UNIVERSIDAD CARLOS III DE MADRID

Working Papers in Economic History

March 2007 WP 07-06

Searching for the Roots of Retardation: Spain in European Perspective, 1500-1850

Carlos Álvarez Nogal y Leandro Prados de la Escosura

Abstract
This paper investigates when did retardation begin in Spain and examines the evidence on economic performance over three centuries. In contrast to earlier estimates that focus almost exclusively on Castilian agriculture we look at trends in urbanization as a measure of economic activity outside agriculture and construct new measures of agricultural and total output at regional and national levels. We find distinctive long-run behaviour across Spanish regions that reject the identification between Castile and Spain. We also provide new output estimates for six Western European countries that allow placing Spanish performance in comparative perspective. Two main findings are highlighted. At the time of her imperial expansion Spain appears to have a relatively affluent nation and, by the late sixteenth century, her income per head was only below the Low Countries' and Italy's. The roots of Spanish retardation lie in the seventeenth century and deepened during the early nineteenth century.

Keywords: Preindustrial Spain, Europe, Urbanization, Agriculture, Retardation.
JEL Classification: O47, N13, N93 D31

Carlos Alvarez Nogal: Departamento de Historia Económica e Instituciones, Universidad Carlos III de Madrid, C/Madrid 126, 28903 Getafe, Spain.
Email: canogal@uc3m.es
http://www.uc3m.es/uc3m/dpto/HISEC/profesorado/Personal_Carlos_Alvarez.html

Leandro Prados de la Escosura: Departamento de Historia Económica e Instituciones, Universidad Carlos III de Madrid, C/Madrid 126, 28903 Getafe, Spain.
Email: leandro.prados.delaescosura@uc3m.es
http://www.uc3m.es/uc3m/dpto/HISEC/profesorado/Personal_Leandro_Prados.html

Searching for the Roots of Retardation: Spain in European Perspective, 1500-1850[1]

Carlos Álvarez Nogal y Leandro Prados de la Escosura
Universidad Carlos III de Madrid

Spain's long term growth over the last one and a half centuries has been roughly similar to that of western European nations but a per capita income gap still remains (Prados de la Escosura 2006). Does it mean that the roots lie in the pre-1850 era?[2] There is no consensus among historians about when Spanish retardation originates. Modern economic historians locate it in the early nineteenth century when a painful definition and enforcement of new liberal property rights took place (Prados de la Escosura 1988), while early modern historians stress the seventeenth century decline (Thompson and Yun 1994).

Spain's macroeconomic evolution from the conquest of Granada (1492) to the definitive loss of the mainland America's colonies (1825) remains unclear. Highly hypothetical exercises suggest different outcomes: from a sustained decline to a moderate increase in GDP per head. Attempts to compare Spain with other European countries also cast contradictory results. Significant puzzles emerge from the debate. How was plausible, for example, that one of the poorest and dwindling countries in Europe succeeded to maintain a permanent state of war with much wealthier rivals over almost three centuries?

Moreover, assessments of Spain's economic performance rely on incomplete attempts to derive product per head in the Kingdom of Castile (Figure 1) largely on the basis of agricultural indicators. Regions outside Castile, especially those coastal areas that became very active overtime, deserve to be considered.

This paper investigates when did retardation begin and investigates the evidence on economic performance during more than three hundred years. We start by examining

[1] We gratefully acknowledge David Reher for his advice and for allowing us access to his unpublished research and to Bartolomé Yun who provided us with a longer, unpublished version of his 1994 paper. We thank help and suggestions by Stefano Battilossi, Albert Carreras, Paolo Malanima, Joan Rosés, and James Simpson. We alone are responsible for the remaining errors.

[2] Nonetheless, it could be argued that, from a neo-classical growth perspective, a lower initial level would be accompanied, *ceteris paribus*, by a faster rate of growth. Thus, Spanish retardation could also originate in the post-1850 era (See Prados de la Escosura 2006).

the available estimates and conjectures on Spain's real product and checking the consistency of their underlying assumptions. We find that widening the focus to include regions other than Castile as well as economic activity outside agriculture is necessary and, as a first step, we look at urbanization levels and trends. Then, we carry out a new estimate of GDP on a regional basis in order to allow for the variance of demographic, agricultural, and urbanization trends across Spain. Specifically, we estimate movements in agricultural consumption and output using a demand function approach, while we proxy output trends in industry and services through changes in urban population (adjusted to exclude those living on agriculture), so tendencies in total output and output per head can be established at regional and national level. Later, Spain' position relative to Western Europe is explored.

Our favoured results show a long-term productivity decline in agriculture, only partially reversed in the seventeenth century and, again, in the early nineteenth century. Urbanization rates, adjusted to exclude population living on agriculture, rose significantly in the sixteenth century and, again, in the eighteenth century (especially after 1750) while fell sharply in the seventeenth century. Overall, the adjusted rate of urbanization almost doubled between the early sixteenth and the late eighteenth century and, by 1850, was nearly two and a half times higher than in 1500. In aggregate terms, we can conjecture that per capita income hardly changed between 1500 and 1800, while increased slightly if the time span is extended up to 1850. Our results highlight the disparity in regional performance, especially between inland and coastal regions. When we look at specific periods we find that real GDP per head grew moderately in the sixteenth century (0.1 percent), declined between the late sixteenth century and 1700 (at -0.1 percent), practically stagnated during the eighteenth century, and rose in the early nineteenth century (at 0.3 percent annually).

In a comparative perspective, our findings support the view that by the end of the sixteenth century Spanish per capita income was among the highest in Europe, only second to Italy and the Low Countries. Thus, and contrary to current assumptions, when Spain colonised America and built a worldwide empire was not a poor country of warriors but a relatively affluent nation. Since 1590 Spain experienced an absolute decline that only became relative in the early nineteenth century. We can, then, confirm that Spanish retardation sink has its roots in the seventeenth century and deepened in the first half of the nineteenth century.

Available conjectures on Spain's economic performance

The available estimates and conjectures about long-run economic performance in early modern Spain are summarized in Table 1. Their variance over 1500-1800 is large as they range from a decline to a rise in per capita income, with (Maddison 2003) and (van Zanden 2005b) providing the extreme optimist and pessimist (+42 and -17.5 percent change) views, respectively.[3] A closer look reveals contradictory assessments of the sixteen century, from a substantial rise to a mild or sharp fall, while no consensus appears on the seventeenth century, usually considered the locus of Spanish decadence, and discrepancies emerge, once again, on the eighteenth century performance. Only Maddison's estimates cover up to 1850 and suggest a mild increase in per capita GDP.[4]

Table 2 offers a contrast between Spain and the two leading early modern economies, England and the Netherlands, according to the available estimates and conjectures that exposes a long-run decline with respect to England and to a lesser extent also to the Netherlands. From nearly parity in 1500, Spanish per capita income fell to represent less than half the English one in the early nineteenth century.[5] With respect to the 'average' European income, guesstimates range from stability to a significant retardation over 1500-1800. Maddison (2003), in particular, points to catching up in the sixteenth century, decline during the seventeenth century and, after the eighteenth century stability, falling behind in the early nineteenth century.

It is worth noting that Maddison and van Zanden based their estimates on previous attempts at quantifying early modern Spanish economic performance. In his most recent study (van Zanden 2005a) follows Albert Carreras (2003), who, in turn, relied on contributions by (García Sanz 1991) and (Yun-Casalilla 1994), while (Maddison 2003) drew also on Yun's estimates. Moreover, (van Zanden 2005b) regressed (largely conjectural) per capita GDP estimates on the labour share in agriculture and on real wage rates for a sample of countries, and used the resulting

---

[3] Computed as the natural logarithm of the ratio between the corresponding values for the final (1800 or 1820) and the initial (1500) dates.

[4] Maddison (2003) uses for 1820-1850 a figure derived from a previous study (Maddison 1995) in which he assumed that real per capita GDP growth between 1820-1850 matched that computed for 1832-1860 by Prados de la Escosura (1982: 110). However, Maddison (2003: 66) implicit yearly growth rate is 0.23 percent while Prados de la Escosura (1982: 69) is 0.34 percent. Later, (Prados de la Escosura 1988) reckoned that real GDP per head increased at an annual rate of 0.14 percent between 1800 and 1860.

[5] Alternative estimates of Spanish per capita GDP relative to the United Kingdom, instead of England, in 1850 suggest a higher figure: 46 percent, according to Maddison (2003) that goes up to 64 and 68 percent, in purchasing power parity terms, in Prados de la Escosura (2000) and (Bairoch 1976) computations, respectively, while it is only 43 percent in nominal terms (that is, when the conversion is made with the trading exchange rate) (Cf. Prados de la Escosura 2000).

parameters, together with data and conjectures on the share of the economically active population employed in agriculture and with real wage rates, to derive per capita income estimates.

Hence, we must begin by examining how these computations were made by (Yun-Casalilla 1994) and (Carreras 2003) and testing their consistency against the available evidence.

Carreras followed an eclectic approach in which he derived GDP guesstimates on the basis of (García Sanz 1991) bold conjectures about Castilian fiscal pressure (that is, tax revenue expressed as a proportion of GDP) and combined them with Yun's GDP estimates from the expenditure side for the Kingdom of Castile. (García Sanz 1991) reckoned that, by mid-eighteenth century, the *Rentas Provinciales* represented between 4.0 and 6.5 percent of the Kingdom of Castile's national income.[6] He went on to suggest that if, around mid-eighteenth century, these main taxes provided the Treasury with 25 percent less revenue than in 1600, while the population had increased by 15 percent, "it would be reasonable to estimate that tax revenues in 1600 represented around 10 percent of Castile's 'national' income". He added that fiscal pressure could have reached 5 percent of GDP around 1500, and up to 15 percent in the first half of the seventeenth century. Thus, Carreras, by (implicitly) identifying Spain with Castile, obtained Spain's nominal GDP as the result of dividing tax revenues –excluding revenue from America– by García Sanz's fiscal pressure guesstimates, and used the available population data to derive per capita GDP.

Estimating fiscal pressure in the Early Modern Age presents a major obstacle not only because GDP estimates are unavailable, but also because of the complexity to derive accurate figures for tax revenues.[7] There were different fiscal authorities in Spain before and after the *Decretos de Nueva Planta* at the beginning of the eighteenth century.[8] Consequently any estimate of Spain's taxation would require information regarding the components of the Kingdom of Aragon (that is, Aragon, Valencia, Catalonia, Balearic Islands) and the Kingdom of Navarre, in addition to that on the Kingdom of Castile (the dominant but declining part, that includes the rest of Spain)

[6] *Rentas Provinciales* were taxes paid in the Kingdom of Castile that mainly fell on consumption goods (alcabalas, cientos, millones, etc.).
[7] Cf. García Sanz (1991). It is well known that the complexity to collect taxes resulted in the decision to concentrate fiscal pressure on cities.
[8] The *Decretos* (decrees) *de Nueva Planta* represented the institutional and fiscal unification of the Kingdoms of Castile and Aragon that led to the introduction of new taxes in Aragon.

(Figure 1). GDP estimates based upon hypotheses on the level of fiscal pressure are, therefore, far from accurate and should be treated with extreme caution.[9]

(Yun-Casalilla 1994) based his computation of private consumption for late sixteenth and early seventeenth century Castile (c. 1590 and c. 1630) on different estimates of rural families' expenditure to which he added public spending in order to reach total consumption, as an approximation to GDP.[10] For 1750, he revised upwards the Cadastre de Ensenada (1752) figures, while he derived his estimates for the last decade of the eighteenth century from the various contemporary sources.

How reliable are these figures? One way of testing their validity would be comparing them with wage data that has been frequently used to measure of welfare (van Zanden 1999), and (Allen 2001). Unfortunately, however, wage rates do not provide a good proxy for per capita income (Hoffman, Jacks, Levin, and Lindert 2002). Evidence on wages refers to wage rates and not to earnings as there is no indication of the number of days and hours worked. Moreover how representative wage earners were in total labour force is usually an unknown (Maddison 2003, Craig and Fisher 2000: 58-60). Furthermore, in the early modern age, an intensification in the time allocated to work occurred, either to offset the decline in wages rates by increasing the amount of working time (van Zanden 1999) or because the consumption opportunities resulting from new industrial developments increased the opportunity cost of leisure (de Vries 1994), (Allen 2004).[11]

We could compute, however, a lower bound for per capita income on the basis of wage information, with the help of the following expression:

$$y = w * L/N * d/L * s^{-1} \qquad [1]$$

where ***y*** represents per capita income; ***w***, the daily wage rate; ***L***, the economically active population; ***N***, total population; ***d***, the number of hours (or days) worked per EAP each year; and ***s***, the share of labour in national income (Malanima 2006).

Gaspar Feliu (1991) provides information on unskilled wages (journeymen or day labourers' (*jornaleros*) and farm workers' (*peones*)), expressed in grams of silver, for Catalonia, along with similar data for Old and New Castile, Andalusia and Valencia

[9] Moreover, the data on taxation capture better, perhaps, the economic situation of the Monarchy than that of the Spanish economy.

[10] He appears to have neglected investment (at least, private capital formation, as public investment could be included under the public spending estimates) in his GDP estimates.

[11] The improvement of housing, the acquisition of durable goods and the increasing consumption of exotic goods has been pointed as evidence of material progress just at the time real wages were declining (Reis 2005: 199).

originally from Earl Hamilton (1934). To derive ***w*** we weighted unskilled wages for the Kingdoms of Castile (taken from Old and New Castile and Andalusia) and for Aragon (obtained from Catalonia and Valencia) by their shares in Spain's population (roughly three-fourths and one-fourth, respectively).

Then, the proportion of the total population represented by the economically active population, ***L/N***, was needed. A figure of 30.5 percent was estimated from the Cadastre of Ensenada (1752) for the Kingdom of Castile by Grupo´75 (1977). Such a low figure results from the practice of excluding the female population from the economically active population (EAP) in the eighteenth century censuses.[12] This is an extreme assumption but, as our goal is to obtain a lower bound estimate for per capita income, we decided to accept it.

The next step was to establish the number of days worked, ***d***. Paul Bairoch (1965) accepted 196 days for nineteenth century Europe, and Robert Allen (2001) opted for a higher figure, 250 working days, for early modern Europe.[13] However, in the Cadastre de Ensenada it was assumed that farmers worked 120 days per year, artisans, 180, and servants, 250 (Ringrose 1983).[14] We chose 180 days as a compromise.

Finally, for the share of labour in national income, ***s***, we adopted the closest available estimate, that one for the 1850s, 0.75 (Prados de la Escosura 2003).

Our estimates represent, therefore, a lower bound estimate not only because of the astringent assumptions introduced in the calculation (the use of unskilled wages only, a low rate of activity, and a low number of days per worker and year) but also because money wages were only a part of the returns to unskilled labour (López-Salazar 1986). Available evidence on the working poor for the 1840s suggests that a large gap existed between their expenditure and their income (García Sanz 1981).[15]

---

[12] An even lower figure, 26.4 percent, results from the 1787 Floridablanca's population census. These figures are lower than those for the mid-nineteenth century: 35.8 percent in the 1850s and 36.5 percent as an average over 1850-1913. In the nineteenth century estimates female agricultural labour has been excluded due to statistical errors. Cf. Prados de la Escosura (2003).

[13] (Bairoch 1965) worked on the assumption that the figure for per capita income equals the daily wage multiplied by 196.

[14] See also Vilar (1970: 129) and Santaolaya (1991). The figure for days worked in agriculture is confirmed by James (Simpson 1992) for late nineteenth century Andalusia, where labour input requirements implied that agricultural workers were employed for fewer than 120 days per year.

[15] Such gap between income and expenditure is a recurrent phenomenon in present day studies carried on the basis of microdata obtained from household surveys (For present day Spain, cf. Goerlich and Mas 2001: 364). A discussion is presented in Milanovic (2005: 16-17). As individuals tend to conceal their income due to taxation, expenditure seems a better approximation to the concept of permanent income and has become a preferred measure of the standard of living.

In order to facilitate the comparison between per capita income estimates resulting from our arithmetical exercise and the available estimates of GDP per head, all of them were converted in grams of silver.[16]

The ratio between the available conjectures on GDP per head and our own lower-bound estimates of per capita income is provided in Table 3. It clearly appears that Carreras (2003) and Yun-Casalilla (1994) figures, and those that can be derived on the basis of García Sanz (1991) conjectures on fiscal pressure, tend to be, up to the mid-eighteenth century, on the low side. Naturally, if the astringent hypotheses introduced were relaxed, our resulting per capita income estimates would, then, be much higher than the available conjectures on GDP per head.

Why are these GDP guesstimates on the low side? Our proposed explanation is that they suffer from two main biases. The first one is that they only take one part of Spain into account: the Kingdom of Castile and, often, only Old and New Castile. Other regions, especially those on the Mediterranean periphery, amounting to approximately 30 percent of Spain's territory, are left aside.

A way of assessing the extent to which focusing exclusively on Castile introduces a downward bias in Spain's GDP estimates is to look at regional population trends. The scant information available indicates substantial differences in population growth across regions (Table 4)[17], a result confirmed since the late seventeenth century by David Reher (Figure 2).[18] The more vigorous demographic performance in the Kingdom of Castile during the sixteenth century is clear, with New Castile and Galicia, where the rate of growth exceeded 1 percent per year, standing out. The Kingdom of Aragon took over in the seventeenth century, with moderate growth, while the population of the Kingdom of Castile fell, despite the increases recorded in some regions (Basque, Murcia, and Andalusia). In the eighteenth century, only Murcia and Asturias (and, to a lesser extent, Galicia) were able to match Catalonia and Valencia's

---

[16] The reason to convert nominal figures into grams of silver derives from the depreciation of the *real de vellón* from the early seventeenth century onwards. The large amount of vellón coinage (fiat money made of copper) in the seventeenth century was rejected by the public, instead of contributing to facilitate minor transactions (Motomura 1997, Sargent and Velde 2002). It is not possible to know what proportion of tax revenues were in silver and what proportion in *vellón*. Consequently, as we had to assume that all tax revenues were in *vellón*, GDP estimates based on fiscal pressure may be downward biased from the seventeenth century onwards.

[17] The dispersion of regional population growth rates (as measured by the coefficient of variation) rose from 0.5 between 1530 and 1591 to 2.2 in the seventeenth century, before falling to 0.6 and 0.3 in the eighteenth and early nineteenth century, respectively.

[18] David Reher kindly allowed us to use his unpublished population estimates derived from baptisms records.

demographic dynamism. Early nineteenth century demographic acceleration was led by the peripheral regions with the pace of Catalan growth doubling that of Castile. In short, the uneven regional expansion since the sixteenth century changed the geographical distribution of Spain's population and, consequently, pushed economic activity (with the exception of Madrid) towards the coastal areas. Regional discrepancies in population growth could signal very different paths of economic progress as demographic expansion often leads to widening the market and increasing specialization (Reis 2005: 198). Alas, such different regional demographic performance is neither captured by current assessments of early modern Spain's economic performance nor by trends in real wages that offer roughly the same declining pattern across regions (Figure 3).

A non negligible caveat to be made is that the population figures assigned to Spain in international comparisons (de Vries 1984, Bairoch, Batou, and Chèvre 1988, Allen 2000) present large discrepancies with those currently used by Spanish historical demographers. Population figures by Bairoch and his associates are significantly higher than those generally accepted by Spain's historians (Table 5): for the early sixteenth century, for example, is one and a half times higher and 18 percent larger than the consensus upward revision of the 1797.[19] The resulting trends in population growth are also discrepant, as illustrates the contrast between the brisk population expansion in the sixteenth century and in the early nineteenth century (Table 4) with the sluggish pace that result from Bairoch et al.'s figures.

The second bias derives from the almost exclusive concentration on agriculture.[20] It is true that there is little documentary evidence on trade, industrial production in rural areas, and services but the lack of data does not justify its neglect.[21] In fact, albeit a significant part of the Spanish economically active population, often the best educated people, worked in services (López-Salazar 1986, Alvar Ezquerra 1989, Reher 1990, Yun-Casalilla 2004), the services sector has been excluded from GDP guesstimates and, consequently, its levels underestimated.[22]

---

[19] It should be noted that de Vries (1984) also tends to overestimate the population: by more than 40 percent for 1500 and around 20 percent for 1600.

[20] For example, computing expenditure on the basis of peasant family consumption, as Yun-Casalilla (1994) does, implies assuming that no difference existed between urban and rural consumption levels.

[21] The fact that, in the late sixteenth century, real wages in Spain were among the highest in Europe (Allen 2001) also suggests that activities outside agriculture must be taken into account.

[22] In fact, it has often been pointed that one of the factors behind Castilian backwardness was the high proportion of the workforce involved in the unproductive services sector.

It is well known, for example, that commerce with America was initiated and controlled by Castile and led to increased trade all over Europe since the sixteenth century. If the arrival of American silver, as has been argued, caused *Dutch disease* in Spain (Forsyth and Nicholas 1983), it should be reflected in an increase in non-tradable goods' production, that is, mainly in construction and services. [23] Neither sector, however, has been taken into consideration in the available estimates.

An active transport sector, for example, had to develop if large quantities of foreign goods were imported into Spain, given the nature of the country's geography and particularly that of Castile which cities were located several hundred kilometres away from the coast.[24] Evidence for Old Castile and Andalusia villages indicates that a non negligible part of the economically active population was employed in transportation (Herr 1989, Bernardos Sanz 2003). Transport activities must have had an impact on urban centres, not only because they received their supplies, as in the case of the capital city, Madrid, but because of the development of highly active trade networks that required its services.[25]

To sum up, a more comprehensive view of early modern Spain's economic performance requires widening the focus to include regions other than Castile and economic activity outside agriculture. Looking at the pace of urbanization is one way to do it, as it was in towns and cities where most, though not all, the industrial and service sectors' activity took place.

Urbanization: A glance at long-run performance outside agriculture

---

[23] The arrival of American silver provides a case in point. There is almost complete agreement among historians about the impact of New World precious metal. In Europe, American silver reduced transaction costs and encouraged trade, leading to an increase in output. Both rural and urban industrial growth received a stimulus. It also strengthened the trade link between Europe and Asia, diversifying consumption and opening new markets to an active group of traders (Hamilton 1934). Spain, however, would be the only country negatively affected by American silver, which pushed up nominal wages, made agricultural products more expensive, encouraged the consumption of luxury goods and acted as a disincentive to work.

[24] A high transport activity must have remained until, at least, mid-seventeenth century, as the amount of American specie arriving in Spain, the main source used to pay for the imports, grew until 1620. The scarcity of transport is, nonetheless, one of the elements most frequently put forward to explain Spain's economic backwardness (Ringrose 1970).

[25] Such networks distributed and traded the foreign goods consumed in Spain that were paid for, not only with silver, but also with wool, high quality cloth or raw materials. One of the most active trade centres was the area of Bilbao and Navarre which linked the French border and the ports along this part of Spain's north coast with the central plateau (Priotti 2005). While, during the sixteenth century, smuggled goods from France passed through Bilbao or Navarre on their way to Valladolid, Burgos and Medina del Campo, in the following century the destination of such goods was mainly Madrid. Merchants from Soria went to the capital to stock up on these imported goods. Madrid's importance lay not only as a centre of consumption but also in its role as a hub of redistribution for all types of merchandise to the rest of the peninsula. Trading activity, in addition to that linked with America via the *Carrera de Indias* also took place in the south.

By comparing figures for urban dwellers with those for the total population we can trace urbanization trends through the Early Modern Age. But how can we define 'urban' population? To keep consistency with Bairoch, Batou, and Chèvre (1988), we define 'urban' population as dwellers of towns of 5,000 inhabitants or more. Such a definition is arbitrary and other authors prefer a threshold of 10,000 (de Vries 1984) or 20,000 (Flora 1981) inhabitants.[26] However, maintaining a constant threshold over time, while population grows, is questionable (Wrigley 1985).

It is clear that the higher the threshold to be deemed as an urban centre, the lower the probability of including people employed in the agricultural sector.[27] In the case of Spain, it has been argued, urbanization rates are over-exaggerated due to the existence of 'agro-towns', especially in central and southern Spain. 'Agro-towns', a legacy of highly concentrated landownership that led to a large proportion of landless agricultural workers, were mainly located in Andalusia, Murcia, and the south of Valencia (Casado 2001, Reher 1990).

Unfortunately, it is far from easy to exclude that part of the population totally or partially employed in agriculture from the urban population for the early modern age. Likewise, it is difficult to leave out the rural population totally or partially occupied in industry or services as the diversification of labour activities was a widespread phenomenon (Federico 1986, Domínguez 1994). In Spain, a non negligible share of the rural population worked in manufacturing and in the provision of services during the slack season in agriculture (Herr 1989, López-Salazar 1986). It is also true that farmers and rural labourers could be found among urban population and, consequently, neither the income of the rural population derived exclusively from agriculture, nor that of the urban population came only from industry and services. Thus, alongside the existence of 'agro-towns', we should keep in mind non-agricultural activities carried out by the rural population (storage, transportation, domestic service, construction, light manufacturing).[28] Perhaps, then, rather than assigning each worker to a single occupation a more rigorous option would be to measure employment composition by

[26] Bairoch, Batou, and Chèvre (1988) employ alternatively 2,000, 5,000, 10,000, and 20,000 inhabitants.
[27] In order to mitigate the inclusion of 'agro-towns', in which most of the population is employed in agriculture, Paolo (Malanima 1998), for example, proposes a lower limit for being considered urban: 5,000 inhabitants for the north and centre of Italy, and 10,000 for the south of the country.
[28] Wool provides a case in point in early modern Spain. A mainly rural activity, it had both industrial and services (trade, transport, financial services) dimensions (García Sanz 1986).

sector in terms of days or hours (Wrigley 1985).[29] More important, however, from the point of view of economic growth is to emphasize that the reduction in transaction costs and the specialization associated to a more intense use of the market in urban centres does not conflict with the kind of economic activity performed by those living in towns (in other words, urban dwellers, regardless their occupation, benefited from the use of the market more than those living in the countryside).

Different attempts to discriminate between agricultural and non-agricultural employment in towns have been carried out for early modern Spain. David (Reher 1990) reckoned that, in 1787, half the economically active population living in towns in Spain worked in agriculture. Reher's computations are on the high side as he increased artificially the share of urban population employed in agriculture by allocating all day labourers to this sector while excluding servants from the labour force (Reher 1990). Recently, Enrique Llopis Agelan and González Mariscal (2006) introduced a more astringent definition of urban population: in order to qualify as 'urban', a population centre needs to have a) more than 5,000 (alternatively, they also used 10,000) inhabitants and b) less than half of its economically active population (EAP) occupied in agriculture. This way they estimated, also for 1787, that the conventional rate of urbanization (23.7 percent, according to their own computations) should be cut down to almost half of it (12.7 percent).[30]

Notwithstanding the existence of 'agro-towns', a large proportion of urban economic activity was associated to industry and services. From data on the six major cities in sixteenth century Old Castile, Yun-Casalilla (2004) reckons that agricultural employment represented, on average, 8 percent of the total labour force. For the late eighteenth century Pérez Moreda and Reher (2003: 129) observe that most urban day labourers were employed outside agriculture and, according to their estimates from the 1787 population census, 'labradores' (farmers) only represented 7.6 percent of the urban population in Spain.

In our case, we accepted the 5,000 inhabitant conventional threshold to define an urban centre, but qualified it by previously adjusting the urban population downwards to exclude those living on agriculture. In order to distinguish the shares of those employed in agricultural and in non-agricultural activities for both the total urban and rural

[29] The number of days (and hours) worked per EAP in Spain was lower in agriculture than in industry and services leaving extra time to work in non-agricultural activities. Cf. Santaolaya (1991), Vilar (1970: 19) and (Ringrose 1983).

[30] 14.5 percent if we accept a less astringent definition of urban population.

population we have carried out an arithmetical exercise along the lines suggested by Wrigley (1985) and more recently Allen (2000) that, nonetheless, introduces some departures from the original approach. Wrigley assumed that all the agricultural population lives in rural areas so the crucial distinction to make is between the agricultural and non-agricultural shares of rural population.[31] However, since the existence of 'agro-towns' is accepted in the case of Spain, our challenge has been to establish the share of population employed in agriculture in both the rural and the urban populations.

In order to do so, we could start by comparing the share of the economically active population occupied in agriculture (L_{agr}/L), with the share of the rural population within total population (N_{rur}/N). If the [(L_{agr}/L):(N_{rur}/N)] ratio is above one it can be claimed that part of the population living in towns worked in agriculture. Conversely, a ratio below one suggests that part of those living in the countryside work for industry and services. This way we could distribute rural and urban population into agricultural and non-agricultural. However, a further adjustment is required to allow for urban-rural differences in both the proportion of those of working age (that is, the potentially active population, PAP), in total population (N), and the share of the working age population (PAP), which is economically active (EAP). This way, a more accurate test can be performed by comparing agricultural and the rural EAPs (L_{agr}/L_{rur}).

Fortunately, we have information on the PAP/N ratio in both rural and urban areas by region for 1787 (Marcos Martín 2005). This ratio (computed –due to data restrictions in the early modern population censuses– as population ages 16 to 50 over total population) differs for each region (i) between urban ($PAP_{urbi1787} / N_{urbi1787}$) and rural ($PAP_{ruri1787} / N_{ruri1787}$) areas, being larger in the former, but with a low dispersion in both cases.[32] The implication is that using rural and urban population without a previous adjustment for age composition would bias our results against agricultural employment as, on average, the rural PAP/N ratio is 87.5 percent of the urban one. Unfortunately, there are no data on the PAP/N ratio over time except for New Castile for which it was computed by David Reher (1991: 70-74) from the late sixteenth century onwards. We decided that given the low regional dispersion in 1787 it was safe

[31] Allen (2000) accepts the difficulties involved in estimating the number of urban farmers, but claims that 'their number was small as is the error from assuming it was zero'.

[32] They were, on average, 55.7 and 48.8 percent in urban and rural areas, respectively. The urban and rural coefficients of variation are 0.056 and 0.023, respectively and are computed from Marcos Martín (2005). The regional dispersion in the activity rate (EAP/PAP) is also low, 0.113.

to assume that long-run changes in this ratio for New Castile ($\boldsymbol{PAP_{NCj} / N_{NCj}}$) would be acceptable for the rest of Spain.[33] Therefore, we derived the urban and rural working age population for every region ***i*** at each benchmark year ***j*** (= 1530, 1591, 1700, 1750, 1787, 1857) as follows,

$$PAP'_{urbij} = N_{urbij} * (PAP_{urbi1787} / N_{urbi1787}) * ((PAP_{NCj} / N_{NCj}) / (PAP_{NC1787} / N_{NC1787})) \quad [2]$$

$$PAP'_{ruri j} = N_{ruri j} * (PAP_{ruri1787} / N_{ruri1787}) * ((PAP_{NCj} / N_{NCj}) / (PAP_{NC1787} / N_{NC1787})) \quad [3]$$

Then, in order to arrive to regional figures for EAP urban ($\boldsymbol{L_{urbij}}$) and rural ($\boldsymbol{L_{rurij}}$) at each benchmark we needed to derive the relevant EAP/PAP ratios. Alas, only the PAP/EAP ratio for 1787 could be computed, being unable to distinguish between urban and rural ratios. Thus, we were forced to estimate regional figures of urban and rural EAP for every region and benchmark year as

$$L'_{urbij} = PAP'_{urbij} * (L_{i1787} / PAP_{i1787}) \quad [4]$$

$$L'_{ruri j} = PAP'_{ruri j} * (L_{i1787} / PAP_{i1787}) \quad [5]$$

Next, we compared the economically active population occupied in agriculture ($\boldsymbol{L_{agr}}$), with the economically active rural population ($\boldsymbol{L_{rur}}$). If $\boldsymbol{L_{agr} > L_{rur}}$ it can be presumed that part of the population living in towns worked in agriculture. Conversely, when $\boldsymbol{L_{agr} < L_{rur}}$ the implication is that those living in the countryside allocated part of their working time to industry and services. This way we distributed rural and urban EAP into agricultural (*agr*) and non-agricultural (*nonagr*) occupations and reached a figure for urban non-agricultural EAP ($L'_{urb\text{-}nonagrij}$).

$$L_{rur\text{-}nonagrij} = L'_{ruri j} - L_{agrij} \quad \text{if } L'_{ruri j} > L_{agrij}\text{, 0 otherwise} \quad [6]$$

$$L_{rur\text{-}agrij} = L'_{ruri j} - L_{rur\text{-}nonagrij} \quad [7]$$

$$L'_{urb\text{-}agrij} = L_{agrij} - L'_{ruri j} \quad \text{if } L_{agrij} > L'_{ruri j}\text{, 0 otherwise} \quad [8]$$

$$L'_{urb\text{-}nonagrij} = L'_{urbij} - L'_{urb\text{-}agrij} \quad [9]$$

Thus, economically active population outside agriculture is obtained as

$$L_{nonagrij} = L_{rur\text{-}nonagrij} + L'_{urb\text{-}nonagrij} \quad [10]$$

Moreover, we can estimate the adjusted population in towns of 5,000 or more inhabitants (excluding those living on agriculture), by re-scaling the resulting figures for urban EAP outside agriculture with the activity rate (***L/N***),

$$N'_{urb\text{-}nonagrij} = L'_{urb\text{-}nonagrij} / (L'_{urbij} / N_{urbij}), \quad [11]$$

Thus, we obtain an 'adjusted' rate of urbanization that offsets partly at least the upward biased effect of the agro-towns:

---

[33] The PAP/N ratio, computed for the share of population between 15 and 50 years old, was rather stable over time with less than 5 percentage changes around the 1787 ratio (Reher 1991: 70-74).

$$Adjusted\ urbanization\ rate_{ij} = 100 * N'_{urb\text{-}nonagr_{ij}} / N_{ij} \quad [12]$$

Regrettably, though, we lack data to compute the share of the EAP occupied in agriculture ($\boldsymbol{L}_{agr}/\boldsymbol{L}$) at each benchmark year. For $\boldsymbol{L}_{agr}$ evidence can only be obtained from the Cadastre of Ensenada (Grupo´75 1977) for the Kingdom of Castile in the 1750s, and from Floridablanca's population census for the whole of Spain in 1787.[34] This shortcoming was also faced by Wrigley (1985) and Allen (2000). Wrigley (1985) assumed that, in early sixteenth century England and France, up to 80 percent of the rural labour force was in agriculture and he reduced arbitrarily this figure over the three following centuries. Allen (2000) accepted the same percentage for most European countries *circa* 1500 and interpolated the years up to the first one (1800) for which he had estimates. In our case we followed Wrigley and Allen and assumed a fixed 80 percent share of EAP in agriculture as the starting point in 1530 and interpolated log-linearly the shares between 1530 and 1787.[35] A sensitivity test was carried out assuming that the 1787 $\boldsymbol{L}_{agr}/\boldsymbol{L}$ remained unchanged for the entire time span considered. Although slightly different, the results exhibited the same trends for adjusted urbanization rates.[36]

Spanish urbanization rates over three and a half centuries, both unadjusted and adjusted to exclude population living on agriculture, are presented, alongside those derived by Bairoch, Batou, and Chèvre (1988), in Table 6. The figures by Bairoch and his collaborators suggest a stable rate of urbanization of around 20 percent, with a moderate rise in the sixteenth century and a similar decline between mid-eighteenth and mid-nineteenth century. Our figures, in contrast, indicate a substantial increase in urbanization during the 1500s, a sharp fall in the seventeenth century that was reversed during the eighteenth century.[37] In the early nineteenth century both the unadjusted and adjusted rates of urbanization continued expanding at 0.4 percent yearly. It is worth stressing that the discrepancy between the unadjusted and adjusted urbanization rates affects mainly to Andalusia, Murcia, and Valencia, as a result of the existence of agro-

[34] Reproduced in Llopis Agelán (2001).

[35] The share of EAP in agriculture in regions of the Kingdom of Castile is systematically higher in the Floridablanca Census (1787) than in the Cadastre de Ensenada (1752). We opted for the former as it provides an upper bound for our $\boldsymbol{L}_{agr}$ estimates and, hence, we bias downwards the adjusted urbanization rates.

[36] The adjusted rates of urbanization for Spain resulting from accepting the 1787 share of labour force in agriculture as fixed over 1530-1787 are only different from those obtained by assuming that, initially (1530), the 80 percent of the labour force was occupied in agriculture, for the sixteenth century. Thus, the alternative results are: 12.0, instead of 9.9 percent, for 1530; and 16.5, instead of 14.5 percent, for 1591.

[37] Cumulative annual rates for the unadjusted and adjusted urbanization rates were, respectively, 0.8 and 0.6 percent in the sixteenth century, -0.55 and -0.24 percent in the seventeenth century, and 0.9 and 0.5 percent in the eighteenth century.

towns (Tables 7 and 8). By 1857, the population living in towns reached around one fourth of total population for the adjusted rate (and almost one third for the unadjusted one), that is, nearly two and a half times the level in the early sixteenth century (although only one and a half times compared to 1591). This represents an annual growth of 0.26 percent for the adjusted urbanization rate (0.29 percent, for the unadjusted one) over three and a half centuries, while, according to Bairoch, the rate of urbanization remained unaltered. Moreover, our adjusted rate of urbanization for 1787, 17.6 percent (including the Canary Islands), is higher than the one proposed by Llopis and Mariscal (2006) which ranges between 12.7 and 14.5 percent.

Highly unequal regional urbanization rates can be observed.[38] The Kingdoms of Castile and Aragon exhibited clearly different trends. In the Kingdom of Castile the (unadjusted) rates of 1591 were only comfortably surpassed in 1787, and then just in Murcia, the Basque Country and New Castile (due to Madrid's capital city effect). The slowdown experienced in the seventeenth century and the subsequent, gradual recovery affected both Kingdoms of Castile and Aragon. Population in the cities fell and de-industrialization took place in Castile, where the rate of urbanization slumped to 8.8 percent in 1646.[39] By the mid 1640s, this urban decline had reached an end, except in New Castile and the Basque Country where it persisted until 1700. In contrast, all the regions of the Kingdom of Aragon, except the Balearic Islands, peaked in the late eighteenth century. Rapid urban growth during the eighteenth century, especially in its second half, allowed the Kingdom of Aragon to recover the leading position it had relinquished during the 1500s.[40]

Table 9 provides another facet of regional diversity: the pace at which adjusted rates of urbanization progressed, that exhibits a much higher dispersion.[41] The growth of the urbanization rate was impressive in New Castile and Extremadura during the sixteenth century (more than four times faster than the national average). Northern regions experienced accelerated urbanization in the late eighteenth and early nineteenth century. Extremadura was also the main actor in the urban collapse of the seventeenth

[38] The coefficient of variation was kept around 0.8 for the unadjusted rates and slightly lower for the adjusted ones.
[39] De-industrialization in Castile is well documented. Cf. Reher (1990) and López-Salazar (1986) for New Castile and García Sanz (1986) and Yun-Casalilla (1987) for Old Castile.
[40] Lack of data prevents us from measure the depth of the urbanization decline in the Kingdom of Aragon during the seventeenth century.
[41] The coefficient of variation reached 2.1 and 2.40 in the sixteenth century and in the early eighteenth and was a bit lower in the seventeenth (1.6) and the late eighteenth and early nineteenth century (1.4 and 1.3, respectively).

century (and, later, in the recovery of the eighteenth century). It is worth pointing that the adjusted rate of urbanization did not fall in seventeenth century Andalusia (although the unadjusted rate shrank) and this partly explains the milder contraction in Spain's adjusted urbanization rate. The big urban push of the late eighteenth century in Valencia, Murcia, and Catalonia, after the recovery of the early 1700s, contributed to overcome the national peak level attained in 1590.

We can conclude, then, by stressing that urbanization did not remain stagnant, as suggested by Bairoch, Batou, and Chèvre (1988) figures but experienced dramatic changes across regions and over time. As changes in the 'adjusted' urbanization cast light on the behaviour outside agriculture, our findings challenge the conventional assessments of Spanish economic performance and lead us to investigate what happened to aggregate economic performance.

Where can we go from here? A proposal of new output estimates

Urbanization has often been used as an indicator of economic progress.[42] The link between increasing urbanization and economic growth is predicated on the fact that cities spread the use of the market and stimulate innovation (North 1982, Boserup 1987). Urbanization represents, according to Kuznets (1966), 'an increasing division of labor within the country, growing specialization, and the shift of many activities from nonmarket-oriented pursuit within the family or the village to specialized market-oriented business firms'. Furthermore, in the early stages of modern economic growth, as a country's capital stock consists largely of dwellings it tends to be correlated with urbanization.[43]

In a pre-industrial economy, according to Wrigley (1985), increases in real per capita income are, *ceteris paribus*, linked to the proportion of the total population living in urban centres.[44] This approach found support in van Zanden (2001) who argued that "regional differences in levels of development (..) are perhaps best approached via variations in the urbanization ratio".[45] More cautious, Paolo Malanima (2003), in the

[42] In Arthur Lewis's (1955: 337) view, 'because economic growth reduces the importance of agriculture in the economy, it is necessarily associated with urbanization'. Simon Kuznets (1966: 60) depicted it as 'a necessary condition for industrialization and modern economic growth'.

[43] In the composition of Spanish capital stock by mid-nineteenth century (the earliest date for which information is available) non-residential construction came second to dwellings while machinery and transportation equipment were much less important (Prados de la Escosura and Rosés 2007).

[44] In the historical literature parallels have been drawn between movements of urbanization rates and those of per capita GDP. Cf. Acemoglu, Johnson, and Robinson (2005), Craig and Fisher (2000), Reis (2005), Peter Temin (2006), Wrigley (1985).

[45] Cf. Craig and Fisher (2000: 114) for a similar proposal that includes using changes in the urbanization rate as a proxy for per capita income growth.

case of early modern Italy, used urbanization to capture output trends in industrial and services,[46] while computed agricultural output indirectly through a demand approach. Analogously van Zanden (2001: 71-2) employed a 'development index' derived by combining population and urbanization ratios to measure European countries' progress between 1500 and 1800.

Our strategy to arrive to aggregate output estimates has been, following Malanima's approach, to accept urbanization as a proxy for economic activities outside agriculture, and to estimate agricultural output indirectly.

Given the lack of hard empirical evidence on agricultural output, two alternative ways of indirectly estimating its trends have been proposed for early modern Europe. Wrigley's (1985) proposal assumes that, in the long run, food consumption per head is roughly constant. This way agricultural output evolves as total population (adjusted, when data are available, for the food trade balance) and labour productivity can be easily derived if we have crude estimates for the EAP in agriculture.[47] Crafts (1976, 1980, 1985) criticised the assumption of constant per capita food consumption arguing that the values of price and income elasticities of demand for food in developing countries are significantly different from zero.[48]

The most recent estimate using the demand function approach has been Robert Allen's (2000) who derived agricultural output per head and EAP for a sample of pre-industrial European countries.[49] He first estimated agricultural consumption per head that, once adjusted for net food imports, allowed him to derive output per head. He, then, obtained total output with population figures and divided it by the EAP in agriculture to estimate labour productivity. Allen (2000) used the following expression to estimate real consumption per head of agricultural goods (c),

---

[46] Malanima (2003: 281) emphasised that he did not identify urban population with the share of the labour force outside agriculture but, rather, suggested a relationship between urbanization and non-agricultural output, regardless whether industrial and services output was produced in town or countryside. Malanima (2003: 281-3) ran a regression between the share of non-agricultural activities in GDP and the urbanization rate over 1861-1938 and used the parameters from the regression to predict the relative size of industry and services for each level of urbanization.

[47] Such method was already used (and sometimes adjusting for the food trade balance) for eighteenth century Britain by Deane and Cole (1967) and Overton (1996), nineteenth century Spain (Simpson 1989, 1995) and, more recently, late medieval Italy (Federico and Malanima 2004).

[48] However, recent research on present day's poor countries reveals that consumption per head of food staples remains constant in aggregate terms as per capita income rises (Bouis 1994). It should notice that Wrigley's proposal is a particular case of a demand function of agricultural goods in which price and income elasticities are zero.

[49] Crafts (1976, 1980, 1985) was the pioneer in the use of the demand approach to derive agricultural consumption and output. The method was later used by Jackson (1985) and Allen (1999) for eighteenth century Britain and by Prados de la Escosura (1988, 1989) for nineteenth century Spain.

$$c = a P^e I^g M^b \qquad [13]$$

in which ***a*** represents a constant to which he arbitrarily assigned the value of one, ***P*** and ***M*** denote agricultural, and non-agricultural prices relative to the consumer price index (CPI), ***I*** stands for real unskilled wages, while ***e***, ***g***, and ***b*** are the values of own price, income and cross price elasticities, respectively.

We have replicated Allen's calculations for the main Spanish regions at given benchmarks between 1530 and 1857 and, later, derived a national aggregate. Since we could only estimate agricultural output through the demand approach for seven regions, we obtained a national estimate by applying a scalar to the regional average. Such scalar was the ratio between the national aggregate and the average for those seven regions derived through the Wrigley approach. We adopted Federico and Malanima's (2004) values for own price (***e*** = -0.5), income (***g*** = 0.4) and cross price (***b*** =0.1) elasticities of demand, as there are significant similarities between Spain and Italy.[50] Due to lack of trade data for most of the considered period, we had to assume, as Allen (2000) did in most European cases, that agricultural trade was balanced. Fortunately, the available evidence for the late eighteenth and early nineteenth century indicates that trade represented a small share of agricultural output (Prados de la Escosura 1988, 1993).[51] This means that output per head (***q***) equals per capita consumption (***c***). Labour productivity can be, then, derived as:

$$(Q/L)_{agr} = q\ N/L_{agr} \qquad [14]$$

We departed from Allen's estimates of agricultural output in early modern Spain by using different regional data set for agricultural and non-agricultural prices, consumer price indices (CPI), and real unskilled wages (***I***).[52]

---

[50] Allen (2000) assumed slightly different values for own price (***e*** = -0.6) and income (***g*** = 0.5) elasticities of demand. We replicated the exercise using Allen's values and the results did not change significantly. These alternative computations are available under request.

[51] It can be reckoned that Spain was a net food importer in the late eighteenth century up to, at most, 5 percent of GDP and no more than 10 percent of agricultural output (Prados de la Escosura 1993: 271-73, 276). By mid-nineteenth century, however, Spain was a net exporter of foodstuffs, though but no more than 5 percent of agricultural output (Prados de la Escosura 1988, 2003). This conjectural calculation suggests that the improvement in consumption per head between 1787 and 1857 should be raised by around 15 percent to represent the increase in agricultural output per head. As a consequence our estimates are downward biases over 1787-1857.

[52] All prices and wages were quoted in silver. Agricultural prices were constructed for Catalonia, New Castile, and Andalusia on the basis of prices quoted in Feliu (1991) and weights for cereals, meat, poultry, wine, and olive oil for 1789 (Feliu 2004). We used wheat prices, otherwise. Thus, for Old Castile, wheat prices come from Hamilton (1934, 1947); for Murcia, from Caro (1985); for Valencia, from Palop (1975) and Hamilton (1934, 1947); and for Majorca, from Vaquer (1987). Textile prices, kindly supplied by Joan Rosés (private communication), were used as non-agricultural prices. Wages were taken from Felíu (2004), for Catalonia; Reher and Ballesteros (1993), for New Castile; Moreno (2002) for Old Castile; and (Allen 2001) for Valencia. The CPIs used come from Reher and Ballesteros (1993), for New Castile,

Before proceeding further, a caveat about the use of real wages as a proxy for per capita income is necessary. Evidence on wages, it is worth stressing again, refers only to wage rates and not to wage earnings, as there is no indication of the number of days and hours worked. Besides, wage earners were only a proportion of the total labour force (Maddison, 2003, Craig and Fisher 2000).[53] Furthermore, using wage rates as a proxy for per capita income hides 'the contribution of property-income growth to the overall rise of national income' (Hoffman, Jacks, Levin, and Lindert 2002). Even in rural areas in mid-eighteenth century Old Castile, where income distribution was considered to be less unequal, the wealthiest 10 percent outweighed the poorest 40 percent by 15 to 17 times (computed from (Yun-Casalilla 1987).[54] Similar ratios have already been observed for England (14 times), and France (17 times) around 1750 (Hoffman et al. 2002).[55] Gini coefficients for income distribution at different Old Castile towns c. 1752 cast values ranging from 0.39 to 0.56, while similar estimates were obtained for Jerez (around 0.5).[56]

The use of real wages to proxy the evolution of real per capita GDP implies assuming the stability of income distribution. A way of testing such a strong proposition is by looking at the trends in income inequality that provide relative factor returns.[57] Land rent/wage ratios provided for Andalusia, Castile and Catalonia rose throughout the sixteenth and eighteenth centuries, while declined in the seventeenth and early

---

Felíu (2004), for Catalonia, Allen (2001), for Valencia; and Llopis et al. (2000) for Old Castile. As a rule, when the coverage of wages and prices was incomplete for a given region it was assumed that they moved as those available for the closer region (namely, Andalusian prices or wages were assumed to move as those for New Castile, and Valencia prices and wages as those for Catalonia).

[53] Moreover, in the early modern age, an intensification in the time allocated to work took place, either to offset the decline in wages rates by increasing the amount of time allocated to work (van Zanden 1999) or because of the new opportunities for consumption derived from new industrial developments increased the opportunity cost of leisure (de Vries 1994, Allen 2004). The improvement of housing, the acquisition of durable goods, and the increasing consumption of exotic goods have been pointed as evidence of material progress just at the time real wages were declining (Reis 2005: 199).

[54] Income distribution in Old Castile has usually been considered less unequal than in regions of large estates (Spain's south). Catalonia, in turn, has been traditionally considered a region of less social inequality than the Kingdom of Castile since the 1486 Guadalupe Ruling (*Sentencia arbitral de Guadalupe*) introduced new property rights of land that differed from those prevailing in the Kingdom of Castile. In the case of the capital city, Madrid, the Gini reaches 0.77 (computed from data in Ringrose (1983))

[55] Rising income inequality within Europe helps to explain why per capita income levels between Europe and the rest of the world widened in the early modern age while international real wage differentials were not so deep.

[56] Estimates obtained from data in Yun-Casalilla 1987), Ramos Palencia (2001), and Abbott (1990). These figures are close to those computed for England and Wales in 1759 (0.52) by Peter Lindert (http://www.econ.ucdavis.edu/faculty/fzlinder/Massie1759rev.htm).

[57] As Hoffman, Jacks, Levin, and Lindert (2005) point, real inequality was 'caused by the interaction of population growth with concentrated land ownership and the Engel's law'.

nineteenth centuries (Figure 4).[58] Hence, the use of real wages as a short-cut for per capita GDP is not warranted. Consequently, our estimates of agricultural output obtained through a demand approach, in which real wages are a surrogate for real GDP per head, are just tentative. Moreover, as they do not capture incomes in the middle and upper part of the distribution, in a context of rising inequality (as it was, at least, the case in the sixteenth and eighteenth centuries) they provide a lower bound of the actual performance of Spanish agriculture.[59] Therefore, although we favour those estimates derived through the demand approach, we decided to present, as a counterpoint, estimates of agricultural output and productivity using Wrigley's approach –albeit the unrealistic implicit assumptions about price and income elasticities–.

Once agricultural output (***q N***) was obtained, we combined it with the indicator of economic activity outside agriculture (namely, adjusted urbanization, $N'_{urb\text{-}nonagr\text{ij}}$) to reach an estimate of aggregate output (***O***). In order to do so, agricultural and non-agricultural output were expressed in index form with 1857 as 100, and, then, weighted by their relative size (percentage of GDP) in the 1850s –the earliest date for which national accounts are available– (Prados de la Escosura 2003),

$$O_{.\text{j}} = a_{.1850\text{s}} (q_{.\text{j}} N_{.\text{j}}) / (q_{.1857} N_{.1857}) + (1 - a_{.1850\text{s}}) (N'_{urb\text{-}nonagr.\text{j}} / N'_{urb\text{-}nonagr.1857}) \quad [15]$$

Where $\boldsymbol{a}_{.1850\text{s}}$ is the average share of agriculture in GDP in the 1850s. Regional weights by sector were obtained by applying each region's share in agricultural and non-agricultural output (Rosés 2003) to their national levels (Prados de la Escosura 2003).

Table 10 offers levels of agricultural output at regional and national levels, expressed with Spain in 1857 as 100. More interesting, however, is the information on agricultural labour productivity contained in Table 11. A major feature is the long-run decline in output per EAP across the board, with the exception of Catalonia. A decline in productivity occurred in Spain during the sixteenth century, followed by a return to the initial levels in 1700. The eighteenth century witnessed a sustained fall in output per

[58] Scattered evidence indicates that the incomes of the middle and upper classes were growing in early modern Spain, while those of the lower classes were stagnant or declining (Nader 1977).

[59] As a test, we have estimated per capita consumption of food for Spain over 1850-1913 using a demand function (and a common data set from Prados de la Escosura (2003)) but using alternatively real wages (Bringas 2000) and GDP per head as indicators of per capita income. The results confirm the downward bias introduced when wages are employed as a proxy for income per head. Food consumption would grow at 0.06 percent annually when estimated using real wages ($\boldsymbol{e}$ = -0.5, $\boldsymbol{g}$ = 0.4, $\boldsymbol{b}$ = 1) while it would reach 0.42 percent if per capita GDP is used instead. Interestingly, when computed agricultural output per head with a demand function for eighteenth century England, Crafts (1985) also reaches a faster pace of growth than Jackson (1985) and Allen (1999) who employed real wages.

worker, only partially reversed in the first half of the nineteenth century. Two clear cut phases appear to exist in the regional behaviour. A first one of remarkable disparities in the evolution of labour productivity across regions (1530-1700) in which the dispersion, as measured by the coefficient of variation, doubled. Regional dispersion, then, declined in the early eighteenth century and, after a reversal in the second half of the century, fell again in the early nineteenth century to return by 1850 to 1750 levels. In Panel B, trends are obtained using the Wrigley approach. Here the picture is more optimistic. Spanish productivity would have experienced a moderate increase over the long-run supported by productivity gains in New Castile, Andalusia, and especially the Kingdom of Aragon, in which Catalonia stands out. Regional dispersion shows a gradual increased up to the late eighteenth century that experienced a reversal in the early nineteenth century.

Levels of output (proxied by the urban population not living on agriculture) and productivity in industry and services are shown in Table 12. Panel B suggests that Spanish labour productivity rose during the sixteenth century, collapsed during the seventeenth century, and only recovered after 1750 to reach a peak by mid-nineteenth century. On the whole, productivity increased by one-third over the three centuries and its dispersion was higher than in agriculture. The productivity advance in Valencia and Catalonia during the second half of the eighteenth century underlies Spanish progress. The early nineteenth century improvement was, in turn, widely distributed across regions.

Trends in total output and output per head at both regional and national levels are offered in Tables 13 and 14. When agriculture output is derived through a demand function, total output multiplied by almost four over three hundred years but population expansion reduced the increase in real product per head to just 15 percent. Per capita output experienced a mild increase in the sixteenth century, followed by a contraction in the seventeenth century, stagnation over the eighteenth century, and growth in the early nineteenth century that led, by the 1850s, to overcome the levels achieved in the late sixteenth century. Only Catalonia and New Castile (largely due to the rise of Madrid) increased their output per head in the long-run. Nonetheless, while in New Castile the increase took place in the sixteenth century, and this level was recovered by 1750, to stagnate thereafter; in Catalonia, a sustained rise in per capita income is observed since 1750. When output is alternatively estimated with agricultural output derived through the Wrigley method, a more optimistic picture emerges: total output multiplied by five,

while output per head in 1850 was a 50 percent higher than in 1530. A rise in product per head across the board turned out since 1700.

How do the new estimates compare with previous assessments of Spanish performance? Table 15 shows that, when agricultural output is derived through the demand approach, our proposed estimate is on the lower bound of the available conjectures about long-run performance. The increase in our estimates over 1530-1857, 15 percent, is just one-fourth of Maddison's figure. A differential feature of our estimates is that, with Maddison's, it posits that growth in real output per head occurred in the sixteenth century. Our estimates for the seventeenth century show the sharpest decline, close to (van Zanden 2005a). Our figures for the eighteenth century are, again, on the pessimistic side, next to (van Zanden 2005b). However, the early nineteenth century recovery is, according to our figures (one fourth increase), more intense than in Maddison's. If, alternatively, the output estimates in which agriculture product is obtained with the Wrigley approach are chosen, they fit well into Maddison's view of mild but steady growth in early modern Spain, except for the seventeenth century decline.

Spain's economic performance in European perspective

A step further is to place early modern Spain's economic performance in an international perspective. We have computed aggregate output for six Western European countries (Belgium, France, Germany, Italy, the Netherlands, and the U.K.) using alternatively the demand and the Wrigley approaches to compute agricultural output and employing urbanization to proxy economic activity outside agriculture.[60] Thus, for each country, agricultural and non-agricultural output were expressed in index form with 1850 as 100 and weighted by their relative shares of GDP.[61] Allen (2000) data set provides population, agricultural output derived through the demand approach, and urbanization (the proxy for output in industry and services) over 1500-1800, that were completed with (Bairoch 1988) urbanization estimates for 1850 and national estimates of agricultural output during the first half of the nineteenth century.[62] Since it

[60] We opted to choose the U.K. rather than England, as scholars usually do (Allen 2000), (van Zanden 2001) since we are looking at whole countries, not regions, and a major point in our paper is to establish trends in Spain, not just in Castile, and to compare Spain to other nations.

[61] Sector shares in GDP were derived from Horlings (1997) for Belgium, Toutain (1997) for France, Hoffmann (1965) for Germany, Fenoaltea (2005) for Italy (1861), Horlings, Smits, and van Zanden (2000) for the Netherlands, and Feinstein (1998), for the U.K.,

[62] Thus, figures for agricultural output in 1850 were obtained from Allen (2004) for England, Horlings and Smits (1997) for Belgium (assuming that the growth rate over 1800-1850 was identical to that of 1810-50), Horlings, Smits, and van Zanden (2000) for the Netherlands, Tilly (1978) for Germany

is worth comparing the new Western European data set, constructed with homogeneous data and under similar assumptions, with those estimates already available for this group of European nations, the latter are presented in Panel C. [63]

Table 16 offers output per head estimates for a sample of Western European countries expressed relative to the U.K. level in 1850. Average (population weighted) per capita product increased in Western Europe between two-fifths (Panel A) and one half (Panel B) –a meagre 0.1 percent per year– over the three and a half centuries considered, while population trebled. A closer look shows, however, that significant growth in product per head only occurred in Western Europe after 1800 (0.56 and 0.42 percent per annum, according to Panels A and B, respectively), with the exceptions of Britain where sustained growth per capita goes back to 1600, and the Netherlands, in which according to van Zanden's direct estimates, per capita income grew in the seventeenth century (Table 17). The dispersion in output per head rose until 1750, to return, by 1850, to its initial level, suggesting an early process of convergence.[64] If, instead, we look at the gap between the richest and the poorest country in Panel A, it went up from 1.6 in 1500 to 2.2 in 1700, to return to the initial ratio by 1850. Nonetheless, European countries evolved very differently and their relative positions were often reversed, as the cases of Italy and Britain epitomise. By mid-nineteenth century the divide between north and south (Italy and Spain) was clearly drawn in Western Europe.

When Spain's performance is placed comparative perspective, we find that, according to Panel A, Spanish per capita income was above the Western European average until 1600, a result at odds with the recent literature. Hence, imperial Spain was a relatively affluent nation, only second in per capita income to the Low Countries and Italy. In the long run, however, Spain experienced a sustained decline. Notwithstanding her relative improvement during the sixteenth century, Spain fell behind during the seventeenth century and up to 1750, and not only to the new leading nations (Britain and the Netherlands) but to Western Europe altogether. Spanish recovery in the first half

---

(proxied by estimates for Prussia over 1816-49), Toutain (1997) for France (1780/90-1845/54), and Federico and Malanima (2004) for Italy 1500-1850 (assuming that per capita consumption in North-Central Italy was representative of the whole country). In the Italian case, population and urbanization for 1500-1850 has been drawn from Malanima (1998, 2003, 2005). Total population figures for 1850 were otherwise taken from De Vries (1984).

[63] In the British case have opted for van Zanden's (2005a) explicit conjectures over 1500-1700 and Maddison (2003) thereafter.

[64] This result was obtained for Panel A with both the unweighted coefficient of variation and weighted entropy measures of inequality (MLD and Theil index).

of the nineteenth century –a significant achievement given that occurred at the time of the loss of empire and the complex institutional transition to a liberal society– fell short of the economic progress that took place in north-western Europe (especially in Britain, Belgium, and France) during the first Industrial Revolution. Thus, Spain suffered the paradox of growing but falling behind. Estimates in Panel B tend to confirm our findings in Panel A, although some discrepancies appear. Thus, the seventeenth century decline did not extend into the early eighteenth century, a gradual recovery occurred since 1700, and Spain gained positions moderately during the late eighteenth century.[65]

Finally, how does the relative position drawn for Spain compare to earlier assessments? We share with Maddison (2003) and van Zanden (2005a) that, by mid-nineteenth century Spanish product per head had shrunk to one half of its relative level to Britain in the early sixteenth century. The relative decline in the seventeenth century was sharp, as suggested by van Zanden (2005b), and not mild, as posit by Maddison (2003), and deepened, again, in the first half of the nineteenth century, as proposed by Maddison (2003).

Summary of findings

Available assessments of long-run performance in early modern Spain are clearly on the low side as they suffer from two shortcomings: focusing on the Kingdom of Castile and failing to include the contribution of non-agrarian activities to GDP.

As an alternative, we have analysed regional demographic trends and urbanization rates to capture trends in non-agrarian activities and in other Spanish regions. Clear differences between inland and coastal regions, indicating uneven rates of economic progress, come out. Rates of urbanization rose significantly in the 1500s, fell sharply in the seventeenth century, and experienced a recovery since the early eighteenth century. By mid-nineteenth century, a quarter of Spanish population lived in urban settings compared with one tenth in the early sixteenth century, according to our adjusted urbanization rates.

As urbanization is associated to economic activity outside agriculture, we combined its trends with those of indirectly estimated agricultural output to reach aggregate output figures for more than three centuries. Real product per head grew during the sixteenth century and suffered an absolute decline during the seventeenth and

[65] It is worth stressing that the inconsistencies between the alternative estimates (even though we favoured the results in Panel A) call for further research before a more conclusive statement can be made about the growth of Western European countries in the early modern age.

early eighteenth century. On the whole, and according to our lower bound estimates, Spain hardly experienced any growth in per capita income terms through the pre-industrial era, except for the moderate progress of the first half of the nineteenth century.

The contrast between per capita income trends in Spain and the main Western European countries suggests that sixteenth century Spain was a relatively affluent nation, and by the turn of the century, only Italy and the Low Countries were ahead of her.

Spain experienced a sustained decline over the long run. A closer look reveals an improvement in Spanish relative position during the sixteenth century, followed by a sharp decline during the 1600s and early 1700s and, again, in the early nineteenth century. Two robust but far from surprising results emerge, thus, from our comparative exercise: the roots of Spanish comparative retardation lie in the seventeenth century (and up to 1750 when Britain is the reference), and deepened during the first half of the nineteenth century.

References

ABBOTT, D.R. (1990). *The Spanish and the Sherry Trade: Jerez de la Frontera in the Eighteenth Century*. University of California, San Diego, Unpublished Ph.D. Dissertation.

ACEMOGLU, D., JOHNSON, S., and ROBINSON, J. (2005). The Rise of Europe: Atlantic Trade, Institutional Change and Economic Growth. *American Economic Review* **95**, 3, pp. 546-79.

ALLEN, R.C. (1999). Tracking the agricultural revolution in England. *Economic History Review* **52**, 2, pp. 209-35.

ALLEN, R. C. (2000). Economic Structure and Agricultural Productivity in Europe, 1300-1800. *European Review of Economic History* **4**, 1, pp. 1-25.

ALLEN, R. C. (2001). The Great Divergence in European wages and prices in Europe from the Middle Ages to the First World War. *Explorations in Economic History* **38**, 4, pp. 411-47.

ALLEN, R. C. (2004). Britain's economic ascendancy in a european context. In L. Prados de la Escosura (ed). *Exceptionalism and Industrialisation. Britain and its European Rivals, 1688-1815*. Cambridge: Cambridge University Press, 15-34.

ALVAR EZQUERRA, A. (1989). *El nacimiento de una capital europea. Madrid entre 1561 y 1606.* Madrid: Turner Libros.

ALVAREZ LLANO, R. (1986). Evolución de la estructura económica regional de España en la historia: una aproximación. *Situación* **1**, pp. 5-61.

ARTOLA, M. (1973). *La burguesía revolucionaria (1808-1869)*. Madrid: Alianza. Historia de España Alfaguara V.

BAIROCH, P. (1965). Niveaux de développement économique de 1810 à 1910. *Annales ESC,* **20**, 6, pp. 1091-1117.

BAIROCH, P. (1976). Europe´s Gross National Product, 1800-1975. *Journal of European Economic History* **5**, pp. 273-340.

BAIROCH, P. (1988). *Cities and Economic Development. From the Dawn of History to the Present.* Chicago: University of Chicago Press.

BAIROCH, P., BATOU, J., and CHÈVRE, P. (1988). *La population des villes européennes. Banque de données et analyse sommaire des résultats, 800 à 1850.* Genève: Librairie Droz.

BERNARDOS SANZ, J. U. (2003). *Trigo castellano y abasto madrileño: los arrieros y comerciantes segovianos en la Edad Moderna.* Valladolid: Junta de Castilla y León.

BLOMME, J. AND VAN DER WEE, H. (1994). The Belgian economy in a long-term historical perspective: economic development in Flanders and Brabant, 1500-1812. In

A. Maddison and H. van der Wee (eds). *Economic Growth and Structural Change. Comparative Approaches over the Long Run*. Milan: Università Bocconi, pp. 77-96.

BOSERUP, E. (1987). Population and technology in preindustrial Europe. *Population and Development Review* **13**, 4, pp. 691-701.

BOUIS, H.E. (1994). The effect of income on demand for food in poor countries: Are our food consumption databases giving us reliable estimates?. *Journal of Development Economics* 44, pp. 199-226.

BRINGAS GUTIÉRREZ, M.A. (2000). *La productividad de los factores en la agricultura española (1752-1935)*. Madrid: Banco de España.

BUSTELO, F. (1972a). Algunas reflexiones sobre la población española de principios del siglo XVIII. *Anales de Economía* **15**, pp. 89-106.

BUSTELO, F. (1972b). La población española en la segunda mitad del siglo XVIII. *Moneda y Crédito* **123**, pp. 53-104.

CARO LÓPEZ, C. (1985). Las oscilaciones del precio del trigo en una ciudad del Levante: el caso de Murcia, 1775-1800. *Revista de Historia Económica* **3**, 2, pp. 247-64.

CARRERAS, A. (2003). Modern Spain. In J. Mokyr (ed.). *The Oxford Encyclopedia of Economic History.* New York: Oxford University Press, 5 vols. 4, pp. 546-53.

CASADO, H. (2001). La economía en las Españas medievales (*c.*1000-*c.*1450). In F. Comín, E. Llopis, and M. Hernández (eds.) (2002). *Historia Económica de España. Siglos X-XX,* Barcelona: Crítica, pp. 13-50.

CLARK, G. (2001). The secret history of the Industrial Revolution. University of California, Davis, http://www.econ.ucdavis.edu/faculty/gclark/papers/secret2001.pdf

CORREAS, P. (1988). Poblaciones españolas de más de 5.000 habitantes entre los siglos XVII y XIX. *Boletín de la Asociación de Demografía Histórica*, **6**, 1, pp. 5-23.

CRAIG, L. A. and FISHER, D. (2000). *The European Macroeconomy. Growth, Integration and Cycles, 1500-1913.* Cheltenham, UK: Edward Elgar.

CRAFTS, N.F.R. (1976). English economic growth in the eighteenth century: A re-examination of Deane and Cole' estimates. *Economic History Review* **29**, 2, pp. 226-35.

CRAFTS, N.F.R. (1980). Income elasticities of demand and the release of labour by agriculture during the British Industrial Revolution. *Journal of European Economic History* **9**, 1, pp. 153-68.

CRAFTS, N.F.R. (1985). *British Economic Growth during the Industrial Revolution*. Oxford: Clarendon Press.

DE VRIES, J. (1984). *European Urbanization, 1500-1800.* Cambridge, Ms.: Harvard University Press.

DE VRIES, J. (1994). The Industrial Revolution and the Industrious Revolution. *Journal of Economic History* **54**, 2, pp. 249-270.

DEANE, P. AND COLE, W.A. (1967). *British Economic Growth, 1688-1959*. 2nd ed. Cambridge: Cambridge University Press.

DOMÍNGUEZ MARTÍN, R. (1994). La mercantilización de factores en la agricultura española, 1860-1880: un intento de estimación de los contrastes regionales. *Revista de Historia Económica* **12**, 1, pp. 85-109.

DURAN i PUJOL, M. (1985). L'evolució de l'ingrés senyorial a Catalunya (1500-1799). *Recerques* **17**, pp. 7-42.

FEDERICO, G. (1986). Mercantilizzazione s sviluppo economico in Italia (1860-1940). *Rivista di Storia Economica* **3**, 2, pp. 149-86.

FEDERICO, G. AND MALANIMA, P. (2004). Progress, decline, growth: product and productivity in Italian agriculture, 1000-2000. *Economic History Review* **57**, 3, pp. 437-64.

FEINSTEIN, C.H. (1998). The United Kingdom in 1851. A quantitative picture of the economy at mid-century. University of Oxford (mimeo).

FELIU, G. (1991). *Precios y salarios en la Cataluña moderna.* Madrid: Banco de España. 2 vols.

FELIU, G. (2004). Aproximació a un índex del cost de la vida a Barcelona, 1501-1807. In *Josep Fontana. Història i projecte social*. Barcelona: Crítica, 1, pp. 151-170.

FENOALTEA, S. (2005). The growth of the Italian economy, 1861-1913: Preliminary second-generation estimates. *European Review of Economic History* **9**, 3, 273-312.

FLORA, P. (1981). Historical Process of Social Mobilization: Urbanization and Literacy, 1850-1965. In S. N. Eisenstadt and S. Rokker (eds). *Building State and Nation,* pp. 213-258.

FORTEA PÉREZ, J.L. (1995). Las ciudades de la Corona de Castilla en el Antiguo Régimen: una revisión historiográfica. *Boletín de la Asociación de Demografía Histórica*, XIII, 3, pp. 19-59.

FORSYTH, P. J. and NICHOLAS, S. J. (1983). The decline of Spanish industry and the price revolution: a neoclassical analysis. *Journal of European Economic History* **12**, 3, pp. 601-10.

GARCÍA SANZ, A. (1981). Jornales agrícolas y presupuesto familiar campesino en España a mediados del siglo XIX. *Anales del CUNEF (1979-80)*, pp. 49-71.

GARCÍA SANZ, A. (1986). *Desarrollo y crisis del Antiguo Régimen en Castilla la Vieja. Economía y sociedad en tierras de Segovia, 1500-1814.* Madrid: Akal.

GARCÍA SANZ, A. (1991). Repercusiones de la fiscalidad castellana en los siglos XVI y XVII. *Hacienda Pública Española, Monografías* **1**, pp. 15-24.

GOERLICH, F. AND MAS, M. (2001). Inequality in Spain 1973-91: Contribution to a regional database. *Review of Income and Wealth* **47**, pp. 361-78.

GRUPO ´75 (1977). *La economía del Antiguo Régimen. La renta 'nacional' de la Corona de Castilla.* Madrid: Universidad Autónoma de Madrid.

HAMILTON, E. J. (1934). *American Treasure and the Price Revolution in Spain, 1501-1650.* Cambridge, MA: Harvard University Press.

HAMILTON, E.J. (1947), *War and Prices, 1651-1800*. Cambridge, MA: Harvard University Press.

HERR, R. (1989). *Rural Change and Royal Finances in Spain at the End of the Old Regimen.* Berkeley: University of California Press.

HOFFMANN, W.G. (1965). *Das Wachstum der Deutschen Wirtschaft seit der Mitte des 19.Jahrhunderts*. Berlin: Springer.

HOFFMAN, P. T., JACKS, D. S., LEVIN, P. A., and LINDERT, P. H. (2002). Real Inequality in Europe since 1500. *Journal of Economic History* **62**, 2, pp. 322-55.

HOFFMAN, P.T., JACKS, D.S., LEVIN, P.A., AND LINDERT, P.H. (2005). Sketching the rise of real inequality in early modern Europe. In R.C. Allen, T. Bengtsson, and M. Dribe (eds). *Living Standards in the Past. New Perspectives on Well-being in Asia and Europe.* Oxford: Oxford University Press, pp. 131-72.

HORLINGS, E. (1997). The contribution of the service sector to Gross Domestic Product in Belgium, 1835-1990. Universiteit Utrecht Research Memorandum.

HORLINGS, E. AND SMITS, J.P. (1997). A Comparison of the pattern of growth and structural change in the Netherlands and Belgium, 1800-1913. *Jahrbuch für Wirtschaftsgeschichte* **2**, pp. 83-106.

JACKSON, R.V. (1985). Growth and deceleration in English agriculture, 1660-1790. *Economic History Review* **38**, 3, pp. 333-51.

KUZNETS, S. (1966). *Modern Economic Growth : Rate, Structure, and Spread.* New Haven: Yale University Press.

LLOPIS AGELAN, E. (2001). El legado económico del Antiguo Régimen desde la óptica regional. In L. Germán, E. Llopis, J. Maluquer de Motes, and S. Zapata (eds). *Historia Económica Regional de España, siglos XIX y XX*. Barcelona: Crítica, pp. 507-24.

LLOPIS, E., JEREZ, M., ÁLVARO, A., AND FERNÁNDEZ, E. (2000). Índices de precios de la zona noroccidental de Castilla y León, 1518-1650. *Revista de Historia Económica* **18**, 3, pp. 665-84.

LLOPIS AGELAN, E. and GONZÁLEZ MARISCAL, M. (2006). La tasa de urbanización en España a finales del siglo XVIII: el problema de las agrociudades. AEHE Documentos de Trabajo 0602.

LÓPEZ-SALAZAR, J. (1986). *Estructuras agrarias y sociedad rural en la Mancha (siglos XVI-XVII).* Ciudad Real: Instituto de Estudios Manchegos.

MADDISON, A. (1995). *Monitoring the World Economy 1820-1992.* París: OECD Development Centre.

MADDISON, A. (2001). *The World Economy. A Millennial Perspective*. París: OECD Development Centre.

MADDISON, A. (2003). *The World Economy: Historical Statistics.* París: OECD Development Centre.

MALANIMA, P. (1998). Italian cities, 1300-1800. A quantitative approach. *Rivista di Storia Economica,* **14**, 2, pp. 91-126.

MALANIMA, P. (2003). Measuring the Italian economy 1300-1861. *Rivista di Storia Economica* **19**, 3, pp. 265-95.

MALANIMA, P. (2005). Urbanization and the Italian economy during the last millennium. *European Review of Economic History* 9, 1, pp. 97-122.

MALANIMA, P. (2006). An age of decline. Product and income in eighteenth-nineteenth century Italy. *Rivista di Storia Economica* **22**, 1, pp. 91-133.

MARCOS MARTÍN, A. (2005). Viejos en la ciudad. La estructura de edad de la población en los núcleos urbanos españoles del Antiguo Régimen. In F. García González (ed). *Vejez, envejecimiento y sociedad en España, siglos XVI-XXI*. Cuenca: Ediciones de la Universidad de Castilla-La Mancha, pp. 67-100.

MILANOVIC, B. (2005). *Worlds Apart. Measuring International and Global Inequality.* Princeton: Princeton University Press.

MORENO LÁZARO, J. (2002). ¿Fomentó el capitalismo agrario la desigualdad? Salarios y niveles de vida en Castilla la Vieja, 1751-1861. In J.M. Martínez Carrión (ed). *El nivel de vida en la España rural, siglos XVIII-XX.* Alicante: Universidad de Alicante, pp. 75-112.

MOTOMURA, A. (1997). New data on minting, seigniorage and the money supply in Spain (Castile), 1597-1643. *Explorations in Economic History* **34**, 3, pp. 331-67.

NADAL, J. (1984). La población española durante los siglos XVI, XVII y XVIII. Un balance a escala regional. In V. Pérez Moreda and D.S. Reher (eds). *Demografía histórica en España*. Madrid: El arquero, pp. 39-54.

NADER, H. (1977). Noble income in sixteenth-century Castile: The case of the Marquises of Mondejar, 1480-1580. *Economic History Review* **30**, 3, pp. 411-28.

NICOLAU, R. (2005). Población, salud y actividad. In A. Carreras and X. Tafunell (eds). *Estadísticas históricas de España*. Madrid: Fundación BBVA, 3 vols. I, pp. 77-154.

NORTH, D.C. (1982). *Structure and Change in Economic History*. New York: W.W. Norton.

OVERTON, M. (1996). Re-establishing the agricultural revolution. *Agricultural History Review* **44**, I, pp. 1-20.

PALOP RAMOS, J.M. (1975). Precios del trigo en Valencia durante el siglo XVIII. *Cuadernos de Historia. Hispania (Anexos)* 5, pp. 419-458.

PÉREZ MOREDA, V. AND REHER, D.S. (2003). Hacia una definición de la demografía urbana: España en 1787. *Revista de Demografía Histórica* **21**, 1, pp. 113-40

PONSOT, P. (1986). *Atlas de Historia Económica de la Baja Andalucía (Siglos XVI-XIX)*. Sevilla: Editoriales Andaluzas Unidas.

PRADOS DE LA ESCOSURA, L. (1982). *Comercio exterior y crecimiento económico, 1826-1913: tendencias a largo plazo*. Madrid: Banco de España.

PRADOS DE LA ESCOSURA, L. (1988). *De Imperio a nación. Crecimiento y atraso económico en España (1780-1930).* Madrid: Alianza.

PRADOS DE LA ESCOSURA, L. (1989). La estimación indirecta de la producción agraria en el siglo XIX: réplica a Simpson. *Revista de Historia Económica* **7**, 3, pp. 703-18.

PRADOS DE LA ESCOSURA, L. (1993). La pérdida del imperio y sus consecuencias económicas. In L. Prados de la Escosura and S. Amaral (eds.), *La independencia americana: consecuencias económicas*. Madrid: Alianza, pp. 253-300.

PRADOS DE LA ESCOSURA, L. (2000). International comparisons of real output, 1820-1990: An Alternative Data Set. *Explorations in Economic History* **37**, 1, pp. 1-41.

PRADOS DE LA ESCOSURA, L. (2003). *El progreso económico de España, 1850-2000*, Madrid: Fundación BBVA.

PRADOS DE LA ESCOSURA, L. (2006). Growth and structural change in Spain, 1850-2000. Universidad Carlos III Working Papers in Economic History 06/05.

PRADOS DE LA ESCOSURA, L. and ROSÉS, J.R. (2007). The sources of long-run growth in Spain, 1850-2000. Universidad Carlos III Working Papers in Economic History 07/02.

PRIOTTI, J.-P. (2005). *Bilbao y sus mercaderes en el siglo XVI. Génesis de un crecimiento.* Bilbao: Diputación Foral de Bizkaia.

RAMOS PALENCIA, F. (2001). *Pautas de consumo familiar y mercado en la Castilla preindustrial. El consumo de bienes duraderos y semiduraderos en Palencia, 1750-1850*. Universidad de Valladolid Unpublished Ph. D. Dissertation.

REHER, D. S. (1990). *Town and Country in Pre-industrial Spain.* Cambridge: Cambridge University Press.

REHER, D. S. (1991). Dinámicas demográficas en Castilla la Nueva, 1550-1900: un ensayo de reconstrucción. In J. Nadal Oller (ed). *La evolución demográfica bajo los Austrias*. Alicante: Instituto de Cultura Juan Gil-Albert, pp. 17-75.

REHER, D. S. and BALLESTEROS, E. (1993). Precios y salarios en Castilla la Nueva: la construcción de un índice de salarios reales, 1501-1991. *Revista de Historia Económica* **11**, 1, pp. 10151.

REIS, J. (2005). Economic growth, human capital formation and consumption in Western Europe before 1800. In R.C. Allen, T. Bengtsson, and M. Dribe (eds). *Living Standards in the Past. New Perspectives on Well-being in Asia and Europe.* Oxford: Oxford University Press, pp. 195-225.

RINGROSE, D. R. (1970). *Transportation and Economic Stagnation in Spain 1750-1850.* Durham, NC.: Duke University Press.

RINGROSE, D. R. (1983). *Madrid and the Spanish Economy, 1560-1850.* Berkeley: University of California Press.

ROSÉS, J.R. (2003). Why Isn't the Whole of Spain Industrialized? New Economic Geography and Early Industrialization, 1797-1910. *Journal of Economic History* **63**, 4: 995-1022.

RUIZ MARTÍN, F. (1967). La población española al comienzo de los tiempos modernos. *Cuadernos de Historia. Hispania (Anexos)* **1**, pp. 189-207.

SANTOLAYA HEREDERO, L. (1991). *Una ciudad del Antiguo Régimen: Toledo en el siglo XVIII*. Madrid: Universidad Nacional de Educación a Distancia.

SARGENT, T. J. and VELDE, F. R. (2002). *The Big Problem of Small Change.* Oxford: Princeton University Press.

SEBASTIÁN AMARILLA, J. A. (1990. La renta de la tierra en León durante la Edad Moderna. Primeros resultados y algunas reflexiones a partir de fuentes monásticas. *Revista de Historia Económica* 8, 1, pp. 53-80.

SIMPSON, J. (1989). La producción agraria y el consumo español en el siglo XIX. *Revista de Historia Económica* **7**, 2, pp. 355-88.

SIMPSON, J. (1992). Technical change, labour absorption and living standards in rural Andalucía 1886-1936. *Agricultural History* **66**, 3, pp. 1-24.

SIMPSON, J. (1995). *Spanish Agriculture: The long siesta (1765-1965)*. Cambridge: Cambridge University Press.

SMITS, J.P., HORLINGS, E., and VAN ZANDEN, J.L. (2000). *Dutch GNP and Its Components 1800-1913***.** Groningen Growth and Development Centre, Monograph Series, #5. http://www.ggdc.net/index-dseries.html#top

TEMIN, P. (2006). The economy of the early Roman empire. *Journal of Economic Perspectives* **20**, 1, pp. 133-51.

THOMPSON, I. A. A. and YUN, B. (1994). *The Castilian Crisis of the Seventeenth Century. New Perspectives on the Economic and Social History of Seventeenth-Century Spain.* Cambridge: Cambridge University Press.

TILLY, R. (1978). Capital formation in Germany in the nineteenth century. In P. Mathias and M. Postan (eds) *Cambridge Economic History of Europe*. VII, 1, pp. 382-441.

TOUTAIN, J.C. (1997). Le produit intérieur de la France de 1789 à 1994. *Economies et Sociétés, XXXI. Série AF Histoire quantitative de l'Economie francaise* (Cahiers de l'ISMEA).

VAN ZANDEN, J. L. (1999). Wages and the standard of living in Europe, 1500-1800. *European Review of Economic History* **3**, 2, pp. 175-98.

VAN ZANDEN, J. L. (2001). Early modern economic growth. A survey of the European economy, 1500-1800. In M. Prak (ed). *Early Modern Capitalism, Economic and Social Change in Europe 1400-1800*. London: Routledge, pp. 69-87.

VAN ZANDEN, J. L. (2005a). Cobb-Douglas in pre-modern Europe. Simulating early modern growth. International Institute for Social History Working Paper IISH.

VAN ZANDEN, J. L. (2005b). Una estimación del crecimiento económico en la Edad Moderna. *Investigaciones de Historia Económica* **2**, pp. 9-38.

VAQUER BENNASSAR, O. (1987). *Una sociedad del Antiguo Régimen. Felanitx y Mallorca en el siglo XVI,* T. I: *Demografía, estructura de la propiedad, economía,* Palma de Mallorca: Es pes de sa Palla.

VELA, J. and MARCOS, A. (1978). Las grandes ciudades campesinas de Andalucía occidental en el siglo XVI. El caso de Jerez de la Frontera. *Actas del I Congreso de Historia de Andalucía.* Córdoba: Publicaciones del Monte de Piedad y Caja de Ahorros, II, pp. 403-17.

VILAR, P. (1970). Estructures de la societat espanyola cap al 1750. *Recerques* **1**, pp. 9-32.

WRIGLEY, E. A. (1985). Urban growth and agricultural change: England and the Continent in the Early Modern Period. *Journal of Interdisciplinary History* **10**, 4, pp. 683-728.

YUN-CASALILLA, B. (1987). *Sobre la transición al capitalismo en Castilla. Economía y sociedad en Tierra de Campos (1500-1830).* Valladolid: Junta de Castilla y León.

YUN CASALILLA, B. (1994). Proposals to quantify long-term performance in the Kingdom of Castile, 1550-1800. In A. Maddison and H. van der Wee (eds.) *Economic Growth and Structural Change. Comparative Approaches over the Long Run*. Milan: Università Bocconi, pp. 97-110. (Updated version).

YUN-CASALILLA, B. (2004). *Marte contra Minerva. El precio del Imperio Español, c. 1450-1600.* Barcelona: Crítica.

Table 1

Real Per Capita GDP in Spain (1600=100): Alternative Guesstimates

	Yun Casalilla *		Carreras	Maddison	van Zanden	van Zanden (2005a) **	
	(a)	(b)			(2005b)	lower bound	upper bound
1500			134.6	77.5	106.4		
1600	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1630 * **	78.4	71.8				90.7	100.0
1700			108.8	100.0	97.0	90.7	91.7
1750	84.8	108.8				85.4	93.0
1800	97.4	118.2	150.4		89.3		
1820				118.2		100.0	111.6
1850				126.5			

Sources: Yun Casalilla (1994), Carreras (2003), Maddison (2003), van Zanden (2005a, 2005b)

Notes:

***** Yun Casalilla, 1590 = 100. (a) converted into grams of silver and deflated with Reher and Ballesteros (1993) consumer price index (in grams of silver); b) deflated with a composite consumer price index for 8 goods from Hamilton (1934) with weights from Vela and Marcos (1978)

****** van Zanden (2005a), 1570 = 100

******* The figure for 1630 corresponds to 1650 in van Zanden (2005a)

Table 2

Relative Real Per Capita GDP in Spain

	van Zanden I *	van Zanden II	Maddison**
		% England	
1500	105.8	98.0	83.4
1570	103.4		
1600		92.3	79.0
1650	80.6		
1700	60.1	68.8	58.3
1750	48.2		
1800		41.7	50.2
1820	48.0		45.8
1850			36.5
		% Netherlands	
1500	78.4	64.5	86.9
1570	78.4		
1600		55.5	61.8
1650	45.8		
1700	44.1	46.4	40.0
1750	43.1		
1800		42.9	
1820	52.2		54.8
1850			45.5
		% Europe ***	
1500	84.3	95.4	85.7
1570	84.3		
1600		89.8	95.9
1650	79.1		
1700	74.1	81.6	85.5
1750	72.3		
1800		75.3	
1820	82.8		83.7
1850			55.1

Sources : van Zanden I (2005a) II (2005b), Maddison (2006: 247, 410, 444)
Notes : * average of the upper and lower bound estimates
** In Maddison's estimates for 1820 and 1850 England was obtained by applying the England/Britain ratio for 1801 (1.0388) to the Britain/U.K. ratio for 1820 (1.2433) and 1840 -the closest date for which data are available- (1.2181) and, then, to the U.K. Estimates for 1820 and 1850
****** weighted average of European countries in each author's sample. Western Europe in the case of Maddison's estimates.

Table 3

Testing Per Capita GDP Estimates

	Per Capita GDP at current prices (grams of silver)			Per Capita GDP/ Income per Head		
	García Sanz	Yun	Carreras	García Sanz	Yun	Carreras
1500	148		160	0.65		0.71
c. 1560	339			1.17		
c. 1590	499	645	521	0.75	0.97	0.78
c. 1630	644	677		0.86	0.90	
c. 1650	521			0.86		
1700			510			0.84
1750	370	462		1.01	1.26	
c. 1800		919	959		1.46	1.52

Note: Income per Head computed assuming: 180 working days, 0.305 rate of activity and 0.75 labour share in national income.

Sources: García Sanz (1991), Yun Casalilla (1994), Carreras (2003), Felíu (1991) and text.

Table 4

Regional Population Growth (annual rates %)

	1530-1591	1591-1700	1700-1787	1787-1857	1530-1787	1530-1857
Andalusia	0.55	0.28	0.28	0.66	0.34	0.41
Aragon	0.32	0.50	0.18	0.49	0.35	0.38
Asturias	0.81	0.08	1.01	0.59	0.57	0.57
Balearic Islands	0.53	0.20	0.20	0.57	0.28	0.34
Basque	0.25	0.52	0.03	0.42	0.29	0.32
Canary Islands				0.48		
Catalonia	0.61	0.32	0.64	0.87	0.50	0.58
Extremadura	0.64	-0.17	0.13	0.75	0.12	0.26
Galicia	1.07	0.44	0.58	0.40	0.64	0.58
Murcia	0.71	0.46	0.68	0.41	0.60	0.56
Navarre	0.06	0.52	0.03	0.39	0.24	0.27
New Castile	1.02	-0.21	0.26	0.39	0.24	0.27
Old Castile & Leon	0.32	-0.27	0.32	0.41	0.07	0.14
Valencia	0.45	0.19	0.66	0.66	0.41	0.46
Spain	**0.58**	**0.09**	**0.39**	**0.54**	**0.31**	**0.36**

Note: Regional data adjusted to match the revised consensus national figures. See Table 5.
Sources: 1530 and 1591, Nadal (1984), completed with Fortea (1995) and Ruiz Martín (1967) (with 4 people per household instead of 5); 1700, Grupo '75 (1977) and Bustelo (1972a); 1787, Nadal (1984) and Nicolau (2005); 1857, Nicolau (2005) and Artola (1973).

Table 5

Spain's Population: Alternative Estimates (million)

	[I] Consensus Estimates	[II] Bairoch	[III] [I/II]
1530	4.8	7.5	0.64
1591	6.8	8.7	0.78
1700	7.5	8.6	0.87
1750	9.3	9.6	0.97
1787	11.0	13.0	0.85
1857	15.5	15.5	1.00

Sources : Bairoch et al. (1988); Consensus estimates, 1500-1700, Carreras (2003); 1750-1800, Bustelo (1972a,1972b); 1850, Nicolau (2005)

Table 6

Urbanization Rate: Alternative Estimates (%)
(5,000 or more inhabitants)

	Bairoch	Unadjusted New Estimate	Adjusted New Estimate
1530	18.4	12.5	9.9
1591	21.3	20.6	14.5
1700	20.3	11.3	11.1
1750	21.4	14.2	13.5
1787	19.5	24.5	17.4
1857	18.0	31.9	23.2

Note : Excluding the Canary Islands
Sources : Bairoch et al. (1988), Bairoch (1988),

Table 7

Urbanization Rate (% Total Population)
(towns of 5,000 or more inhabitants)

	1530	1591	1700	1750	1787	1857
Andalusia	33.3	55.0	26.4	31.8	59.6	58.3
Aragon	6.0	6.4	2.9	6.6	13.2	16.0
Asturias	6.8	10.1	4.8	2.1	11.4	13.5
Balearic Islands	22.9	21.7	19.2	21.3	18.1	58.2
Basque	1.3	2.7	2.2	2.8	9.3	21.7
Canary Islands					32.8	26.6
Catalonia	13.8	13.5	13.8	10.7	23.4	31.5
Extremadura	4.8	20.4	1.7	15.1	13.3	32.4
Galicia	4.0	1.2	2.5	2.4	2.2	13.8
Murcia	25.6	35.3	24.7	25.9	53.5	73.6
Navarre	5.1	11.9	6.5	8.3	8.1	19.3
New Castile	6.7	24.3	14.0	26.7	27.7	27.5
Old Castile & Leon	7.9	8.7	4.0	4.5	6.2	9.9
Valencia	19.6	24.7	12.0	18.3	38.7	45.2
Spain						
excluding Canary Is.	12.5	20.6	11.3	14.2	24.5	31.9
including Canary Is.					24.6	31.9

Sources: Urban population, Fortea (1995), Correas (1988), completed with Bairoch et al. (1988).
Total population, as in Table 4.

Table 8

Adjusted **Urbanization Rate (% Total Population)**
(towns of 5,000 or more inhabitants excluding population living on agriculture)

	1530	1591	1700	1750	1787	1857
Andalusia	18.5	20.1	25.7	27.4	27.7	33.8
Aragon	6.0	6.4	2.9	6.6	13.2	16.0
Asturias	6.8	10.1	4.8	2.1	11.4	13.5
Balearic Islands	19.2	21.7	19.2	21.3	18.1	29.7
Basque	1.3	2.7	2.2	2.8	9.3	21.7
Canary Islands					32.8	26.6
Catalonia	13.8	13.5	13.8	10.7	23.4	31.5
Extremadura	4.8	20.4	1.7	15.1	13.3	21.8
Galicia	4.0	1.2	2.5	2.4	2.2	13.8
Murcia	16.3	19.8	24.7	25.9	31.5	23.2
Navarre	5.1	11.9	6.5	8.3	8.1	19.3
New Castile	6.7	24.2	14.0	26.7	27.7	27.5
Old Castile & Leon	7.9	8.7	4.0	4.5	6.2	9.9
Valencia	19.3	22.0	12.0	18.3	30.2	32.4
Spain						
excluding Canary Is.	9.9	14.5	11.1	13.5	17.4	23.2
including Canary Is.					17.6	23.3

Sources : As in Table 7. See text

Table 9

Annual Variation of the Adjusted Urbanization Rate (%)

	1530-1591	1591-1700	1700-1787	1787-1857	1530-1787	1530-1857
Andalusia	0.14	0.22	0.09	0.29	0.16	0.18
Aragon	0.11	-0.72	1.74	0.28	0.31	0.30
Asturias	0.66	-0.69	0.99	0.24	0.20	0.21
Balearic Islands	0.20	-0.11	-0.07	0.71	-0.02	0.13
Basque	1.21	-0.20	1.66	1.22	0.76	0.86
Canary Islands				-0.30		
Catalonia	-0.03	0.02	0.61	0.42	0.21	0.25
Extremadura	2.36	-2.26	2.35	0.70	0.40	0.46
Galicia	-1.96	0.67	-0.16	2.64	-0.24	0.38
Murcia	0.32	0.20	0.28	-0.44	0.26	0.11
Navarre	1.40	-0.55	0.24	1.25	0.18	0.41
New Castile	2.10	-0.50	0.78	-0.01	0.55	0.43
Old Castile & Leon	0.17	-0.71	0.49	0.67	-0.09	0.07
Valencia	0.22	-0.56	1.06	0.10	0.17	0.16
Spain						
excluding Canary Is.	0.62	-0.24	0.51	0.42	0.22	0.26
including Canary Is.				0.40		

Sources: Table 8

Table 10

Agricultural Ouput (Spain in 1857=100)

Panel A. Demand Approach *

	1530	1591	1700	1750	1787	1857
Spain	48.2	61.9	66.0	68.9	61.6	100.0
New Castile	7.6	11.2	8.7	8.7	7.3	10.1
Andalusia	9.6	9.0	13.2	11.6	13.0	22.4
Murcia	1.0	1.5	2.4	2.8	2.5	3.4
Old Castile/ Leon	14.1	17.0	12.4	13.6	10.3	15.6
Valencia	3.1	3.6	4.0	5.9	4.8	8.9
Balearic Is.	1.3	1.7	2.6	1.6	1.7	2.9
Catalonia	2.2	2.6	4.5	5.7	5.4	11.6

Panel B. Wrigley Approach

	1530	1591	1700	1750	1787	1857
Spain	31.5	44.8	49.3	61.1	68.3	100.0
Asturias	0.6	1.0	1.1	2.5	2.7	4.1
New Castile	4.2	7.8	6.2	6.6	7.7	10.1
Andalusia	5.8	8.2	11.0	12.1	14.1	22.4
Murcia	0.6	0.9	1.4	2.0	2.5	3.4
Old Castile/ Leon	9.8	11.9	8.9	12.2	11.7	15.6
Extremadura	2.0	3.0	2.5	2.4	2.8	4.7
Galicia	1.3	2.4	3.9	6.0	6.4	8.5
Aragon	2.3	2.7	4.7	4.6	5.5	7.8
Valencia	2.0	2.6	3.2	5.0	5.6	8.9
Balearic Is.	1.0	1.3	1.7	1.7	2.0	2.9
Catalonia	1.8	2.6	3.6	5.3	6.3	11.6

***Note*: *** Demand Approach (e = -0.5; g = 0.4; b = 0.1)

Sources: Relative regional levels for 1857, Rosés (2003, background computations); benchmark for Spain in 1857, Prados de la Escosura (2003). Indices of agricultural output, see the text and the sources are provided in footnote 52.

Table 11

Agricultural Ouput per Economically Active Population (Spain in 1857=100)

Panel A. Demand Approach *

	1530	1591	1700	1750	1787	1857
Spain	130.5	123.4	131.0	113.5	92.3	100.0
New Castile	153.6	130.1	146.0	145.1	108.9	115.0
Andalusia	155.8	106.4	124.2	101.5	97.6	116.3
Murcia	125.6	129.3	146.6	127.7	86.7	78.9
Old Castile/ Leon	112.9	120.4	133.3	113.2	93.2	88.2
Valencia	140.6	127.8	125.2	119.8	87.9	106.6
Balearic Is.	181.5	200.8	294.2	192.8	185.5	160.2
Catalonia	105.5	91.4	120.7	109.5	88.2	124.1
c.v.	0.19	0.27	0.40	0.24	0.33	0.23

Panel B. Wrigley Approach

	1530	1591	1700	1750	1787	1857
Spain	85.5	89.3	97.7	100.7	102.3	100.0
Asturias	96.3	95.8	96.5	96.8	95.7	99.4
New Castile	84.7	90.1	104.5	110.1	115.3	115.0
Andalusia	94.4	96.3	103.5	105.9	106.4	116.3
Murcia	72.5	75.6	85.5	89.5	88.6	78.9
Old Castile/ Leon	78.4	84.0	95.8	101.4	105.6	88.2
Extremadura	82.5	84.0	92.3	93.5	95.9	85.0
Galicia	59.6	60.7	62.2	63.0	63.6	60.3
Aragon	109.8	117.1	132.9	138.9	142.2	115.2
Valencia	89.3	92.4	99.2	101.9	103.3	106.6
Balearic Is.	139.4	154.6	186.2	202.5	215.9	160.2
Catalonia	86.3	90.3	97.8	102.0	102.5	124.1
c.v.	0.23	0.26	0.30	0.32	0.35	0.26

***Note*: *** Demand Approach (e = -0.5; g = 0.4; b = 0.1)
Sources: Regional output levels, Table 10. Economically active population in agriculture, see the text

Table 12

Output and Labour Productivity in Industry and Services (Spain in 1857 = 100)

Panel A. Industry & Services Output *

	1530	1591	1700	1750	1787	1857
Spain	13.5	28.0	23.6	35.4	51.1	100.0
Asturias	0.13	0.33	0.17	0.17	0.97	1.73
New Castile	1.86	12.49	5.77	11.68	14.23	18.54
Andalusia	3.51	5.35	9.22	10.82	12.73	24.66
Murcia	0.33	0.62	1.28	1.91	2.96	2.91
Old Castile/ Leon	6.26	8.44	2.90	4.43	5.88	12.50
Extremadura	0.32	1.99	0.14	1.18	1.21	3.34
Galicia	0.16	0.09	0.32	0.48	0.46	3.84
Aragon	0.61	0.79	0.62	1.35	3.26	5.61
Valencia	1.00	1.50	1.01	2.41	4.49	7.66
Balearic Is.	0.43	0.67	0.74	0.83	0.82	2.02
Catalonia	1.14	1.63	2.35	2.66	6.95	17.19

Panel B. Industry & Services Output per Economically Active Population **

	1530	1591	1700	1750	1787	1857
Spain	69.2	85.4	50.6	57.1	71.2	100.0
Asturias	38.4	58.3	26.8	11.5	66.2	67.2
New Castile	69.3	200.2	81.0	140.5	135.8	135.7
Andalusia	110.7	110.7	110.7	110.7	110.7	110.7
Murcia	98.8	98.8	83.8	79.5	98.8	98.8
Old Castile/ Leon	93.7	81.1	27.0	27.2	35.2	79.9
Extremadura	23.9	94.3	6.0	50.3	41.9	96.5
Galicia	14.1	4.0	7.6	7.0	6.1	46.8
Aragon	56.5	47.4	15.6	32.6	62.5	125.9
Valencia	84.4	84.4	37.1	52.7	84.4	84.4
Balearic Is.	114.8	91.8	55.9	55.2	43.5	114.8
Catalonia	112.8	92.0	73.3	51.3	111.3	107.8
C.V.	0.49	0.55	0.74	0.72	0.54	0.27

***** = Urban Non-living on agriculture population

****** = Urban Non-living on agriculture population/EAP in industry and services

Sources: Relative regional levels for 1857, Rosés (2003, background computations); benchmark for Spain in 1857 Prados de la Escosura (2003). Industry and Services Output, proxied by urban population not living on agriculture from Table 8; Economically active population outside agriculture, see text.

Table 13

Total Output (Spain in 1857 = 100)

Panel A (Computed with agricultural output derived through the demand approach*)

	1530	1591	1700	1750	1787	1857
Spain	27.5	41.7	40.8	48.9	55.4	100.0
New Castile	3.9	11.1	6.5	9.7	10.6	14.0
Andalusia	5.7	6.5	10.3	10.5	12.1	22.5
Murcia	0.6	0.9	1.7	2.2	2.7	3.0
Old Castile/ Leon	9.0	11.4	6.4	7.8	7.4	13.2
Valencia	1.8	2.2	2.1	3.6	4.4	7.8
Balearic Is.	0.7	1.1	1.4	1.1	1.1	2.3
Catalonia	1.5	1.9	3.0	3.7	5.9	13.9

Panel B (Computed with agricultural output derived through the Wrigley approach)

	1530	1591	1700	1750	1787	1857
Spain	20.8	34.8	34.0	45.8	58.1	100.0
Asturias	0.3	0.6	0.5	1.1	1.6	2.6
Basque	0.7	0.8	1.4	1.1	1.7	3.0
Navarre	0.5	0.7	1.0	0.9	1.1	1.9
New Castile	2.6	9.8	5.5	8.9	10.7	14.0
Andalusia	4.2	6.1	9.4	10.7	12.6	22.5
Murcia	0.4	0.7	1.3	1.9	2.7	3.0
Old Castile/ Leon	7.4	9.4	5.1	7.2	7.9	13.2
Extremadura	1.0	2.3	1.0	1.6	1.8	3.7
Galicia	0.6	1.0	1.7	2.6	2.7	5.6
Aragon	1.2	1.5	2.2	2.5	4.0	6.3
Valencia	1.3	1.9	1.8	3.3	4.7	7.8
Balearic Is.	0.6	0.9	1.1	1.1	1.2	2.3
Catalonia	1.3	1.9	2.7	3.5	6.3	13.9

***Note*: *** Demand Approach (e = -0.5; g = 0.4; b = 0.1)

Sources: Relative regional levels for 1857, Rosés (2003, background computations) and Álvarez Llano (1986) for Basque and Navarre; national level, Prados de la Escosura (2003); output by sector, Tables 10 and 12. See the text.

Table 14

Total Output Per Head (Spain in 1857 = 100)

Panel A (Computed with agricultural output derived through the demand approach*)

	1530	1591	1700	1750	1787	1857
Spain	87.2	93.0	82.7	80.1	81.0	100.0
New Castile	98.6	150.2	109.6	154.3	143.2	144.9
Andalusia	113.6	92.6	108.8	101.5	100.4	117.2
Murcia	90.4	96.1	105.5	98.1	93.3	78.2
Old Castile/ Leon	89.6	93.2	70.1	62.0	61.0	82.3
Valencia	97.1	93.6	72.2	78.9	85.0	94.8
Balearic Is.	128.2	133.7	146.2	110.4	97.0	132.6
Catalonia	88.2	78.9	88.6	73.5	100.0	128.1
c.v.	0.15	0.25	0.26	0.31	0.25	0.24

Panel B (Computed with agricultural output derived through the Wrigley approach)

	1530	1591	1700	1750	1787	1857
Spain	65.9	77.6	69.0	75.0	85.0	100.0
Asturias	60.3	68.0	55.7	49.4	71.0	75.8
Basque	67.2	70.2	69.1	70.3	83.8	109.6
Navarre	69.3	83.8	72.3	76.1	75.6	99.4
New Castile	65.9	132.3	93.6	141.5	145.4	144.9
Andalusia	84.5	87.9	99.8	103.4	104.1	117.2
Murcia	65.2	71.7	81.0	83.4	94.0	78.2
Old Castile/ Leon	73.1	77.1	55.5	57.7	65.4	82.3
Extremadura	49.3	80.1	43.1	69.6	66.2	83.0
Galicia	33.7	29.6	31.5	31.4	31.0	48.3
Aragon	73.1	74.5	62.2	75.2	98.5	108.6
Valencia	73.3	77.8	61.3	71.6	91.2	94.8
Balearic Is.	108.6	114.4	108.7	113.5	106.2	132.6
Catalonia	79.1	78.4	79.0	70.5	105.7	128.1
c.v.	0.25	0.30	0.32	0.36	0.31	0.27

Note **: *** Demand Approach (e = -0.5; g = 0.4; b = 0.1)
Sources : Total output, Table 13; population, as in Table 4.

Table 15

New Proposal for Per Capita GDP: Comparative Perspective

Panel A. Levels

	1530*	1591**	1700	1750	1787***	1857
New Estimates Demand approach	93.7	100.0	88.9	86.1	87.1	107.5
Wrigley approach	84.9	100.0	88.9	96.6	109.5	128.9
Yun Casalilla** **(a)**		100.0		84.8	97.4	
(b)		100.0		108.8	118.2	
Carreras	134.6	100.0	108.9		150.4	
Maddison	77.5	100.0	100.0		118.2	126.5
van Zanden (2005b)	106.4	100.0	97.0		89.3	
van Zanden (2005a)						
lower bound			100.0	90.7	85.4	100.0
upper bound			100.0	91.7	93.0	111.6

Panel B. Growth Rates (%)

	1530-1591	1591-1700	1700-1787	1787-1857	1530-1787	1591-1787	1530-1857
New Estimates Demand approach	0.11	-0.11	-0.02	0.30	-0.03	-0.07	0.04
Wrigley approach	0.27	-0.11	0.24	0.23	0.10	0.05	0.13
Yun Casalilla** **(a)**						-0.01	
(b)						0.08	
Carreras	-0.30	0.08	0.32		0.04	0.20	
Maddison	0.26	0.00	0.14	0.10	0.13	0.08	0.15
van Zanden (2005b)	-0.09	-0.02	-0.08		-0.06	-0.05	
van Zanden (2005a)							
lower bound		-0.10	0.08			0.00	
upper bound		-0.09	0.16			0.05	

Sources: Yun Casalilla (1994), Carreras (2003), Maddison (2003), van Zanden (2005a, 2005b) and Table 14

Notes:

***** 1500 for Carreras, van Zanden (2005b), and Maddison estimates

****** 1600 for Carreras, van Zanden (2005a), and Maddison. 1570 for van Zanden (2005b)

******* 1800 for Carreras and van Zanden (2005b), and 1820 for Maddison and van Zanden (2005a)

******** Yun Casalilla (1994)

(a) converted into grams of silver and deflated with Reher and Ballesteros (1993) consumer price index (in grams of silver)

(b) deflated with a composite consumer price index for 8 goods from Hamilton (1934) with weights from Vela and Marcos (1978)

Table 16

Output per Head in Western Europe (U.K. in 1850 = 100)

	Belgium	U.K. (I)	U.K. (II)	France	Germany	Italy	Netherlands	Spain	Western Europe weighted average	Western Europe unweighted average
Panel A (Computed with agricultural output derived through the demand approach)										
1500	62.4	45.6		50.0	41.9	68.7	62.2	55.6	52.5	55.2
1600	67.8	40.3		50.0	36.8	65.8	67.0	59.3	51.7	55.3
1700	67.7	58.2		53.6	32.9	65.2	73.1	52.8	53.3	57.6
1750	54.7	72.1		55.2	35.5	73.6	72.7	51.1	56.8	59.3
1800	51.5	73.4		55.8	39.2	64.3	68.4	51.7	56.3	57.8
1850	74.2	100.0		78.1	60.9	66.0	79.1	63.8	74.5	74.6
Panel B (Computed with agricultural output derived through the Wrigley approach)										
1500	56.9	32.5		50.7	44.6	62.9	65.2	42.0	49.7	50.7
1600	66.1	37.1		56.1	45.2	65.5	72.8	49.5	53.9	56.0
1700	68.3	49.8		60.3	43.4	61.6	79.0	44.0	54.9	58.1
1750	53.7	61.0		61.2	46.0	67.7	75.2	47.8	57.9	59.0
1800	52.9	70.8		61.7	47.4	67.3	72.0	54.2	60.3	60.9
1850	74.2	100.0		78.1	60.9	66.0	79.1	63.8	74.5	74.6
Panel C (Direct estimates)										
1500	39.0	29.1	79.3				41.6			
1600	45.1	29.5	65.9				50.0			
1700	52.9	46.8	74.9	43.9		86.5	67.3			
1750	57.6	56.9	80.6			72.8	67.3			
1800	59.5	67.8	78.8	50.8		62.5	65.9			
1850	74.2	100.0	100.0	78.1		66.0	79.1			

Sources: Panel A and B (indirect estimates), see the text and, especially, footnotes 61 and 62. Panel C (direct estimates)
Belgium, Blomme and van der Wee (1994) and Horlings (1997); U.K., col. I, van Zanden (2005a b), col II, Clark (2001) (England);
France, Toutain (1997); Italy, Malanima (2006); The Netherlands, Horlings, Smits, and van Zanden (2000), van Zanden (2005a)
Relative levels to the U.K. In 1850, Prados de la Escosura (2000). For the case of Italy we assumed the level in 1850 was similar to that of 1861.

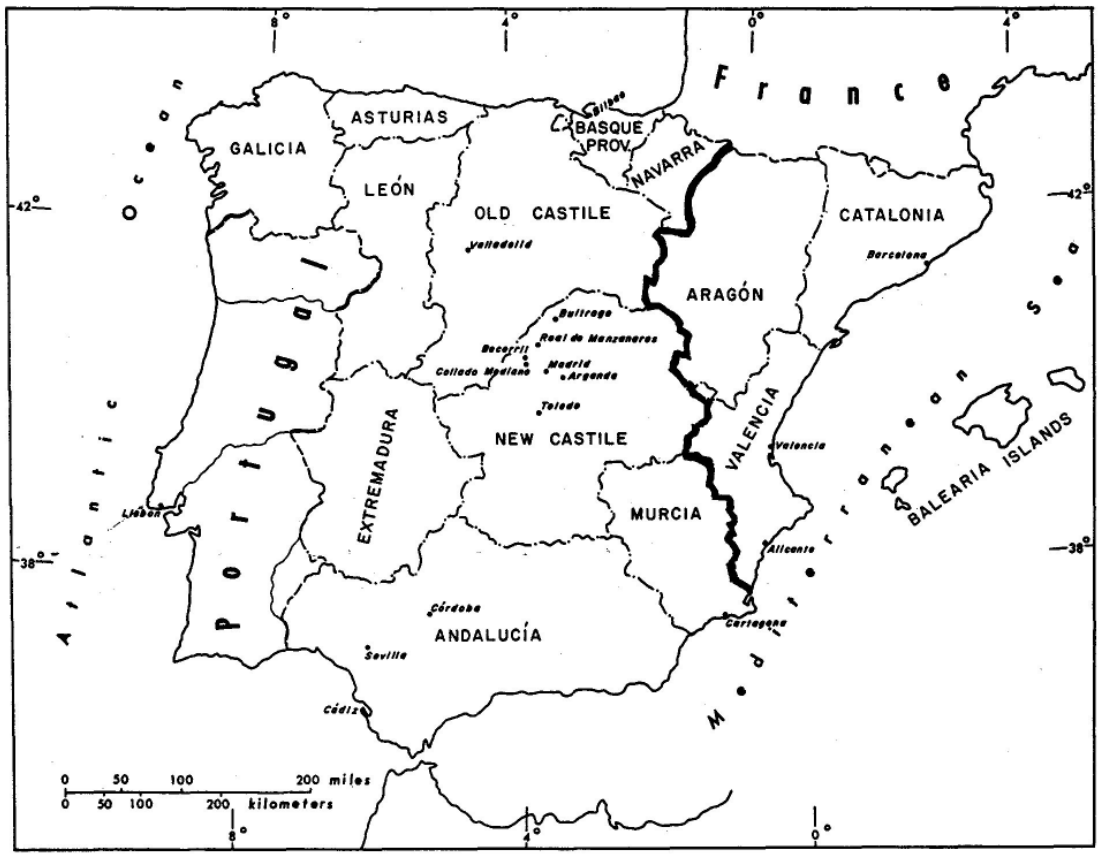
Table 17

Per Capita Output Growth in Western Europe: Alternative Estimates (%)

	Belgium	England (I)	England (II)	France	Germany	Italy	Netherlands	Spain	Western Europe weighted average
Panel A (Computed with agricultural output derived through the demand approach)									
1500-1600	0.08	-0.12	-0.42	0.00	-0.13	-0.04	0.07	0.11	-0.02
1600-1700	0.00	0.37	0.49	0.07	-0.11	-0.01	0.09	-0.11	0.03
1700-1800	-0.27	0.23	0.07	0.04	0.18	-0.01	-0.07	-0.02	0.05
1800-1850	0.73	0.62	0.61	0.67	0.88	0.04	0.29	0.30	0.56
1700-1750	-0.42	0.43	0.29	0.06	0.15	0.24	-0.01	-0.06	0.13
1750-1800	-0.12	0.04	-0.15	0.02	0.20	-0.27	-0.12	0.03	-0.02
1500-1800	-0.06	0.16	0.04	0.04	-0.02	-0.02	0.03	-0.03	0.02
1500-1850	0.05	0.22	0.13	0.13	0.11	-0.01	0.07	0.04	0.10
Panel B (Computed with agricultural output derived through the Wrigley approach)									
1500-1600	0.15	0.13		0.10	0.02	0.04	0.11	0.27	0.08
1600-1700	0.03	0.30		0.07	-0.04	-0.06	0.08	-0.11	0.02
1700-1800	-0.26	0.35		0.02	0.09	0.09	-0.09	0.24	0.09
1800-1850	0.68	0.69		0.47	0.50	-0.03	0.19	0.23	0.42
1700-1750	-0.48	0.40		0.03	0.12	0.19	-0.10	0.17	0.11
1750-1800	-0.03	0.30		0.02	0.06	-0.01	-0.09	0.34	0.08
1500-1800	-0.02	0.26		0.07	0.02	0.02	0.03	0.10	0.06
1500-1850	0.08	0.32		0.12	0.09	0.01	0.06	0.13	0.12
Panel C (Direct estimates)									
1500-1600	0.14	0.01	-0.19				0.18		
1600-1700	0.16	0.46	0.13				0.30		
1700-1800	0.12	0.37	0.05	0.17		-0.33	-0.02		
1800-1850	0.44	0.78	0.48	0.66		0.11	0.36		
1700-1750	0.17	0.39	0.15			-0.34	0.00		
1750-1800	0.06	0.35	-0.05			-0.31	-0.04		
1500-1800	0.14	0.28	0.00				0.15		
1500-1850	0.18	0.35	0.07				0.18		

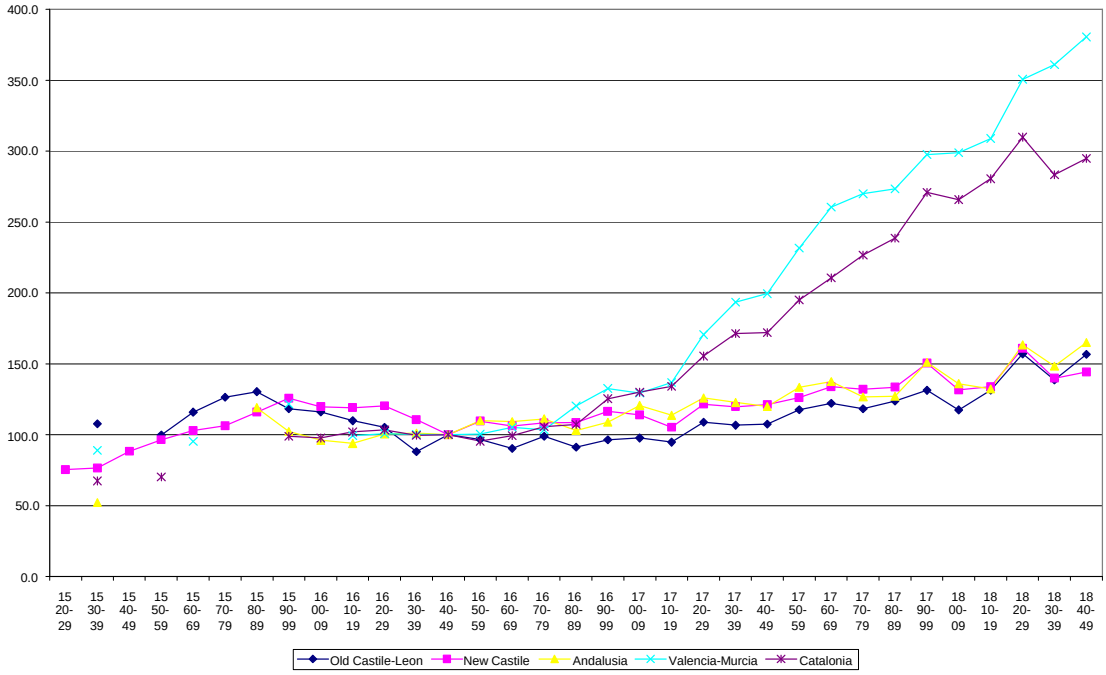
Sources : Table 16.

Figure 1. Early Modern Spain



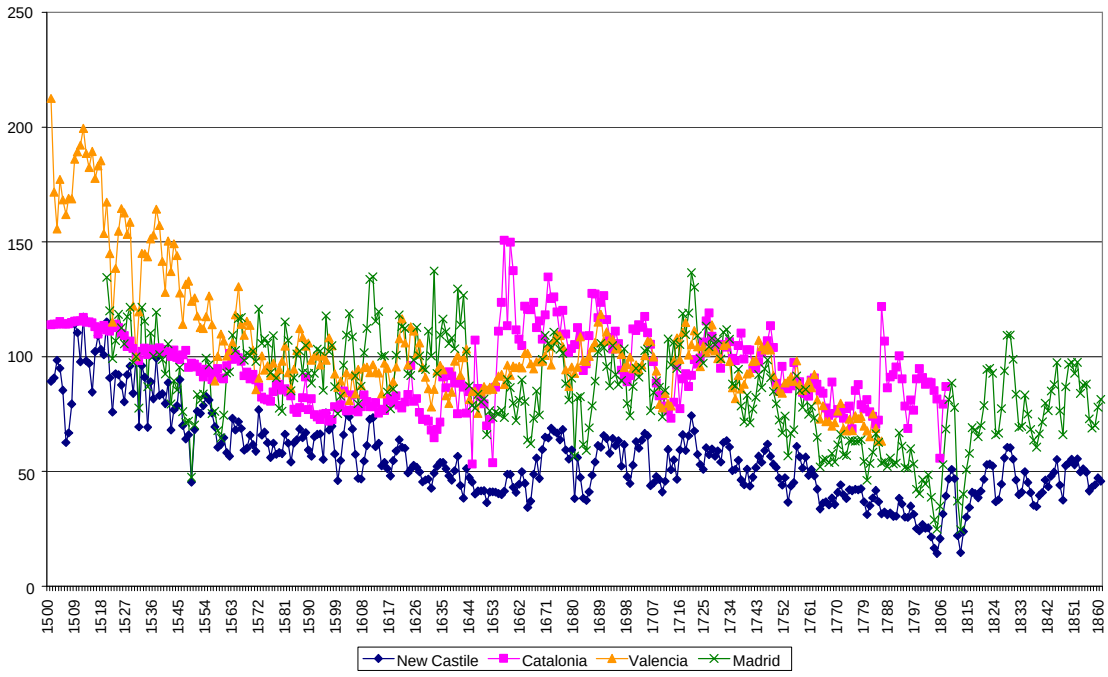
Sources: Ringrose (1983).

Figure 2. Regional Population Trends: David Reher's Estimates (1640/49 = 100)



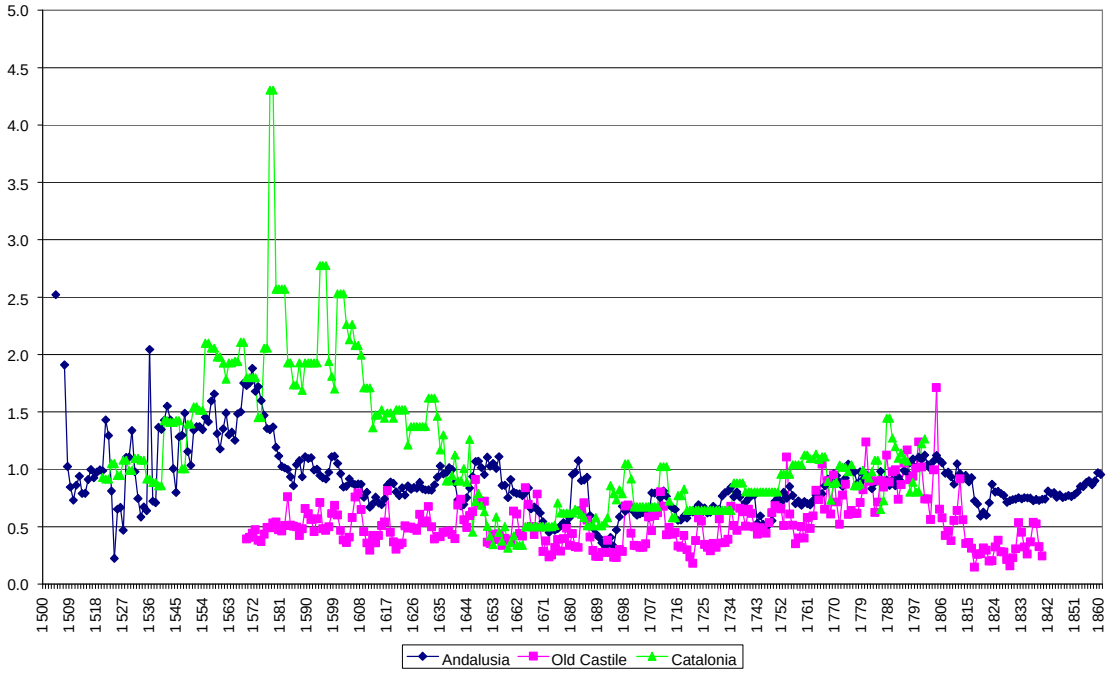
Sources: David Reher (private communication).

Figure 3. Regional Trends in Real Wages, 1500-1860 (1530 = 100)



Sources: New Castile, Reher and Ballesteros (1993), Catalonia, Felíu (2004), Valencia and Madrid, Allen (2001, background data set).

Figure 4. Land Rent /Wage Ratios, 1500-1860 (1790/99 = 1)



Sources: Land rent, Andalusia (Ponsot 1986), Old Castile (Sebastián Amarilla 1990), Catalonia (Duran 1985); wages, for Andalusia we used New Castile's (Reher and Ballesteros (1993), Old Castile (Moreno 2002), Catalonia (Felíu 2004).