economies, Moore found that production per capita for counties in England and Wales indicated "a higher position for Wales and southwest England than for the east and southeast. Careful checking of published statistics and experiments with the national price ratios revealed no explanation for this somewhat surprising result" 1945, p.39.

TABLE 4.

GROWTH IN PRODUCTIVITY

	labour productivity			land productivity			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1891/5	3,299*	4,033	818	109	23,934*	138	109
1897/01	3,308	4,392	753	100	25,898	127	100
1909/13	3,679	4,680	786	104	26,832	137	108
1929/33	4,741	3,827	1,239	165	28,567	166	131

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1. gross output at 1910 prices, millions of pesetas
2. no of male agricultural workers (000s) in the 1887, 1900, 1910 and 1930 censuses.
3. output per male worker, pesetas
4. index of labour productivity, 1897/01 = 100
5. agricultural land, thousands of hectares
6. output per hectare, pesetas
7. index of land productivity, 1897/01 = 100

* assumes vegetables, fruit and raw materials represented 20% of output, as suggested for other years in Table 2, and area of these crops 7.5% of all cropped land, as in 1897/01.

Sources: Active labour, Table 2 and Nicolau, 1989. Agricultural land, see text.

Spain, and that national figures are in reality only the total of individual provincial estimates, suggests that a more detailed study is both feasible and necessary. In what follows we present the first detailed regional breakdown of output net of recycled items (seed corn, feed), from which we calculate land and labour output for Spain on the eve of the Civil War. Here we consider only the results, leaving for Appendix 2 details by province, the coefficients for conversions and sources used.

Given the geographical diversity of many provinces, a division of Spain into distinct agricultural regions is inevitably controversial ²⁶. Here we divide the country into four areas: the North (Galicia, Asturias, Santander and the two maritime provinces of the Basque Country- Guipúzcoa and Vizcaya); the Mediterranean coastal areas (Cataluña minus Lleida, the Balears, the País Valenciano and Murcia); Andalucía (the eight provinces), and the rest which we call the Interior (see Map in Appendix 2).

TABLE 5.

REGIONAL OUTPUT AND PRODUCTIVITY IN SPANISH AGRICULTURE, 1929/33.

	% of agricultural area	% of national output	output per hectare ptas	output per male worker ptas
North	7.3	18.5	809	2750
Interior	62.6	42.1	216	2326
Andalucía	19.1	17.1	288	1630
Mediterranean	11.0	22.3	650	2688

Spain	100.0	100.0	327*	2315*

* includes the Canary Islands

North: Galicia, Asturias, Santander, Guipúzcoa y Vizcaya.

Mediterranean: Alicante, Barcelona, Baleares, Castellón, Gerona, Murcia, Tarragona, and Valencia.

Andalucía: Almería, Cádiz, Córdoba, Granada, Huelva, Jaén, Málaga and Sevilla.

Interior: the rest.

Source: See Appendix 2.

The Mediterranean has been singled out as the most dynamic of Spain's agricultural regions, most notably by Vilar, who emphasized the major contribution of Catalan agriculture to the industrialization of the region

²⁶ The province is the smallest statistical unit that can be reconstructed, except for 1917 and 1922, when a limited amount of data is available by partido judicial.

during the second half of the eighteenth century ²⁷. More recently, the diversification and relatively heavy capital investment in agriculture and related industries has been noted in Valencia from the late nineteenth century ²⁸. By contrast, institutional or climatic factors are usually cited as restricting opportunities in the rest of the country. Table 5 does not necessarily refute these affirmations, as what is of importance for economic development is the question of value added in the sector, level of exports, and forward and backward linkages with the rest of the economy. However, Table 5 does suggest that if agriculture was more dynamic in the Mediterranean than elsewhere, its influence on the national economy would be limited because of its relatively small size. At the beginning of the Second Republic the Mediterranean contributed little more than 20 per cent of national output, not so very different to regions usually considered as "backward", such as Andalucía or the North ²⁹. Table 5 shows that between them, the Interior and Andalucía accounted for four fifths of agricultural land, but output per hectare was only a third, and labour productivity three quarters that of the North and the Mediterranean in 1929/33. We shall now proceed to consider the causes of regional differences in both land and labour output in more detail.

2a. OUTPUT PER HECTARE. If land quality was highly varied in Spain, the intensity of rotations and potential crop mix by 1936 was determined essentially by the presence or not of summer droughts. Table 6 shows that output in the Interior and Andalucía was achieved mainly from cereals, legumes, olives and vines, crops typically found in areas of low and irregular rainfall. Any comparative advantage that these regions enjoyed in the production of these crops was not on account of yields, which were little above the national average and, in the case of cereals, required extensive rotations.

²⁷ Vilar, 1962.

²⁸ Garrabou, 1985, Palafox, 1985, Piqueras, 1985 and Nadal, 1990, pp.296-314.

²⁹ Using political instead of agricultural regions gives us the following results. For Cataluña (Barcelona, Gerona, Lleida and Tarragona) produced 8.7 per cent of net output, labour productivity was 2,439 ptas per male worker, and output per hectare was 605 pesetas. The País Valenciano (Alicante, Castellón and Valencia) produced 10.9 per cent, labour productivity was 2,987 ptas., and land output 905.

TABLE 6.

COMPOSITION OF REGIONAL AGRICULTURE, 1929/33.

	cereals	vines & olives	other crops	livestock	hects/ male worker
North	16.8	2.6	26.7	53.9	3.4
Interior	41.0	13.2	23.7	22.2	10.8
Andalucía	28.4	27.5	23.6	20.5	5.7
Mediterranean	15.5	17.3	48.5	18.7	4.1

Spain*	28.0	14.3	31.0	26.7	7.1

* The Canary Islands are included in total.

Source: Appendix 2.

By contrast, output per hectare was much higher in the North and Mediterranean, which can be explained by the more favourable conditions for intensive livestock husbandry (North) and intensive crops, especially fruit, nuts, vegetables (Mediterranean - "other crops", in Table 6). Intensive livestock husbandry was difficult outside the North because of high pasture and fodder costs, caused by summer droughts. The Mediterranean benefitted from irrigation which permitted specialist fruit farming and market gardening. These two regions, which in 1929/33 between them had only 18 per cent of the nation's agricultural land, produced 55 per cent of the national output of fruit, nuts and vegetables ³⁰.

A second factor was farm size, with contemporaries frequently noting the high output per hectare on small family run enterprises in contrast to the large estates which used wage labour. The limited area of good land (whether irrigated in the Mediterranean, or arable in the North), together with population growth led to high rents, leaving farmers little alternative but to cultivate intensively their small plots. High rental obligations reduced farm profits, affecting investment and personal consumption. However, Table 6 suggests that intensive cultivation was also a means of reducing risk. The complexity of rotations in the North and on the irrigated lands in the Mediterranean allowed farmers to benefit both from a wider variety of products, and also higher and more stable yields. Furthermore, in the coastal areas where external demand had allowed specialization in viticulture from the seventeenth century, traditional technologies had benefited smaller units of production, rather than penalize them.

³⁰ The Canary Islands were responsible for another 7 per cent, leaving only 38 per cent for the Interior and Andalucía.

The impact of economies of scale are more difficult to assess in the Interior and Andalucía. In general agricultural production in these two regions was much more similar than between the North and Mediterranean. However, whilst Andalucía was a region of large estates, in the Interior small holdings were common ³¹. Technical change in dry farming appears to have made only a minimal contribution to increasing yields prior to the Civil War, and little difference in production methods existed between the small and large farms. Where technology did lead to yield improvements, for example with the introduction of more specialised breeds of cattle, phylloxera resistant vines, or improved rice and orange strains, the benefits were often reaped by small farmers, but usually in the North and Mediterranean ³².

2b. LABOUR PRODUCTIVITY. If the difference in labour productivity between regions was less pronounced than output per hectare, then it is also much harder to explain. Whilst the North is usually regarded as one of Europe's more "backward" regions, recent studies have suggested that the Mediterranean was a "leader" ³³. The results in Table 5 need more detailed comments.

First, the relatively high figure for the North can partly be explained because of the distortions caused by including only male labor, and assuming that these worked identical hours as in other regions. They clearly did not. The North was undoubtedly the region where female labour played the biggest role in farming, substituting for long periods males who had migrated, or even emigrated, in search of cash incomes. If we assume that the female labor force was equivalent to two thirds of the male in the North, and to a third elsewhere, then labor productivity in the North would fall to 82 per cent of that of the Mediterranean, 95 per cent of the Interior, but still a third greater than in Andalucía. However, this line of reasoning is dangerous, not just because of the nature of our assumptions, but because it fails to solve one very important problem, namely that of living standards. Labour productivity cannot be taken as a direct indicator of per capita income because it does not include the farmer's operating costs, taxes, or rental obligations. It would appear that Northern farmers provided most inputs themselves, were unlikely to have paid significantly more taxes than

³¹ The regions of La Mancha and Extremadura in the Interior are exceptions.

³² Often, however, it would be the larger farmers in the North and Mediterranean who were responsible for the initial changes. See Calatayud, 1986, Garrabou and Pujol, 1988, and Puente Fernández, 1992.

³³ In particular Garrabou, 1985.

elsewhere, and were increasingly becoming full owners of their land ³⁴. Perhaps even more important, farmers in the North appear to have benefitted from both high labour productivity in agriculture and cash incomes earned from seasonal migration (not to mention emigrants remittances). Instead of being one of the country's poorest regions, the North might thus appear to be one of the richest. Contemporary observations make this argument unconvincing, so we have to look elsewhere.

One possibility to dispense with immediately is that the coefficients used, or that using national prices as opposed to provincial ones in the calculations, have produced some major biases. Following the method used by GEHR (i.e. total output and not final output), does not change significantly the relative position of the North ³⁵. Likewise, earlier estimates for final output using provincial prices, as opposed to national ones here, also failed to change appreciably the high labour productivity of the North ³⁶. The answer to the problem would seem to lie with prices. The North was a region of small farms and poor communications, both locally and with the rest of the country. If labour was integrated into national and international labour markets from an early date, this was not so with product markets. As late as the mid 1960s, farmers still produced a third of net output for home consumption ³⁷. A significant part of output was therefore not only not marketed, but not traded at all, a fact which is obviously ignored in the official statistics, where a market price is given to all production whether it is sold or not. Low levels of market integration for agricultural produce would severely restrict economic growth, as surplus agricultural production

³⁴ However the small highly divided nature of holdings, together with the region's lack of alternative employment opportunities, probably pushed land prices above those of elsewhere. Information is not available to measure how important this was to farm profitability

³⁵ Figures for crops in 1931, together with livestock estimates used here, suggest labour productivity in the North was a third above the national average. This, as we would expect, is even greater than shown in Table 5 because of the double accounting involved.

³⁶ Labour productivity was a quarter above the national average. Simpson, 1992a, cuadro 4.3. Note however that an error exists in this Table, namely the legend has been inadvertently switch with that of the facing Table (cuadro 4.4).

³⁷ If recycled items are included, farm house consumption was a fifth. Only approximately two-fifths of total output was sold to non-farm consumers. INE, 1964, cited in Leal, et.al., 1975, p.100.

could not easily be converted into an easy form of stored wealth³⁸. Market orientated livestock production might have overcome this limitation, and also was compatible with the region's natural endowments, but the small scale of most farms made the risks of specialization considerable, and most farmers had neither the necessary finance, or access to capital markets.

The difficulties in selling farm produce in the North can be illustrated by remarks concerning local diets in Guipúzcoa at the end of the nineteenth century. This was a province which in 1909/13 had by far the highest labour productivity in Spain, and had some 45 per cent of its active labour force employed in the sector³⁹:

The guipuzcoan farmer, as frugal as any, feeds himself on chestnuts, beans, a type of cake made from maize called tálua, meat (very rarely) and in particular, milk from his cows

If the farm was near a town some milk might be sold off-farm, but hardly any butter was produced and the little that was, was consumed once more by the farmer⁴⁰.

Just as it would be wrong to forget that in some areas of the North efficient markets for agricultural commodities were operating by the 1936-9 Civil War, so it would be equally wrong to assume that all farmers in the Mediterranean were totally market orientated. However, a major difference between the regions was that of opportunities: in the coastal Mediterranean a rapidly growing urban population and dynamic external markets encouraged high labour and capital inputs to produce specialised agricultural products, whilst in the North there was, a "Boserupian concentration on basic food crops in response to localized population pressures"⁴¹. The relatively small share of national output which we have estimated for the Mediterranean in 1929/33 hides the fact that a much higher share enter commercial circuits, leading to

³⁸ Mokyr (1985) makes this point for Ireland as one explanation of how a comparatively well fed population could suffer a loss of a million people in the Great Hunger of 1845-50.

³⁹ Dirección General de Agricultura, Industria y Comercio, Madrid, 1892, 1, p.448. See Appendix 2 for labour productivity.

⁴⁰ *Ibid.*, p.448.

⁴¹ The quote is from Grantham, 1989, p.50, who makes a similar distinction for northern France to explain regional differences in agricultural income per hectare. See also Parker, 1982, pp.1-24.

a significantly greater value in transport and food processing industries ⁴².

In the case of Andalucía, low labour output can be explained by a combination of three factors: low output per hectare, low land labour ratios, and the lack of mechanisation. Large units of production, coupled with low crop yields need not have led to low labour productivity if they had been associated with mechanisation. However, as Table 6 shows, the number of hectares per male worker per hectare in Andalucía was not significantly greater than those found in the Mediterranean, even though these figures include uncultivated land found within crop rotations. In total contrast to the North, and especially Galicia, it would seem that whereas farmers in Andalucía were integrated into commodity markets at a relatively early date, this was not the case with labour ⁴³. Despite low wages and a short working year, the region was the only one which saw a growth in the number of farm workers during the first third of the twentieth century ⁴⁴. If few would doubt the profitability of large farms in southern Spain during this period, the slowness to mechanise and for labour to leave the countryside had important implications for the overall efficiency of the economy.

The final region, the Interior contained three fifths of the nation's agricultural land and two fifths of farm workers on the eve of the Civil War. Output per hectare was two thirds and labour productivity similar to the national average. Although the Interior encompasses a region with great contrasts, an underlying characteristic was the specialization on low yield, cereal-legume rotations. In 1929/33 some 41 per cent of output was from cereal and legumes, with only 22 per cent of output derived from livestock products, and 24 per cent from fruit, vegetables and industrial products, products which had contributed to the high output per hectare in the North and Mediterranean respectively. It was the specialization on extensive cereals, together with extensive viticulture in La Mancha and ranching in Extremadura, which limited labour productivity because, although each worker enjoyed more land than those in the North, two and half times more than those in the Mediterranean, and twice as much as in Andalucía, yields were significantly below those of the first two regions. Despite a loss of some 17 per cent of

⁴² Nadal, 1990, pp.296-314, Martínez Carrión, 1989, pp.619-649, Palafox, 1985, 319-343, Pérez Picazo, 1990, pp.315-341, and Simpson, 1992a, pp.131-137.

⁴³ For the market orientation of agriculture in Andalucía before our period, see Bernal, 1988 and Herr, 1989, chapter 16.

⁴⁴ Bernal, 1985, p.246 and Simpson, 1992b.

its labour force between 1900 and 1930, this would not be enough to close the gap with either the North or the Mediterranean.

3. LONG TERM CHANGES IN REGIONAL PRODUCTIVITY.

In the first part of this article we saw that productivity growth appears to have only started from the eve of the First World War. Sufficient information exists to calculate final agriculture output by province for the period 1909/13, allowing a comparison with 1929/33. Although it has been thought necessary to change slightly some of the methods of calculation, the results are very similar to those in section two (Table 7) ⁴⁵.

A comparison of changes between the two dates allows a more dynamic vision for our commentaries of regional differences. First, Andalucía suffered not just from low output per hectare and low labour productivity in 1929/33, but in both areas it was falling behind the other three regions. In particular, labour productivity grew by only a quarter of that which was achieved in the North and Mediterranean. As we have mentioned, the rural exodus was much less marked in Andalucía than in the other three regions. If Andalucía had been as successful as elsewhere in reducing labour, and if agricultural output had not been affected by this out-migration, then labour productivity would have grown by 59 per cent, and not by 25 per cent between 1909/13 and 1929/33 as shown in Table 7 (at 1909/13 prices). A significant cause of the growing social agitation in Andalucía during this period was that whilst the region was the slowest to release labour, it was also that which had the slowest growth in total output.

The Interior was much more successful in reducing its labour force, although there were considerable regional differences in performance. Output increased, caused mainly by favourable cereal prices as a result of government policies, and the greater use of fertilisers and improved ploughs, which led to the extension of cultivation on previously marginal land. However, as the agricultural press of the 1920s would suggest, neither the greater quantity of land per worker, nor the increase in labour productivity would ease the lot of many of the smaller farmers. The fundamental regional problems, namely product mix, excess labour, and farm size remained. If in 1909/13 some 53.9 per cent of total output was from extensive crops (cereals, legumes and

⁴⁵ Differences are noted in Appendix 2. Estimates by "province" show a slightly slower rate of growth. Thus whilst labour output grew by 65 per cent using "national" figures, the figure is 59 per cent for "provincial" figures; land output shows a growth of 21 and 17 per cent respectively. As Table 7 indicates, the use of 1909/13 or 1929/33 prices to measure changes makes only small differences.

TABLE 7.

REGIONAL PRODUCTIVITY GROWTH 1909/13 - 1929/33.

	1909/13 pesetas per hectare	1929/33 pesetas per hectare	% change	1909/13 pesetas per male worker	1929/33 pesetas per male worker	% change
North	285	461	61.8	774	1565	102.2
Mediterranean	290	348	20.0	747	1439	92.6
Interior	112	121	8.0	806	1298	61.0
Andalucía	149	169	13.4	764	955	25.0
Spain*	155	182	17.4	778	1286	65.3

using 1909/13 prices

	1909/13 pesetas per hectare	1929/33 pesetas per hectare	% change	1909/13 pesetas per male worker	1929/33 pesetas per male worker	% change
North	531	809	52.4	1440	2750	91.0
Mediterranean	521	650	24.8	1340	2688	100.6
Interior	201	216	7.5	1446	2326	60.9
Andalucía	257	288	12.1	1314	1630	24.0
Spain*	280	327	16.8	1400	2315	65.4

using 1929/33 prices

* The Canary Islands are included in total.
Source: Appendix 2.

	% change in area cultivated	% change in labour supply	% change in total output
North	- 7.9	-26.4	+48.9
Mediterranean	+16.1	-27.8	+39.1
Interior	+19.5	-20.0	+28.8
Andalucía	+ 7.7	- 2.6	+21.8
Spain*	+13.8	-19.6	+32.9

* The Canary Islands are included in total; output at 1909/13 prices.
See Appendix 2.

vines), the figures in 1929/33 had fallen to only 51.6 per cent ⁴⁶. The share of fruit, vegetables and industrial products grew marginally, increasing from 17.2 to 18.9 per cent. Given the technical limitations of increasing dry farming yields, increased labour output could only come from the mechanisation of labour, which in turn required both out-migration and land consolidation.

In the case of the Mediterranean, output grew by some 39 per cent whilst labour inputs fell by 28 per cent between the two dates. Extensive crops (cereals, legumes and vines ⁴⁷) fell from 34.2 to 27.1 per cent, but intensive crops (namely rice, fruit, vegetables and raw materials) stagnated at 45.8 to 45.1 per cent. This was still considerably above any other region, and was the result of the success in widening the number of export products, as well as growing urban demand for fresh vegetables and fruit. However the major change was in livestock, which increased from 14.6 to 21.8 per cent of total output. Although the region was still only responsible for 15 per cent of national production in 1929/33, output had more than doubled in the two decades in response to growing urbanisation in the region ⁴⁸.

The case of the North suggests significant progress over the period. Not only did the region shed about a quarter of its labour force, it also increased output by about half, leading to a doubling of labour productivity. By the Civil War significant changes were occurring in those areas where farmers were able to specialize, either as the result of local industrial growth (the Basque Country and Asturias), or as a provider of meat for the country's capital, Madrid (Asturias and Galicia). In Galicia however, the further fragmentation of the property at the end of the nineteenth and beginning of the twentieth centuries, together with the region's poor communications, insured that regional self-sufficiency remained strong. Thus whereas increases in labour productivity were significant in both Galicia and the other four northern provinces (91 and 129 per cent increase respectively), they were achieved in different ways. In Galicia the rural exodus was a comparatively modest 16 per cent, but net revenue per hectare grew by 82 per

⁴⁶ We include wines as most were produced in La Mancha using extensive production techniques. Simpson 1992a. By 1929/33 total net output from viticulture from Alava and Logroño was only 5.5 per cent of the Interior's total.

⁴⁷ Rice has been excluded here from "extensive crops".

⁴⁸ Output grew by 107 per cent in the Mediterranean between 1909/13 and 1929/33, with growth fastest in Valencia (254 per cent), Murcia (209 per cent), Tarragona (147 per cent), Alicante (120 per cent) and Barcelona (104 per cent). For local studies see especially Martínez Carrión, 1991.

cent; elsewhere two fifths of the labour force left agriculture and output per hectare grew by "only" 37 per cent. As late as 1930, Galicia still had just 11 per cent of its population in towns of 10,000 inhabitants or more, compared to 32 per cent in the rest of the North, or 38 per cent in all Spain.

CONCLUSION.

In this paper we have argued that labour productivity grew slowly - an annual 1.10 per cent over the period 1891/5 - 1929/33. However this hides two very different periods: between 1891/5 and 1909/13 labour productivity actually declines by -0.22 per cent a year, whilst it accelerates to an annual 2.30 per cent over the next twenty years. This was to be a characteristic of Spanish agriculture over the past century: periods of stagnant or falling labour productivity (1891/5-1909/13, mid 1930s to mid 1950s) followed by periods of rapid growth in labour productivity (1911-1931, from mid 1950s).

A second conclusion is that Spanish agricultural historians have been correct in emphasizing the regional nature of the sector. Climate, crops, farming practices, land distribution, and market opportunities varied significantly within the country. It is argued that three factors explain the different regional performances: the predominance of low value, extensive cereal-legume rotations using excessive quantities of labour; the relatively small areas of high value crops such as fruit trees, sugar beet, market gardening, which maximized land output, and finally the small scale of intensive dairy and meat production. The mayor part of agricultural resources, some 81 per cent of agricultural land and 65 per cent of labour in 1929/33, were found in the Interior and Andalucía. Whilst the Interior lost 20 per cent of its agricultural labour force between 1910 and 1930, the fall in Andalucía was less than 3 per cent and this, together with the region's traditionally low levels of labour productivity, would contribute to the major social problems during the period. In both regions, resource endowments made it difficult to introduce more intensive production systems, and the abundance of labour and, in the case of the Interior also heavily divided properties, reduced the profitability of mechanization. If resource endowments are not enough in themselves to explain fully the slow productivity growth of the sector, they were certainly a constraining factor.

APPENDIX 1.A.

AREA OF CULTIVATION
in thousands of hectares

	1891-5	1897-01	1909-13	1929-33
<u>A.1 Cereals and legumes</u>				
wheat	3,220	3,733	3,864	4,486
barley	1,045	1,376	1,420	1,874
oats	416	374	516	776
rye	680	753	804	612
maize	328	465	459	432
rice	32	34	38	48
others	53	80	77	86
sub-total	5,774	6,815	7,178	8,314
chick-peas	145	167	180	232
habas	158	211	183	207
judias	219	236	265	213
lentils	16	15	17	25
carob bean	69	87	152	205
others	78	77	129	271
sub-total	685	793	926	1,153
unsown fallow	5,292	6,101	6,247	6,591
sub-total	11,751	13,709	14,351	16,058
<u>A.2 Vines</u>	1,460	1,429	1,274	1,531
<u>A.3 Olives</u>	1,123	1,197	1,427	1,952
<u>A.4 Fruit trees</u>				
oranges		42	48	73
almond		41	104	138
carob		98	154	186
banana			3	4
chestnut			60	26
others		126	139	61
sub-total		307	508	488
<u>A.5 Vegetables</u>				
potatoes		243	271	406
onions		na	na	27
others		118	116	124
sub-total		361	387	557
<u>A.6 Raw Materials and forage</u>				
sugar beet		21	33	84
ground nuts	6	6	8	8
esparto grass		500	584	579
turnips		96	111	117
others		61	83	235
sub-total		684	819	1,023
<u>A.7 Artificial pastures</u>	138	138	383	357
<u>A.8 Rough pasture</u>	8,274	8,073	7,683	6,601
TOTAL	23,934	25,898	26,832	28,567

APPENDIX 1.B.

GROSS OUTPUT AT CURRENT PRICES.

in millions of pesetas

	1891-5	1897-01	1909-13	1929-33
<u>A.1 Cereals and legumes</u>				
wheat	762	997	1,117	2,193
barley	244	295	391	815
oats	65	60	92	220
rye	110	127	190	275
maize	117	137	161	304
rice	60	64	56	101
others	17	17	15	25
sub-total	1,375	1,697	2,022	3,933
chick-peas	43	49	58	109
habas	34	46	45	92
judias	50	43	63	157
lentils	3	2	3	14
carob bean	10	13	22	48
others	12	12	18	77
sub-total	152	165	209	497
unsown fallow	43	41	17	47
sub-total	1,570	1,903	2,248	4,477
<u>A.2 Vines</u>	452	418	340	748
<u>A.3 Olives</u>	204	223	268	589
<u>A.4 Fruit trees</u>				
oranges		51	69	252
almonds		25	49	108
carob		13	31	106
bananas			10	67
chestnuts			19	55
others		98	82	288
sub-total		187	261	876
<u>A.5 Vegetables</u>				
potatoes		199	271	920
onions			30	84
others		186	225	688
sub-total		385	526	1,692
<u>A.6 Raw Materials and forrage</u>				
sugar beet		23	34	172
ground nuts	5	6	8	20
esparto grass		5	7	12
turnips		22	40	85
others		79	89	150
sub-total		135	178	439
<u>A.7 Artificial pastures</u>	66	82	156	319
<u>A.8 Pasture & forestry</u>	336	416	303	421
Total crops	---	3,749	4,280	9,561
livestock	736	932	1,090	2,302
TOTAL OUTPUT -current prices	---	4,681	5,370	11,863

APPENDIX 1.C. GROSS OUTPUT AT CONSTANT PRICES (1909/13).
in millions of pesetas.

	1891-5	1897-01	1909-13	1929-33
<u>A.1 Cereals and legumes</u>				
wheat	812	974	1,115	1,290
barley	241	319	391	545
oats	70	61	92	150
rye	117	142	190	157
maize	118	141	161	162
rice	42	46	57	78
others	17	17	15	14
sub-total	1,417	1,700	2,021	2,396
chick-peas	50	57	58	68
habas	38	45	45	52
judias	65	55	63	71
lentils	6	4	3	5
carob bean	9	11	22	25
others	13	13	17	40
sub-total	181	185	208	261
unsown fallow	14	17	17	18
sub-total	1,612	1,902	2,246	2,675
<u>A.2 Vines</u>	552	458	340	509
<u>A.3 Olives</u>	285	284	268	431
<u>A.4 Fruit trees</u>				
oranges		54	69	104
almonds		50	49	76
others		71	113	88
sub-total		175	231	268
<u>A.5 Vegetables</u>				
potatoes		201	271	408
others		238	257	398
sub-total		439	528	806
<u>A.6 Raw Materials and forage</u>				
sugar beet		19	34	75
ground nuts		7	8	11
esparto grass		6	7	7
turnips		37	40	71
others		81	85	75
sub-total		150	174	239
<u>A.7 Artificial pastures</u>	56	56	156	145
<u>A.8 Pasture & forestry.</u>	325	317	303	259
Total crops	---	3,781	4,246	5,332
livestock	953	891	1,090	1,426

TOTAL OUTPUT -constant prices	---	4,672	5,336	6,758

APPENDIX 1.D.

NET OUTPUT AT CURRENT PRICES.

in millions of pesetas

	1891-5	1897-01	1909-13	1929-33
<u>A.1 Cereals and legumes</u>				
wheat	498	720	808	1,661
barley	36	45	59	124
oats	7	7	11	29
rye	88	102	133	188
maize	52	61	73	135
rice	58	62	55	97
sub-total	739	997	1,139	2,234
chick-peas	33	37	48	91
habas	4	5	5	11
judias	42	36	52	132
lentils	2	2	2	11
sub-total	81	80	107	245
<u>A.2 Vines</u>	429	397	323	711
<u>A.3 Olives</u>	194	211	254	559
<u>A.4 Fruit trees</u>				
oranges		51	69	252
almonds		25	49	108
bananas			10	67
others		98	72	343
sub-total		174	200	770
<u>A.5 Vegetables</u>				
potatoes		152	207	704
onions			30	84
others		186	225	688
sub-total		338	462	1,476
<u>A.6 Raw Materials and forrage</u>				
sugar beet		23	34	172
ground nuts		5	6	16
others		58	72	102
sub-total		86	112	290
Total crops	1,988	2,283	2,597	6,285
livestock	736	932	1,090	2,302
TOTAL OUTPUT -current prices	2,724	3,215	5,370	11,863

APPENDIX 1.E.

NET OUTPUT AT CONSTANT PRICES (1909/13).
in millions of pesetas

	1891-5	1897-01	1909-13	1929-33
<u>A.1 Cereals and legumes</u>				
wheat	555	688	808	939
barley	37	50	59	85
oats	8	7	11	17
rye	90	107	133	108
maize	56	67	73	79
rice	41	45	55	75
sub-total	788	964	1,139	1,303
chick-peas	41	47	48	57
habas	5	5	5	6
judias	52	44	52	57
lentils	5	8	2	4
sub-total	103	104	107	124
<u>A.2 Vines</u>	525	435	323	484
<u>A.3 Olives</u>	270	270	254	409
<u>A.4 Fruit trees</u>				
oranges		54	69	104
almond		50	49	76
others		63	82	70
sub-total		167	200	250
<u>A.5 Vegetables</u>				
potatoes		154	207	312
others		238	257	298
sub-total		392	464	610
<u>A.6 Raw Materials</u>				
sugar beet		19	34	75
ground nuts		7	8	11
others		59	60	49
sub-total		85	102	135
Total crops	2,346	2,417	2,589	3,315
livestock	953	891	1,090	1,426
<hr/>				
TOTAL OUTPUT -constant prices	3,299	3,308	3,679	4,741

SOURCES FOR APPENDIX ONE.

The principal modifications to the pionering work of the Grupo de Estudios de Historia Rural (GEHR, 1983) are:

- 1 output calculated net of intermediate products
- 2 changes in the construction of constant prices
- 3 new estimates for livestock products

The divisions of crops follows standard practice in Spanish official statistics of the period, with the exceptions of A.5 and A.6, "vegetables" and "raw materials and forage". A.5 includes plantas hortícolas, potatoes and onions. A.5 raw materials and forage crops - essentially turnips.

APPENDIX 1.A.

1891/5 A1, A2, and A3, Sotilla, 1911 except wheat for 1891, Simpson 1989, and unsown fallow, GEHR, 1983. The same figures for 1897/01 have been used for categories A4, A5, and A6. A7 and A8 - GEHR, 1983. For division of A8, see 1929/33 below.

1897/01 A1, A2 and A3 Sotilla. Ministerio de Agricultura, 1902, for individual fruits, vegetables, raw materials and roots; this source does not give a specific year, and does not include all products in these categories. For totals in categories A4, A5, A6 A7 and A8, GEHR 1983; area dedicated to esparto grass estimated as half a million hectares. For division of A8, see 1929/33 below.

1909/13 JCA annual publications for A1 (except rice in 1911 - BATEM), A2 and A3. A4 BATEM, with area of banana calculated assuming all "other fruit trees" in the Canary Islands belonged to this category. A5 potatoes AEE año 1915; "other vegetables", GEHR. A6 Sugar beet as potatoes, rest BATEM. A7 and A8 GEHR 1983. For division of A8, see 1929/33 below.

1929/33 - AEPA. The area devoted to potatoes and onions includes the relatively small area cultivated in market gardens. The figure for natural pasture has been taken as 29.5% of the categories prados, dehesas y montes, as explained in the text.

APPENDIX 1.B

1891/5, 1897/01, and 1929/33 as Appendix 1.A.

1909/13 The JCA did not include any value for their annual crop estimates during this period, although they gave an average value for the main categories for different periods (i.e. cereals, legumes, vines, and olives between 1903/12; fruit and root crops 1910, vegetables and industrial crops 1911). The estimates here have been carried out using the unit prices for these years with the production figures for the period 1909/13 where possible. When not, the values given have been assumed to be equal to 1909/13. For "other" cereals and legumes, the average of 1909/10 has been used, Sotilla being the source. Unsown fallow, and categories A7 and A8, as GEHR, 1983.

APPENDIX 1.C.

A1. Individual cereals and legumes: calculated by multiplying grain and straw output by unit prices of 1909/13; "others" assuming the same share in sub-total as with current prices.

A2 and A3. Total output of all products have been divided by wine and olive oil production for 1909/13. These coefficients (wine 22.57 ptas/hl. and olive oil 1,219 ptas/tn) have then been applied to wine production and olive oil production for other dates.

A4. Oranges and almonds, as individual cereals and legumes above, other fruit based on value per hectare in 1909/13, 317 ptas/ha. A5 Potatoes, as individual cereals; plantas hortícolas based on value per hectare in 1909/13, 2,123 ptas/ha; and half of total for raíces, tubérculos y bulbos, minus the potato and turnip. A6 Sugar beet, ground nuts, esparto grass and turnips, as cereals; other plantas industriales assumed to have same relative importance in each period as with current prices; other root crops as A5. A7 and A8, based on value of production by hectare in 1909/13, A7 407 and A8 11 pesetas/hectare.

APPENDIX 1.D.

The major difficulty in converting gross output into net output concerns the use of suitable coefficients for seed corn and the share of products re-employed on the farm. Information on seed corn usage is limited. Annual estimates exist for seed corn for wheat, barley, rye, oats, and maize, 1909/13 (AEE año 1919, 212-3). For off-farm sales, no information exists, and the estimates here have to be regarded as arbitrary. The following coefficients have been used:

	net of seed seed corn %	off-farm sales % of net harvest
wheat	86	100
barley	88	20
rye	86	100
oats	91	15
maize	95	50
rice	99	100
chick-peas	87	100
broad beans (<u>habas</u>)	86	15
green beans (<u>judias</u>)	89	100
lentils	80	100
carob	84	15
potatoes	90	85

In general, it has been assumed that with those crops devoted to human consumption all production given by the agricultural statistics was for off-farm sales, whereas with those cereals and legumes normally associated with animal feed, the figure is only 15%. In the case of barley another 5% of the net harvest has been allowed for beer production, not an important industry in Spain in this period. A figure of 50% for off-farm sales for maize has been used, as it was grown for both animal and human consumption. All hay, straw, and other animal fodder has been assumed for farm consumption. Finally, the by products of the vine and olive are assumed for on farm consumption.

A.2 and A.3 net has been taken as 95 per cent of gross output.

A4, A5 and A6 as Appendix 1.B, with produce of carob tree and turnips taken as cattle fodder and re-employed on farm.

APPENDIX 1.E.

As Appendix 1.C and 1.D.

LIVESTOCK.

Unless otherwise stated, prices GEHR, 1983, p.201.

MILK. cows - the 1929 and 1933 census figures provides, (a) the number of female animals within the total (75%), the share of these milked (45%), and gives an annual average yield of 1,146 litres/head. The 1865 census also divides animals by sexes (59% female), and it is assumed that

the share of females increased in a constant fashion between these benchmarks. A yield of 730 litres/head a year is given by Bona (1879) for 1877, which suggests an improvement in yields took place, and here it is assumed that the rate of increase was constant, except in the case of 1865. The following milk yields are used: 1865, 700 litres; 1891/15, 815; 1897/01, 875; 1909/13, 940; 1929/33 1,146.

-sheep. The number of female animals fell from 69.5% of the total in 1865, to 62.7% in 1929/33; of these, 23.4% were milked at this later date. Yields were 25.8 litres/head/year in 1929/33, and no change is assumed during this period, as breeding changes appear to have been much less than with milking cattle.

-goats. The number of female animals fell from 73.4% of the total to 65.2% between 1865 and 1929/33. The yields at the end of the period were 175 litres/head, and again no change has been assumed during the period.

MEAT. AEPA año 1930 gives:

- a. number of animals in 1929
- b. number sold in 1930 for meat
- c. total live weight of these animals
- d. farms prices obtained

From these figures, an estimate of the total number slaughtered of each type is made for 1929/30: cattle 28.0%, sheep 37.5%, goats 38.3% and pigs 59.6%. These coefficients have then been applied to the total numbers in each census. In theory, the categories could be disaggregated into bulls, oxen, cows, heifers etc., but it is likely that consumer tastes changed over the period (Gómez Mendoza and Simpson, 1988), and there is no way of measuring these changes at a national level.

Average weights in 1930 were 260.5 kilos for cattle, 22.2 sheep, 21.1 goats and 96.2 pigs. Again, until more empirical evidence is available, no long term change can be assumed. Prices for 1930 taken from census, and for other dates GHER.

Wool. The production figures for 1929/33 have been averaged, and applied to the flock sizes of the different census figures. Prices used have been for white wool from GEHR.



MAP SHOWING THE DIFFERENT PROVINCES IN SPAIN.

APPENDIX 2a
 Production in 1909/13 at 1909/13 prices

	labour productivity	output per hectare
Alava	114	147
Albacete	134	73
Alicante	79	158
Almería	49	51
Avila	130	85
Badajoz	85	60
Baleares	119	144
Barcelona	80	288
Burgos	142	98
Cáceres	80	52
Cádiz	105	111
Canarias	91	151
Castellón	99	164
Ciudad Real	89	48
Córdoba	110	86
Coruña, La	97	104
Cuenca	99	67
Gerona	97	250
Granada	97	107
Guadalajara	92	66
Guipúzcoa	194	356
Huelva	94	122
Huesca	124	67
Jaén	82	86
León	76	100
Lleida	102	85
Lugo	107	359
Madrid	74	99
Malaga	87	132
Murcia	57	67
Navarra	129	85
Orense	84	306
Oviedo	95	142
Palencia	101	70
Pontevedra	86	164
Rioja, La	93	51
Salamanca	127	74
Santander	108	203
Segovia	101	58
Sevilla	145	99
Soria	138	94
Tarragona	130	224
Teruel	107	46
Toledo	115	72
Valencia	121	369
Valladolid	127	73
Vizcaya	93	242
Zamora	94	68
Zaragoza	101	104
SPAIN	100	100

APPENDIX 2a
 1909/13 production using 1909/13 prices
 in millions of pesetas

	cereals	legumes	wine	olive oil	fruit	veget- -ables	raw material	TOTAL ARABLE	livest- -ock	TOTAL OUTPUT	labour force	O/LW ptas	agricult area	O/H ptas
Alava	6.698	0.155	0.461	0.020	0.943	2.444	0.602	11.323	6.241	17.564	19716	891	76969	228
Albacete	28.275	0.601	16.176	3.221	0.504	6.887	6.342	62.006	12.327	74.333	71077	1046	655012	113
Alicante	7.347	0.151	23.082	4.153	18.906	8.566	5.284	67.489	3.293	70.782	115318	614	287529	246
Almería	4.801	0.845	8.189	0.352	4.573	5.107	3.415	27.282	6.269	33.551	87829	382	424085	79
Avila	16.981	2.738	6.132	3.158	1.207	10.021	0.332	40.569	17.327	57.896	57262	1011	436753	133
Badajoz	37.343	3.466	6.071	5.535	0.471	14.320	0.020	67.226	39.583	106.809	162091	659	1142733	93
Baleares	9.349	0.531	2.166	3.343	14.138	8.588	0.163	38.278	23.802	62.080	66880	928	277631	224
Barcelona	11.723	1.128	44.939	0.432	0.641	20.213	0.151	79.227	19.622	98.849	159384	620	220829	448
Burgos	44.825	2.376	10.031	0.000	0.644	26.841	0.434	85.151	13.968	99.119	89593	1106	647854	153
Cáceres	17.354	1.670	1.774	6.095	1.456	9.383	4.692	42.424	26.720	69.144	110686	625	863793	80
Cádiz	21.085	2.802	5.102	3.587	1.670	9.678	0.000	43.924	21.149	65.073	79665	817	378585	172
Canarias	7.403	0.932	0.773	0.018	13.992	14.826	1.688	39.632	18.621	58.253	82648	705	248394	235
Castellón	14.570	1.661	6.724	4.784	25.655	6.054	0.887	60.335	8.248	68.583	89235	769	268380	256
Ciudad Real	14.732	2.017	17.836	3.614	0.096	13.682	0.110	52.087	10.686	62.773	90365	695	843598	74
Córdoba	25.444	3.516	2.369	39.230	1.443	8.180	0.000	80.182	30.068	110.250	128633	857	829298	133
Coruña, La	20.820	4.085	0.463	0.000	0.226	21.694	0.061	47.349	50.397	97.746	129338	756	605596	161
Cuenca	24.267	0.440	9.287	1.142	0.242	7.732	2.211	45.321	16.070	61.391	79475	772	590267	104
Gerona	15.217	0.611	3.273	2.607	0.807	8.773	0.000	31.288	20.151	51.439	68182	754	132271	389
Granada	35.978	4.811	2.938	7.479	3.523	11.552	13.245	79.526	17.953	97.479	129490	753	585010	167
Guadalajara	22.285	0.750	3.655	1.092	0.039	6.220	0.380	34.421	9.101	43.522	61052	713	423716	103
Guipúzcoa	4.467	0.612	0.011	0.000	6.324	1.746	0.000	13.160	32.399	45.559	30187	1509	82371	553
Huelva	7.767	0.864	2.554	3.604	1.505	4.026	0.000	20.320	22.873	43.193	59010	732	227867	190
Huesca	29.858	1.344	7.085	3.521	0.612	9.378	0.132	51.930	16.005	67.935	70525	963	648402	105
Jaén	35.662	1.688	1.594	34.195	0.676	8.052	0.127	81.994	22.052	104.046	163122	638	774704	134
León	24.119	4.459	2.310	0.000	0.247	7.343	0.791	39.269	23.199	62.468	106212	588	403772	155
Lleida	20.327	0.591	4.484	13.154	2.277	8.660	0.907	50.400	12.715	63.115	79368	795	478989	132
Lugo	16.013	2.381	2.890	0.010	5.395	24.448	0.639	51.776	59.167	110.943	133406	832	198944	558
Madrid	26.417	2.733	14.911	1.809	0.602	10.310	1.633	58.415	26.001	84.416	147524	572	548817	154
Málaga	20.378	1.268	15.495	11.477	3.665	9.128	9.452	70.863	10.230	81.093	120009	676	395674	205
Murcia	14.563	0.318	7.074	5.230	16.408	10.031	8.931	62.555	6.549	69.104	155416	445	668281	103
Navarra	31.439	0.878	3.167	0.444	0.664	14.605	1.943	53.140	24.885	78.025	77995	1000	587926	133
Orense	18.907	1.564	9.348	0.008	2.605	7.416	0.311	40.159	30.820	70.979	108167	656	149263	476
Oviedo	9.497	4.388	1.374	0.000	12.623	23.193	2.023	53.098	72.801	125.899	170383	739	570059	221
Palencia	25.703	0.395	1.899	0.000	0.105	1.904	0.155	30.161	8.733	38.894	49425	787	355608	109
Pontevedra	20.249	8.866	4.966	0.000	1.268	3.195	0.000	38.544	20.955	59.499	88871	669	232808	256
Rioja, La	11.716	0.786	2.253	0.156	0.183	7.195	0.215	22.504	7.276	29.780	41233	722	375362	79
Salamanca	47.895	3.842	2.501	0.871	2.539	4.858	0.593	63.099	20.434	83.533	84285	991	730715	114
Santander	3.271	0.549	0.025	0.000	0.816	4.122	0.070	8.853	35.224	44.077	52537	839	140036	315
Segovia	16.530	1.436	1.173	0.000	0.062	3.560	0.021	22.782	9.607	32.389	41224	786	359855	90
Sevilla	57.789	6.552	5.170	50.503	3.261	7.129	0.300	130.704	28.860	159.564	141419	1128	1035934	154
Soria	21.841	0.534	0.959	0.000	0.061	5.415	0.202	29.012	15.328	44.340	41261	1075	303181	146
Tarragona	16.772	1.340	30.608	12.842	21.471	8.815	0.216	92.064	3.831	95.895	95068	1009	274958	349
Teruel	19.456	2.350	3.587	5.884	0.553	7.349	4.662	43.841	12.216	56.057	67030	836	779409	72
Toledo	48.967	3.961	8.154	4.594	0.461	7.273	2.913	76.323	21.792	98.115	109561	896	876443	112
Valencia	77.835	2.183	24.460	5.733	38.021	28.524	9.155	185.911	20.308	206.219	218604	943	359277	574
Valladolid	36.746	1.722	5.076	0.000	0.223	3.132	1.597	48.496	12.459	60.955	61848	986	535587	114
Vizcaya	2.482	0.867	0.139	0.000	2.634	2.488	0.000	8.610	31.549	40.159	55600	722	106943	376
Zamora	31.080	1.225	6.773	0.028	1.083	3.380	1.303	44.872	9.764	54.636	74508	733	515750	106
Zaragoza	40.132	0.913	6.552	3.881	3.188	10.396	10.301	75.363	14.986	90.349	114938	786	561257	161
SPAIN	1124.375	95.895	348.033	247.806	220.708	467.832	98.609	2603.258	1004.614	3607.872	4636655	778	23216495	155

APPENDIX 2b
1909/13 production using 1929/33 prices
in millions of pesetas

	cereals	legumes	wine	olive oil	fruit	veget- ables	raw material	TOTAL ARABLE	livest- ock	TOTAL OUTPUT	labour force	O/LM ptas	agricult area	O/H ptas
Alava	12.044	0.434	0.700	0.027	2.749	4.474	1.291	21.719	10.390	32.109	19716	1629	76969	417
Albacete	50.260	1.718	24.429	4.288	1.157	14.220	10.554	106.626	20.193	126.819	71077	1784	655012	194
Alicante	13.052	0.372	30.105	5.525	40.072	19.087	7.015	115.228	5.222	120.450	115318	1045	287529	419
Almería	8.613	2.402	15.370	0.469	10.533	11.590	4.570	53.547	10.016	63.563	87829	724	424085	150
Avila	30.902	6.044	9.275	4.204	3.203	20.553	0.549	74.730	28.482	103.212	57262	1802	436753	236
Badajoz	65.657	7.168	9.660	7.368	1.162	44.435	0.017	135.467	65.369	200.836	162091	1239	1142733	176
Baleares	16.344	1.281	3.277	4.451	29.035	19.283	0.263	73.934	38.919	112.853	66880	1687	277631	406
Barcelona	21.366	3.124	67.714	0.574	1.810	42.828	0.167	137.583	30.543	168.126	159384	1055	220829	761
Burgos	80.483	5.847	15.183	0.000	2.684	48.710	0.787	153.694	23.209	176.903	89593	1975	647854	273
Cáceres	30.865	3.609	2.701	8.114	3.560	21.040	7.796	77.685	43.673	121.358	110686	1096	863793	140
Cádiz	37.690	5.969	7.928	4.775	3.833	20.161	0.000	80.356	33.782	114.138	79665	1433	378585	301
Canarias	13.620	2.244	1.229	0.024	46.375	39.411	2.118	105.021	28.162	133.183	82648	1611	248394	536
Castellón	25.776	4.585	10.594	6.369	63.825	13.573	0.980	125.702	13.355	139.057	89235	1558	268380	518
Ciudad Real	25.954	4.691	26.872	4.811	0.251	29.343	0.195	92.117	16.902	109.019	90365	1206	843598	129
Córdoba	45.425	7.927	3.689	52.227	4.639	22.482	0.000	136.389	49.529	185.918	128633	1445	829298	224
Coruña, La	40.615	11.578	0.708	0.000	0.743	42.658	0.053	96.355	85.447	181.802	129338	1406	605596	300
Cuenca	42.662	1.047	14.082	1.520	0.520	17.100	4.070	81.001	26.566	107.567	79475	1353	590267	182
Gerona	27.521	1.582	4.937	3.471	2.410	17.609	0.000	57.530	33.679	91.209	68182	1338	132271	690
Granada	64.716	11.896	4.505	9.957	7.518	25.662	23.955	148.209	28.637	176.846	129490	1366	585010	302
Guadalajara	39.918	1.858	5.502	1.453	0.124	14.881	0.422	64.158	15.029	79.187	61052	1297	423716	187
Guipúzcoa	8.549	1.655	0.017	0.000	25.037	3.969	0.000	39.227	49.977	89.204	30187	2955	82371	1083
Huelva	13.824	1.805	3.913	4.798	3.613	10.127	0.000	38.080	37.107	75.187	59010	1274	227867	330
Huesca	53.555	3.934	10.696	4.688	1.300	21.520	0.143	95.836	26.185	122.021	70525	1730	648402	188
Jaén	63.878	3.672	2.925	45.526	2.644	20.803	0.174	139.622	36.333	175.955	163122	1079	774704	227
León	45.050	12.034	3.515	0.000	0.681	13.376	1.692	76.348	39.003	115.351	106212	1086	403772	286
Lleida	36.446	1.501	6.775	17.513	5.171	19.496	1.425	88.327	21.136	109.463	79368	1379	478989	229
Lugo	31.387	6.704	4.363	0.013	15.400	44.241	0.555	102.663	98.586	201.249	133406	1509	198944	1012
Madrid	46.381	6.086	22.936	2.408	2.403	22.730	3.439	106.383	40.102	146.485	147524	993	548817	267
Malaga	36.178	2.681	24.637	15.280	7.385	20.239	13.311	119.711	16.314	136.025	120009	1133	395674	344
Murcia	25.822	0.801	10.995	6.962	35.855	24.442	13.968	118.845	10.502	129.347	155416	832	668281	194
Navarra	56.331	2.241	4.853	0.591	2.553	32.951	4.018	103.538	39.774	143.312	77995	1837	587926	244
Orense	37.885	4.275	14.068	0.011	8.901	14.010	0.270	79.420	50.565	129.985	108167	1202	149263	871
Oviedo	19.217	12.447	2.068	0.000	43.001	41.951	4.299	122.983	115.244	238.227	170383	1398	570059	418
Palencia	46.068	1.211	2.858	0.000	0.403	3.928	0.332	54.800	14.470	69.270	49425	1402	355608	195
Pontevedra	42.153	25.151	7.474	0.000	5.377	6.854	0.000	87.009	34.695	121.704	88871	1369	232808	523
Rioja, La	20.860	2.097	3.549	0.208	0.623	17.587	0.413	45.337	11.649	56.986	41233	1382	375362	152
Salamanca	88.719	8.390	3.831	1.159	6.938	9.339	1.089	119.465	34.935	154.400	84285	1832	730715	211
Santander	6.526	1.542	0.037	0.000	3.204	7.681	0.132	19.122	56.144	75.266	52537	1433	140036	537
Segovia	29.905	2.955	1.800	0.000	0.260	10.192	0.023	45.135	16.228	61.363	41224	1489	359855	171
Sevilla	103.172	13.785	8.201	67.231	8.295	17.411	0.643	218.738	47.918	266.656	141419	1886	1035934	257
Soria	39.717	1.687	1.446	0.000	0.226	9.809	0.212	53.097	25.656	78.753	41261	1909	303181	260
Tarragona	23.035	3.720	46.346	17.097	53.244	15.946	0.239	159.627	5.878	165.505	95068	1741	274958	602
Teruel	35.526	6.901	5.425	7.834	1.865	14.405	8.633	80.589	20.478	101.067	67030	1508	779409	130
Toledo	86.099	8.427	12.332	6.116	1.023	17.744	5.350	137.091	35.281	172.372	109561	1573	876443	197
Valencia	95.872	6.103	37.797	7.629	97.782	75.917	17.825	338.925	31.442	370.367	218604	1694	359277	1031
Valladolid	65.466	4.182	7.713	0.000	0.480	6.636	3.419	87.896	19.239	107.135	61848	1732	535587	200
Vizcaya	4.714	2.421	0.215	0.000	8.238	5.517	0.000	21.105	48.235	69.340	55600	1247	106943	648
Zamora	56.599	2.763	10.281	0.037	2.370	7.122	1.832	81.004	16.543	97.547	74508	1309	515750	189
Zaragoza	72.020	2.643	10.204	5.167	8.038	21.806	22.034	141.912	24.308	166.220	114938	1446	561257	296
SPAIN	1984.437	239.190	529.730	329.895	578.513	1026.849	170.272	4858.886	1631.031	6489.917	4636655	1400	23216495	280

APPENDIX 2b
 Production in 1931 at 1931 prices

	labour productivity	output per hectare
Alava	103	158
Albacete	117	51
Alicante	81	137
Almería	60	58
Avila	140	86
Badajoz	74	52
Baleares	120	144
Barcelona	122	333
Burgos	115	88
Cáceres	99	43
Cádiz	62	100
Canarias	171	365
Castellón	102	198
Ciudad Real	100	56
Córdoba	73	83
Coruña, La	129	231
Cuenca	92	55
Gerona	84	214
Granada	69	92
Guadalajara	101	78
Guipúzcoa	165	391
Huelva	55	85
Huesca	91	50
Jaén	71	85
Leon	93	113
Lleida	82	100
Lugo	143	405
Madrid	135	104
Malaga	74	120
Murcia	81	77
Navarra	121	89
Orense	70	307
Oviedo	139	157
Palencia	127	73
Pontevedra	79	207
Rioja, La	110	69
Salamanca	107	83
Santander	129	295
Segovia	152	72
Sevilla	81	87
Soria	105	70
Tarragona	124	172
Teruel	81	35
Toledo	74	53
Valencia	165	434
Valladolid	137	60
Vizcaya	145	228
Zamora	94	69
Zaragoza	106	91
SPAIN	100	100

APPENDIX 2c

1931 production using 1931 prices
in millions of pesetas

	cereals	legumes	wine	olive oil	fruit	veget- -ables	raw material	TOTAL ARABLE	livest- -ock	TOTAL OUTPUT	labour force	O/LM ptas	agricult area	O/H ptas
Alava	15.614	1.047	2.472	0.152	1.163	5.707	3.042	29.197	11.917	41.114	17290	2378	79882	515
Albacete	63.666	1.937	25.435	3.392	1.087	14.417	10.110	120.044	26.480	146.524	54115	2708	887248	165
Alicante	13.976	0.453	27.550	7.290	40.277	36.701	6.551	132.798	11.322	144.120	77082	1870	322783	446
Almería	9.931	1.283	15.483	1.635	16.206	15.162	7.509	67.209	16.512	83.721	60665	1380	444481	188
Avila	32.937	6.421	6.034	2.373	1.545	29.723	0.228	79.261	49.928	129.189	39802	3246	461706	280
Badajoz	85.308	10.569	11.387	22.656	2.199	45.357	0.077	177.553	96.725	274.278	160696	1707	1602047	171
Baleares	20.379	4.388	3.498	3.090	44.722	22.170	0.791	99.038	46.168	145.206	52409	2771	307764	472
Barcelona	26.332	3.929	90.935	1.802	16.384	80.481	0.158	220.021	62.937	282.958	100349	2820	260270	1087
Burgos	82.581	2.269	13.627	0.000	4.041	34.534	2.898	139.950	40.948	180.898	67954	2662	628914	288
Cáceres	61.178	2.459	1.933	9.629	4.316	25.647	4.782	109.944	66.599	176.543	77031	2292	1249180	141
Cádiz	33.547	13.082	8.420	5.013	2.398	17.802	3.183	83.445	26.552	109.997	76105	1445	337398	326
Canarias	7.131	2.079	1.711	0.024	122.713	40.975	0.511	175.144	30.278	205.422	51854	3962	172170	1193
Castellón	17.494	4.639	7.390	11.692	107.417	19.310	0.278	168.220	17.328	185.548	78334	2369	287414	646
Ciudad Real	54.233	1.447	92.682	14.989	0.187	27.408	0.408	191.354	24.982	216.336	93415	2316	1192808	181
Córdoba	58.902	9.234	4.856	70.728	4.829	30.014	1.620	180.182	47.844	228.026	134083	1701	845390	270
Coruña, La	39.384	18.614	1.140	0.000	3.679	148.513	0.003	211.333	109.835	321.168	107869	2977	424931	756
Cuenca	87.944	1.474	16.116	6.556	0.451	29.125	4.597	146.263	27.668	173.931	81437	2136	969117	179
Gerona	22.921	1.673	8.408	3.274	4.154	22.138	0.010	62.578	49.964	112.542	57667	1952	160856	700
Granada	71.232	11.219	3.479	16.190	11.223	30.706	47.834	191.883	33.697	225.580	140890	1601	752913	300
Guadalajara	43.681	1.595	1.303	4.248	0.285	18.832	2.171	72.115	34.438	106.553	45496	2342	419299	254
Guipúzcoa	7.341	3.450	0.021	0.000	6.378	5.377	0.000	22.567	72.938	95.505	24966	3822	74816	1277
Huelva	16.123	2.193	14.351	7.346	8.541	11.881	0.000	60.435	21.960	82.395	65009	1267	297138	277
Huesca	51.196	3.197	5.672	5.673	2.516	25.408	2.958	96.620	14.631	111.251	53090	2096	681015	163
Jaén	40.266	2.945	3.440	129.836	3.256	26.203	0.765	206.711	38.410	245.121	148941	1646	883697	277
León	66.389	7.018	15.707	0.000	19.188	35.753	12.953	157.008	26.847	183.855	84972	2164	496095	371
Lleida	54.785	2.290	7.247	17.484	5.851	29.807	9.147	126.611	21.595	148.206	77618	1909	451676	328
Lugo	46.880	3.605	6.723	0.005	8.370	87.642	0.051	153.276	197.738	351.014	105944	3313	264982	1325
Madrid	30.322	2.744	15.370	5.261	2.034	30.803	8.883	95.217	44.266	139.483	44649	3124	411490	339
Málaga	35.732	4.876	26.917	20.208	16.273	34.722	14.384	153.112	49.413	202.525	118705	1706	518276	391
Murcia	33.829	0.783	18.053	6.117	52.212	34.245	11.717	156.956	32.065	189.021	101192	1868	753316	251
Navarra	66.310	2.751	15.533	3.143	15.060	37.526	24.256	164.579	37.790	202.369	72353	2797	694449	291
Orense	30.056	0.645	22.676	0.018	4.680	41.532	0.349	99.956	62.975	162.931	100005	1629	162473	1003
Oviedo	17.732	21.706	1.326	0.000	26.765	29.527	3.182	100.238	186.650	286.888	89194	3216	560453	512
Palencia	58.665	1.339	1.371	0.000	2.478	12.731	2.181	78.765	19.921	98.686	33519	2944	415548	237
Pontevedra	39.776	9.681	8.350	0.000	5.356	14.349	0.043	77.555	52.289	129.844	71206	1824	191878	677
Rioja, La	20.904	3.334	16.007	0.737	2.163	23.095	8.230	74.470	9.067	83.537	32753	2551	368992	226
Salamanca	74.764	11.068	4.925	2.004	4.601	21.146	0.038	118.546	54.659	173.205	70226	2466	635878	272
Santander	5.915	1.333	0.098	0.000	5.498	6.933	0.153	19.930	96.596	116.526	39135	2978	120707	965
Segovia	65.320	4.757	4.388	0.000	0.243	15.393	0.070	90.171	21.703	111.875	31712	3528	473789	236
Sevilla	90.427	8.260	5.869	63.451	5.444	22.232	9.056	204.739	61.037	265.776	141056	1884	932362	285
Soria	35.740	0.649	0.847	0.000	0.411	13.390	0.806	51.843	24.777	76.620	31404	2440	334850	229
Tarragona	43.368	2.473	55.110	29.678	21.031	37.200	0.294	189.154	14.820	203.974	70949	2875	363317	561
Teruel	30.376	4.269	3.909	3.756	1.804	11.546	17.439	73.099	23.548	96.647	51358	1882	846594	114
Toledo	77.743	4.580	21.944	24.647	0.538	22.538	5.701	157.691	40.042	197.733	114783	1723	1145357	173
Valencia	81.232	13.387	35.482	15.627	204.344	126.788	21.045	497.905	116.960	614.865	160824	3823	433394	1419
Valladolid	74.777	2.268	9.884	0.000	0.446	9.923	9.001	106.299	22.846	129.145	40769	3168	655730	197
Vizcaya	8.461	5.909	0.234	0.000	9.398	7.811	0.000	31.813	59.568	91.381	27306	3347	122471	746
Zamora	63.261	2.669	17.934	0.040	1.062	16.688	0.168	101.822	24.052	125.874	58053	2168	561398	224
Zaragoza	70.855	2.504	20.678	7.810	11.715	24.206	64.689	202.457	22.605	225.062	91420	2462	753484	299
SPAIN	2186.916	236.495	703.925	527.574	836.931	1511.117	324.120	6327.078	2303.889	8630.966	3727674	2315	26412176	327

APPENDIX 2d
1931 production using 1909/13 prices
in millions of pesetas

	cereals	legumes	wine	olive oil	fruit	veget- -ables	raw material	TOTAL ARABLE	livest- -ock	TOTAL OUTPUT	labour force	O/LM ptas	agricult area	O/H ptas
Alava	8.685	0.389	1.638	0.114	0.344	2.955	1.419	15.544	7.387	22.931	17290	1326	79882	287
Albacete	35.908	0.726	16.845	2.548	0.400	7.078	6.059	69.564	16.043	85.607	54115	1582	887248	96
Alicante	8.328	0.184	21.384	5.478	17.361	16.073	4.705	73.513	7.244	80.757	77082	1048	322783	250
Almería	5.509	0.510	8.264	1.228	7.151	6.376	4.671	33.709	10.287	43.996	60665	725	444481	99
Avila	18.195	2.767	3.978	1.782	0.556	14.542	0.150	41.970	29.817	71.787	39802	1804	461706	155
Badajoz	48.688	5.019	7.219	17.018	0.894	14.334	0.089	93.261	59.837	153.098	160696	953	1602047	96
Baleares	11.562	1.687	2.313	2.321	21.999	9.268	0.502	49.652	28.076	77.728	52409	1483	307764	253
Barcelona	14.817	1.430	60.368	1.354	5.548	37.737	0.126	121.380	40.115	161.495	100349	1609	260270	620
Burgos	46.118	0.915	8.997	0.000	0.967	18.527	1.352	76.876	25.038	101.914	67954	1500	628914	162
Cáceres	34.508	1.154	1.264	7.233	1.825	10.486	3.126	59.596	40.901	100.497	77031	1305	1249160	80
Cádiz	18.780	6.211	5.428	3.766	0.891	7.112	1.524	43.712	16.205	59.917	76105	787	337398	178
Canarias	3.905	0.749	1.093	0.018	35.542	15.116	0.339	56.762	19.814	76.576	51854	1477	172170	445
Castellón	10.793	1.682	4.595	8.782	35.953	9.082	0.252	71.139	10.876	82.015	78334	1047	287414	285
Ciudad Real	30.758	0.563	61.564	11.258	0.074	12.254	0.222	116.693	15.594	132.287	93415	1416	1192808	111
Córdoba	33.214	4.330	3.144	53.126	1.581	10.726	0.778	106.899	28.339	135.238	134083	1009	845390	160
Coruña, La	20.079	6.600	0.751	0.000	1.004	80.088	0.004	108.526	69.078	177.604	107869	1646	424931	418
Cuenca	49.442	0.583	10.639	4.924	0.157	12.278	2.470	80.493	16.763	97.256	81437	1194	969117	100
Gerona	12.453	0.616	5.579	2.459	1.437	10.171	0.007	32.722	31.842	64.564	57667	1120	160856	401
Granada	39.828	4.455	2.256	12.160	5.245	13.679	26.564	104.187	22.190	126.377	140890	897	752913	168
Guadalajara	24.557	0.622	0.865	3.190	0.084	8.312	1.039	38.669	21.499	60.168	45496	1322	419299	143
Guipúzcoa	3.787	1.220	0.014	0.000	1.952	2.393	0.000	9.366	46.672	56.038	24986	2243	74816	749
Huelva	9.159	1.045	9.489	5.518	3.639	4.326	0.000	33.176	13.506	46.682	65009	718	297138	157
Huesca	28.603	1.146	3.746	4.261	1.094	10.308	1.434	50.592	9.491	60.083	53090	1132	681015	88
Jaén	22.685	1.304	1.936	97.521	1.054	9.371	0.364	134.235	23.953	158.188	148941	1062	883697	179
León	35.882	2.738	10.411	0.000	6.821	19.816	6.249	81.917	17.175	99.092	84972	1166	496095	200
Lleida	30.703	0.852	4.798	13.132	2.591	13.769	4.671	70.516	13.046	83.562	77618	1077	451676	185
Lugo	24.034	1.271	4.458	0.004	2.569	48.295	0.059	80.690	122.950	203.640	105944	1922	264982	769
Madrid	17.045	1.274	9.884	3.952	0.585	12.521	4.057	49.318	28.241	77.559	44649	1737	411490	188
Malaga	19.973	2.214	17.010	15.179	6.361	15.208	8.324	84.269	32.848	117.117	118705	987	518276	226
Murcia	19.062	0.313	11.763	4.595	21.920	14.780	7.592	80.025	20.228	100.253	101192	991	753316	133
Navarra	36.975	1.083	10.263	2.361	5.256	14.951	11.327	82.216	24.455	106.671	72353	1474	694449	154
Orense	14.989	0.248	15.067	0.014	1.643	22.882	0.402	55.245	38.475	93.720	100005	937	162473	577
Oviedo	8.849	7.653	0.881	0.000	8.994	15.910	1.491	43.778	119.424	163.202	89194	1830	560453	291
Palencia	32.813	0.532	0.911	0.000	0.644	6.478	1.018	42.396	11.941	54.337	33519	1621	415548	131
Pontevedra	19.140	3.414	5.548	0.000	1.281	7.365	0.049	36.797	31.495	68.292	71206	959	191878	356
Rioja, La	11.865	1.202	10.530	0.554	0.618	9.162	3.859	37.790	5.822	43.612	32753	1332	368992	118
Salamanca	41.429	4.595	3.228	1.506	2.098	10.546	0.043	63.445	32.688	96.133	70226	1369	635878	151
Santander	3.001	0.477	0.065	0.000	1.414	3.371	0.100	8.428	63.764	72.192	39135	1845	120707	598
Segovia	36.581	2.312	2.892	0.000	0.070	6.362	0.043	48.260	13.340	61.600	31712	1842	473789	130
Sevilla	50.952	3.932	3.620	47.663	1.802	7.755	4.340	120.064	38.003	158.067	141056	1121	932362	170
Soria	20.047	0.253	0.561	0.000	0.107	7.256	0.382	28.606	14.908	43.514	31404	1386	334850	130
Tarragona	33.413	0.916	36.432	22.292	8.501	15.771	0.179	117.504	9.449	126.953	70949	1789	363317	349
Teruel	16.787	1.475	2.580	2.821	0.618	5.137	8.564	37.982	14.237	52.219	51358	1017	846594	62
Toledo	44.200	2.074	14.540	18.513	0.259	8.598	3.063	91.247	23.644	114.891	114783	1001	1145357	100
Valencia	69.939	4.767	22.921	11.740	66.409	53.563	10.847	240.186	71.896	312.082	160824	1941	433394	720
Valladolid	42.179	0.959	6.519	0.000	0.200	3.989	4.200	58.046	13.985	72.031	40769	1767	655730	110
Vizcaya	4.411	2.091	0.151	0.000	2.346	3.589	0.000	12.588	38.192	50.780	27306	1860	122471	415
Zamora	34.410	1.198	11.859	0.030	0.395	8.657	0.193	56.742	14.448	71.190	58053	1226	561398	127
Zaragoza	39.712	0.868	13.512	5.867	3.386	10.441	30.321	104.107	14.501	118.608	91420	1297	753484	157
SPAIN	1248.752	94.618	463.773	396.282	293.640	688.764	168.569	3354.398	1439.722	4794.120	3727674	1286	26412176	182

APPENDIX 2. REGIONAL PRODUCTIVITY.

Constructing regional output series requires a greater number of crops to reduce excessive distortions in provincial figures. National prices are used, and no attempt has been made to calculate local seed corn requirements, or differences in the proportion of produce sold off-farm. For these national totals are used (see Appendix 1.D). The years given below refer to those used for calculating physical output and, for the period "1929/33" both physical output and prices. Information for prices for "1909/13 are given in the section, Notes and Sources.

crop	year	price per tn	year	price per tn
<u>A.1 Cereals and legumes.</u>				
wheat	1909/13	261.0	1929/33	468.1
barley	1911	208.6	1931	324.1
rye	1909/13	186.5	1931	369.7
oats	1911	198.0	1931	284.0
maize	1909/13	195.1	1931	411.3
rice	1909/13	326.0	1931	337.2
chickpeas	1909/13	491.8	1931	1037.2
broad beans	1911	233.9	1931	457.0
beans	1911	340.0	1931	964.5
lentils	1911	145.0	1931	856.8
carob beans	1911	215.5	1931	380.5
<u>A.2 Vines.</u>				
wine (hl)	1909/13	200.0	1929/33	30.1
grapes	1903/10	**	1932	345.7
raisins	1903/10	**	1932	100.8
<u>A.3 Olives.</u>				
olive oil	1909/13	1100.0	1929/33	1464.5
olives	1903/10	**	1931	459.1
<u>A.4 Fruit Trees.</u>				
oranges	1910	82.5	1929/33	210.6
almonds	1910	495.5	1931	985.5
apples	1910	82.0	1931	393.2
chestnuts	1910	104.1	1931	287.6
bananas	1910	144.5	1931	512.4
figs	1910	103.0	1931	188.8
hazel nuts	1910	477.4	1931	1328.4
pears	1910	132.8	1931	472.8
coefficient				
other fruit	1905/9	x1.13	1931	x1.19
<u>A.5 Vegetables.</u>				
potatoes	1910+12	108.5	1929/33	192.3
garlic	1910	164.3	1931	444.4
tomatoes	*	*	1931	187.3
onions	1910	164.6	1931	164.6
melons	*	*	1931	3421.1*
water melons	*	*	1931	3242.4*
cabbages+	*	*	1931	5411.0*
peppers	*	*	1931	6359.3*
cauliflowers	*	*	1931	8023.0*
lettuce	*	*	1931	5046.2*
other vegetables	*	1620*	1932	4060.0*

A.6 Raw materials.

sugar beet	1910	35.6	1931	80.5
sugar cane	1910	40.8	1931	48.6
hemp	1910	1144.1	1931	1267.0
flax	1910	1971.4	1931	1711.6
paprika	1910	938.7	1931	1559.8
tobacco	1910	1100.0	1931	1680.0
esparto grass	1910	12.5*	1931	17.2*
saffron	1910	996.7	1931	1843.3
peanuts	1910	1151.0	1931	2264.9

A.7 LIVESTOCK PRODUCTS.

a. milk.		yield	price		yield	price
	census	animal	litre	census	animal	litre
cow	1917	1,139	0.31	1929+33	1,142	0.45
sheep	1917	24	0.36	1929+33	26	0.51
goat	1917	117	0.42	1929+33	177	0.60
b. meat		price			price	
	census	live weight		census	live weight	
		pts/tn			ptas/tn	
cow	1917	930	1930		1700	
sheep	1917	800	1930		1570	
goat	1917	1360	1930		1390	
pig	1917	1100	1930		2270	
c. wool			1909/13		1929/33	
census			1917		1929+33	
wool per animal in kilos			1.66		1.66	
price ptas/tn			1930		2340	

NOTES:

* figures exist for value of total output, not volume. In these cases we take 1931 area cultivated to calculate a "price".

** figures exist for value of total output, not volume. In these cases we take 1931 yields to calculate a "price" for 1909/13.

+ cabbages, brussels sprouts, and broccoli.

ACTIVE POPULATION.

census	1910	1930
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TOTAL AREA CULTIVATED.

1910. Cereals and legume rotations, 1903/12 (calculated by GEHR, 1983a), vines 1909/13, olives 1913, fruit trees, roots, industrial crops, artificial pastures, horticultural products 1910 and natural pastures 1931, (see below). 1931. AEPA año 1931, except horticulture for which we have used año 1932. Natural pastures include "praderas" and "dehesas a pastos y pastizales".

SOURCES:

-unless otherwise stated, physical production and farm prices have been taken from the same sources cited by GEHR, 1991.

A.1 Cereals and legumes.

1909/13: Cereal and legume prices, except rice, refer to 1909/13 AEE año, 1917, p.259. These show similar trends to Sotilla (1911) and Ministerio de Fomento, 1915 (for 1903/12). As rice differs significantly, we prefer Sotilla for 1909 and 1910.

A.2 Vines.

1909/13: Sotilla gives an average of 18.14 for 1903/10 but, as the price seems slightly stronger for 1909/13, we use 20.0.

grapes and raisins: As 1931 estimates are considered of poor quality those of the following year have been used (see AEPA, año 1932, pp.130-1). We differentiate between the two methods of raisin production. As only an estimate of the total value of the crop is given for 1903/10, we divide this by 1932 production to derive a unit value.

A.3 Olives.

1909/13: Price based on Sotilla and GEHR, 1981.

olives: method for calculating unit output for 1903/10 as grapes and raisins,

A.4 Fruit Trees.

Carob beans and prickly pears have been assumed were used as animal feed, and excluded entirely. Individual fruit prices for first column taken as 1905/9. A coefficient for "other fruit" has been calculated by dividing the value of those products identified in the table above by the value for total fruit (minus carob and prickly pears); this figure (1.13 for 1909/13 and 1.19 for 1929/33) is then applied to individual provincial totals.

A.5 Vegetables.

Vegetables taken as plantas hortícolas together with potatoes, onions and garlic found under raíces, tubérculos y bulbos. The coefficient for "other vegetables" is calculated by dividing the area sown by value of production of plantas hortícolas that are not identified in the table. For 1929/33 we use the 1932 area, as the 1931 figure is suspect in numerous provinces. 1910 production of potatoes, BATEM, 1910, pp.222-225.

A.6 Raw materials.

Prices for 1909/13 calculated from Ministerio de Fomento, 1914.

A.7 Livestock products.

prices GEHR, 1983, p.201.

milk.

1909/13 yields are provincial. Asociación General de Ganaderos (n.d.) 1923.

meat.

1909/13 Herd size 1917 census; numbers and weight of slaughtered animals as 1930 (national figure), coefficient AEPA, año 1930.

wool

1909/13 Herd size 1917 Census; fleece national as 1929/33.

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AEPA: Ministerio de Agricultura, Anuario Estadístico de la Producciones Agrícolas, Madrid.

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