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ON THE TIMINGS AND MAGNITUDE OF THE *LITTLE DIVERGENCE* IN EUROPE**


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ABSTRACT

The aim of this paper is twofold. First, to present a new estimation of real wages for Early Modern Spain with regard to a subsistence line -understood as a theoretical minimum of consumption necessary to meet basic human needs and to sustain an active life. Second, to contribute, with new evidence, to the debate on the economic divergence before the Industrial Revolution. In broad terms, our results describe a general picture of low real wages in Spain in the long run, although there are regional variations in levels and timings that challenge previous perceptions, particularly in the case of urban Castile. In terms of international comparisons, our data suggests different chronologies and magnitudes of the Spanish divergence. As we attempt to demonstrate, two issues conditioned the dimension of the gap on real wages between Spain and the European North-Western core, as displayed in the recent literature. The first is related to the available Spanish evidence; the second deals with some methodological choices in the composition of the subsistence baskets -namely, the “oatmeal effect”. The question we discuss here is whether the Spanish Little Divergence was as great and early as it has been suggested; or, turning it around, whether the European North-west was, in respect of real wages, so exceptional before 1800. Calculations will show that the divergence did not appear clearly until the early 18th century, and that North-western European real wages for labourers were not that far from the bare subsistence line as they appeared to be. Our paper provides some different responses to the issue of the timing of the Spanish divergence and questions the conventional wisdom on its magnitude.

Keywords: Early Modern Europe, Little Divergence, real wages, subsistence ratios, history of wages and prices.

RESUMEN

El objetivo del texto es doble. Por un lado, presentar una nueva estimación de salarios reales en España durante la Edad Moderna respecto de una línea teórica de subsistencia -entendida esta como el mínimo de consumo necesario para cubrir las necesidades vitales y poder mantener una vida activa. Por el otro, contribuir, con nuevos datos, al debate de la divergencia económica anterior a la Revolución Industrial. Los resultados obtenidos ofrecen una imagen generalizada de salarios reales bajos, aunque hay variaciones regionales en cuanto a niveles y cronologías que contrastan con percepciones previas sobre su evolución, en particular en el caso de la Castilla urbana. Con respecto a las comparaciones internacionales, nuestros datos sugieren cronologías y magnitudes de la divergencia de los salarios reales españoles distintas a las que se pueden encontrar en la literatura reciente sobre el tema. Ello es debido a dos razones. La primera tiene que ver la evidencia disponible hasta ahora sobre España. La segunda está relacionada con ciertas opciones metodológicas en la composición de las cestas de la compra, que denominamos como “el efecto avena”. Se discute si la “Pequeña Divergencia” española fue tan temprana y tan grande como se ha sugerido; o si, cambiando las tornas, los salarios reales en la Europa Noroccidental eran tan excepcionales antes de 1800. Nuestro texto ofrece explicaciones y respuestas distintas sobre el tempo de la divergencia y cuestiona las convenciones últimamente establecidas sobre su dimensión.

Palabras clave: Edad Moderna, la “Pequeña Divergencia”, salarios reales, ratios de subsistencia, historia de precios y salarios.

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SPANISH REAL WAGES IN THE NORTH-WESTERN EUROPEAN MIRROR, 1500-1800. ON THE TIMINGS AND MAGNITUDE OF THE *LITTLE DIVERGENCE* IN EUROPE.¹

In 2001 Robert Allen published the highly influential *The Great Divergence in European Real Wages and Prices* (Allen, 2001), a seminal text that not only opened a new fruitful methodological approach in the literature, but also provided a quantitative snapshot of the diverging performance of real wages in Europe that has since become widespread. Through the calculation of *welfare* ratios related to a hypothetical *Poverty Line*, he established a comparative framework in which the European *Little Divergence* appeared visibly depicted. From approximately the early 16th century, there was a clear contrast in the fortunes of the wage labourers of the North-west and the rest of Europe, with differences expanding considerably from the 17th century onwards. As van Zanden (2009, p. 98) explained, an increasing global productivity of the economies surrounding the North Sea allowed real wages to stabilise in the context of a stronger demographic growth than in the rest of the continent, where downward trends in labour's rewards prevailed.

However, as results showed, the *Poverty Line* basket, under the simulated conditions, exceed the apparent possibilities of the majority of European labourers as it was closer to a kind of respectability threshold that only a few labourers in North-western Europe would have been able to reach. Moreover, the structure of the standardised basket did not adapt to intercontinental comparative approaches. Given those circumstances, Allen (2009, pp. 37-41) changed his perspective. Instead of measuring purchasing capacities over a basket that would resemble a European urban consumption standard, he moved to assess the cost of a hypothetical minimum of subsistence, with a basket based on the computation of the cheapest grain available and with the minimal allowance for clothing, lighting, and fuel for supporting a bare bones subsistence. Thus, the analysis moved to measure how far or how close to that subsistence line wages were, and to discuss

¹ Previous versions of this paper were presented at the Posthumus Sixth Low Countries Conference 'Rich and Poor in the Preindustrial World', Antwerp (Nov. 2011). The Workshop 'The global and long-term development of real wages: methods, problems and possibilities', Amsterdam (Nov. 2012), the IV Encuentro AEHE (Asociación Española de Historia Económica), Pamplona (Sept. 2013) and in a seminar at the Universidad Autónoma de Madrid. (Dec. 2014). We thank participants for their comments and suggestions. This work was co-financed by the Spanish Ministry of Economy and Competiveness (HAR2012-35965) and the Basque Government (Gobierno Vasco/Eusko Jaurlaritza - Grupo de Investigación consolidado - IT337-10)

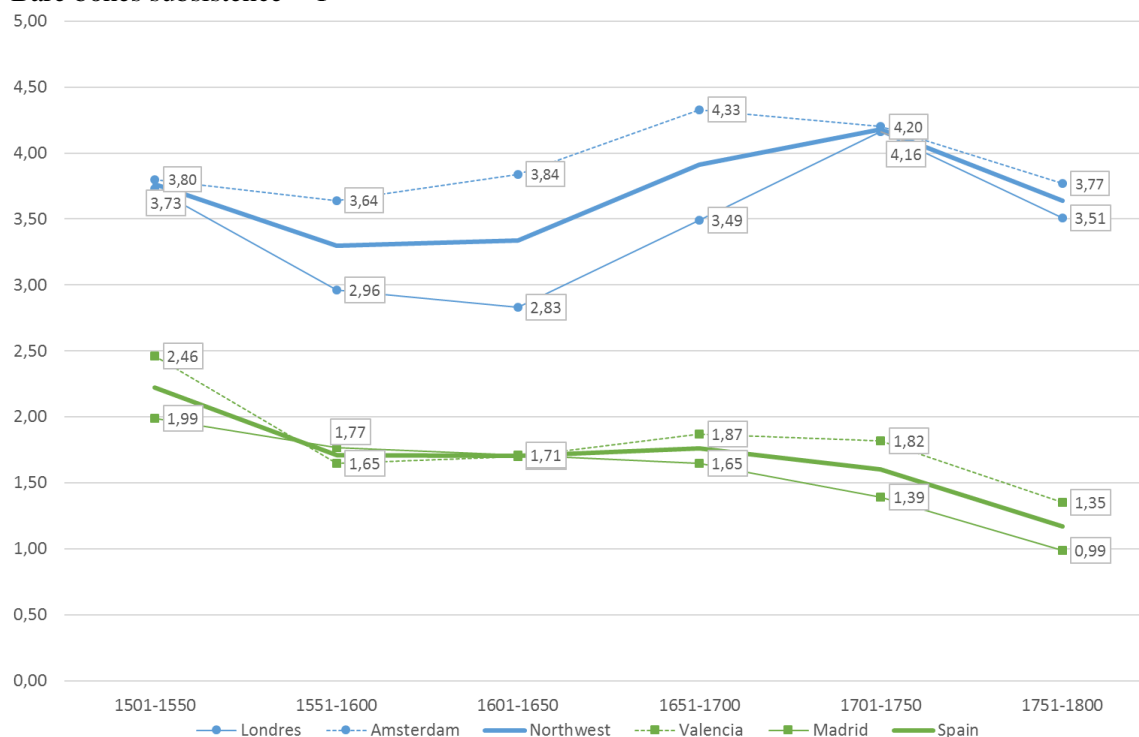
its further implications. This change helped to expand the research programme from Europe to other continents².

Yet it did more than that. It also changed the picture of the so-called *Little Divergence* in Europe. The newly computed real subsistence wages not only reinforced the idea of an Early Modern North-western exceptionality, already present in the former calculation, but it also altered its timing and, principally, its scale, with earlier and much greater differences between the Northwest and the rest of Europe. As for Spain, it meant that at the approach of the 16th century the divergence was already in existence: then, on average, Spanish urban building labourer's earnings would have barely been little more than half of their northern counterparts' (see Figure 1). The differences would have subsequently become significant and deepened even more from the 17th century onwards. On the eve of the 19th century, for instance, unskilled subsistence ratios in London or in Amsterdam would be 3.5/3.8 times higher than in Madrid. Whilst the earnings of the majority of Europeans would have declined towards bare subsistence, in the high-wage economies of the North-west labourers would have enjoyed real wages well above the vital minimum and, therefore, they would have had the means to upgrade their consumption to more abundant, diverse and higher quality foodstuffs, consumption goods and services, such as education. All this seems to have begun at an early time, or at least, earlier than was commonly thought. The foundations of the European divergence in real wages could be traced back to late medieval times (Allen, 2001, p. 413; 2011, p. 11), with all that this would have implied for future developments and this is something that Pamuk (2007) also suggested in his *Black Death* thesis.

With this background, the present text aims to shed new light on the subject by drawing on new evidence on real wages in Early Modern Spain and, in this way, contributing to the discussion on the economic divergence during the Early Modern centuries. This paper gathers estimates of the subsistence real wages of unskilled building labourers for six Spanish cities (Barcelona, Valencia, Seville, Madrid, Valladolid and Bilbao) and compares them with four North-western locations (London, Oxford, Amsterdam and Antwerp). Our calculations show that wages in Spain moved close to the subsistence line during the whole period. However, the new evidence we provide in this paper furnishes some novel insights in trends and international comparisons. We contend that Spanish subsistence real wages would have lagged behind less and later than was previously believed and calculated. This is, first, because new and more comprehensive evidence on prices and wages has improved the quality of the Spanish estimates, with results differing from those displayed in the literature. Second, this is because subsistence ratios in the North-west vary significantly when the canonical subsistence basket is revalued with the substitution of brown bread for crude grain (oats/wheat) as the main source of carbohydrates.

² Among others, Allen (2014); Allen, Bassino, Ma, Moll-Murata, and van Zanden (2011); Allen, Murphy, and Schneider (2012); Arroyo Abad, Davies, and van Zanden (2012); Challú and Gómez-Galvarriato (2015); De Zwart and Van Zanden (2015); Rönnbäck (2014).

Figure 1
Labourer's subsistence ratios in North-western and South-western Europe
 Bare bones subsistence = 1



Source: Allen et al. (2012). Northwest is the average of London and Amsterdam. Spain, of Madrid and Valencia.

This paper is structured as follows. The first and second sections describe the new *corpus* of Spanish prices and wages collected and discuss the methodological aspects – principally, the ‘oatmeal effect’ and our choice of a coarse bread-based European *Subsistence Basket*. The third section displays the new price and wage evidence. The fourth section presents our new estimates of subsistence real wages in Spain, also providing tentative regional and national averages. In the following section, and with the aim of fostering debate, we propose a view that challenges the picture stemming from the existing literature on the subject. We discuss whether the Spanish *Little Divergence* was as great, and began as early as it has been suggested, - or, turning it around, whether the European North-west was, in terms of subsistence real wages, so *exceptional* before 1800. On the other hand, our results would insinuate a more diverse Europe than the basic distinction between a lagging Mediterranean and Central Europe and a burgeoning North-west. The final section recaps the main contributions of the paper.

1.- Sources³

Until recent times, Spanish historiography has lived under the long-term legacy of Earl Hamilton who bequeathed an impressive dataset of published prices and wages. In *American Treasure and Price Revolution, 1501-1650* he published the series of prices

³ See Appendix for a detailed account of the sources.

and wages for the four cities/regions of reference – Valencia, Andalusia (Seville), Old Castile and New Castile. Unfortunately, in *War and Prices in Spain, 1651-1800*, due to high printing costs, it was only possible for New Castile. Yet all those unpublished prices and wages that formed the core of his regional indices survived among his papers kept at Duke University.⁴ The recovery and processing of these data has allowed us to complete Hamilton's Spanish panorama for the Early Modern centuries (López Losa, 2013). In any case, the evidence needed further improvement. On the one hand, Hamilton himself regretted that despite the efforts he was unable to find sources with a minimum quality to build a series for Catalonia, a gap in his immense opus that he tried to resolve by considering Valencia's series as also representative of Barcelona. Nevertheless, Vilar (1949, p. 37) missed specific approaches to the Catalan and Basque cases for the economic particularities of these regions. The first loophole was brilliantly filled by Feliu (1991) and, in this paper, we add unedited data for the Basque Country (Bilbao) from 1651 onwards. On the other hand, there was the issue of the prices of Madrid. The Hamiltonian series for New Castile are composed with prices from various locations (Hamilton, 1934, 1947; López Losa, 2013) and only few of them are from the city. Recently, Llopis Agelán and García Montero (2007, 2011) and Andrés Ucendo and Lanza García (2014) warned about the particularity of Madrid regarding the evolution and characteristics of prices. In our computations, we use the new set of prices for the 17th century recently made public by the latter and we have extended the series of Madrid towards 1800 with prices from local sources. Similarly, we have completed the unpublished Hamiltonian series of prices for Seville and Valladolid (Old Castile) with new evidence from primary sources.

Confronted with the extraordinary richness of prices, the evidence on wages in Hamilton is weaker, with long periods of total absence, or with partial evidence in both published works and unpublished papers. As with prices, we have improved the evidence for Seville, Madrid, Valladolid and Valencia with new unpublished data from ledgers from a variety of institutions, together with some new contributions from Spanish historiography. The series of wages for Madrid available today provides more comprehensive evidence that compensates for the fragility of Hamilton's series up until 1737.⁵ With regard to the dataset that Allen built based on the latter, this new data translates into higher nominal wages for both labourers (on average a difference of 32% between 1601 and 1650, 21% for 1701-50 and a 11% for 1751-1800) and masons (15% between 1651 and 1700, 19% in 1701-50 and 28% in 1751-1800). In the case of Valencia, and in local currency, differences are also noticeable, especially in mason's wages, yet in terms of grams of silver they reduce because the silver premium that Allen interpolates is higher than the calculation we use from Feliu (1991, p. 21). However, this affects silver

⁴ Hamilton (1928, 1929, 1934, 1947); http://library.duke.edu/rubenstein/findingaids/hamiltonearl/#c01_5 (EHP thereafter)

⁵ Daily wages in Madrid from Andrés Ucendo and Lanza García (2014); Llopis Agelán and García Montero (2011). The last quarter of the 18th century, wages also from Archivo Histórico Nacional, sección Universidades (see Appendix).

price levels, with Allen's estimate elevating them as much as a 20% for most of the 18th century (Appendix Figure A).

All the data has been standardised to metric measures, and prices and wages converted into silver grams. This poses some challenges as metrology varies abundantly across the country and it is not simply a matter of different systems in united but different kingdoms (Aragón-Castile) since variations occur between regions and even within localities. The risk of distortions is high since sources do not always register measurements in detail and a careful accountancy and detailed attention to almost every price is needed. The use of silver prices is also controversial. As Hamilton (1947, p. 232) wrote '... like a railway ticket and the cardboard upon which is printed, money and the substance from which it is made are not identical'. However, as Braudel and Spooner (1967, p. 392) recalled, silver was a 'means of international payments' and, therefore, it allows us to make comparisons between different economies. Despite these reservations, by unifying measures we overcome the problems posed by the existence of different currencies and metrological systems in Early Modern Spain and, at the same time, this helps to establish baselines for regional and international comparisons.

2.- Methodology: the choice for a bread-based European Subsistence Basket

Nearly twenty years ago, Scholliers and Zamagni (1995, p. ix) lamented the lack of standardisation in the literature on real wages in contrast with the developments in other fields of economic historiography. Comparisons were thus limited to trends and differences in rates of change but without providing any insight into what this could mean in terms of levels (Broadberry, 2011). They informed us, among other things, of whether waged workers earned less or more than before or after, but we ignored how much they were able to buy then and now. More recently, a new perspective has emerged. The methodology for measuring real wages through the evaluation of the purchasing capacities of wages in terms of standardised baskets has provided a way to establish criteria for comparative research, beyond the basic contrasts based on grain wages. Now, together with trend analysis, the computation of wage rates (the number of baskets a daily wage can afford) helps to ask questions such as those mentioned above, and to drive interest on research into what the answers to these questions would mean or imply - specially, from an international perspective. Yet Allen (2001, 2005, 2007a, 2009, 2011) moved beyond this. He proposed to translate the information that those wage rates give (the how much and who) into hypothetical welfare thresholds. The 'how much' then becomes a proxy of a kind of wellbeing (for the 'who') regarding some conjectural lines of poverty/ respectability or of subsistence.

The model of welfare ratios relies on some assumptions that generate debate and criticism.⁶ The male breadwinner family model of four, the amount of calories provided by the basket, as well as the number of working days attributed to the family head are at

⁶ See Humphries (2013) and the response in Allen (2015).

the centre of the discussion. Sometimes, the established parameters are seen as either too high or too low. At other times, the model is criticised for neglecting the contribution of the work of women (and children). Its historicity is also seen as dubious, even more so when the time span covered is centuries long. However, if we assume that one of its goals is not to seek an historical *truth*, but to set some basic *stylised* conditions to allow for comparative analysis, the standardised baskets and its assumptions, debatable as they are, make some interesting points. On the one hand, they offer a way to develop a methodology missed in the literature by providing a basket with equivalent utilities in terms of calories to consumers no matter where they live. On the other hand, welfare ratios set benchmarks that, under given conditions, offer yardsticks to discuss how close or far from subsistence, in this case, computed wages might have been over time and to speculate on the hypothetical implications for comparative levels of consumption, health, industriousness or economic development.⁷ Paraphrasing Edward Box, it may not be exact, but it is certainly useful.

What does *subsistence* mean? In short, Allen's *subsistence* basket is computed to cover what would be the minimal nutritional requirements to sustain an active life and it reduces to the lowest any other expenditure on non-food goods. The first model of the *bare bones* basket provided 1,940 calories per day and this was multiplied by a factor of three to calculate total family consumption (ideally composed of two adults and two dependent children), taking into account the different caloric needs within the family. To that was added 5% per basket to compute housing expenses (Allen, 2009, p. 37). However, that quantity of calories was criticised by Humphries (2013, pp. 697-703) and Malanima (2013, p. 49) for being too low for the goals pursued. More recently, Allen recognised this limitation and recalculated the amount of calories for each basket on the base of modern standards regarding age and physical activity. The result was that the amount of calories per basket increased to 2,100 and to compute the family consumption it is now multiplied by 4.2 (four baskets plus 5% each for housing)⁸. Based on these new computations, this paper calculates welfare ratios for a bare bones subsistence budget for Spanish and North-western European labourers. The model implies 250 working days and, in consequence, the daily wage is multiply by this number. A ratio is obtained by dividing the hypothetical family earnings by the cost of the basket. A *Subsistence* ratio above one would indicate that the earnings accumulated during the year allow the family unit to reach the minimum level of subsistence. Below that, everything indicates that the annual wage income accumulated by the working head of the family would not suffice to provide the goods and services that would guarantee the household survival and, therefore, more working days, the contribution of other family members, or charity, becomes compulsory.

Several debates may arise in the application of this model to Early Modern Spain, but there are two worth considering: the composition of the basket and the number of

⁷ See Allen (2001, p. 427) and the reply to the criticism of the *welfare* ratio methodology of Dobado-González (2015) in Allen, Murphy, and Schneider (2015)

⁸ It means to increase the kg of oats in the basket from 155 to 170, and of wheat/rye from 177 to 195.

working days accounted for (250 days). As regards the latter, one common reference to the subject in the Spanish literature are the 120, 180 and 250 working days that the *Cadaestre of Ensenada* of the mid-18th century attributed to rural labourers, urban trades and service sector respectively. However, these were a sort of standards applied to every worker to calculate a proxy of personal annual income obtained from professional activities in order to set a tax. Conjecturally, these numbers might have had more relationship with the fiscal goals pursued in the *Cadaestre* than with a realistic measure of annual work intensity (García Zúñiga, 2011, p. 2). As Vilar (1970, p. 19) rightly pointed out with regard to the 120 working days attributed to peasants, this number is no more than a sort of convention, easier to accept in itself than as uniform reference in a very diverse Early Modern Spain. In fact, the *Catastro* gives many detailed accounts of the working activities of the people surveyed and, not surprisingly, references to annual working days well above the benchmarks abound.

Based on the number of festivities that Canon and Royal Statutes established, recent studies have shown that the implicit working calendar in Spain moved from around 270 days per year in late medieval times, to reach the 281 days in the second half of the 18th century (García Zúñiga, 2014, p. 67). These numbers do not go far from the 286 wage days accounted for some labourers in Seville in 1685 and in 1770, yet they are a little below the 290 days that Domingo García worked as a building labourer in Madrid in 1777, the 296 that masons billed to the same Madrilean College in 1785 or the 312 days that two laundry women worked for a wage in the *Real Colegio Seminario de San Telmo* of Seville in the same last year.⁹ These scattered references probably reflect situations of full demand of labour yet regular estimations put averaged working days per year well above the 200-day line. Using the reference for the 18th century Madrilean masons provided by Nieto (2006, p. 428) it is possible to assume an estimated working year of around 240-250 days. In the mid-19th century, Cerdà (1867, pp. T. II, 587) calculated that building workers in Barcelona would have lost 141 days on average (64 for festivities, 3 for illness, 18 for economic circumstances, and 58 for factors linked to bad weather or works at standstill during winter months) to give a sum total of 224 working days annually. This number is close to the 225 days attributed by Llopis Agelán and García Montero (2011, p. 299) to the same trades in 18th century Madrid. If we take the latter as lower bound estimations and those given above for Seville or Madrid as the upper limit, the 250-day year would not be far from being an acceptable conjectural average. Nevertheless, the discussion as to what figure is more realistic is certainly pointless as we lack data to build up reliable estimations over time. Consequently, we should take Allen's 250 days, as Pierre Vilar did with the estimates of the *Catastro*, as a more or less realistic conjectural benchmark to gauge a hypothetical annual wage income that served not as an explanatory fact but, fundamentally again, as a point of reference.

⁹ Archivo Histórico Nacional (AHN), Universidades 606-1/2; Libro 1327. Archivo Histórico de la Universidad de Sevilla (AHUS), Real Seminario de San Telmo, Libros de cuentas 1, 87; Libro de Data, 101, 116.

One of the requirements for consumption baskets in comparative studies is not to include the exact same type of goods but those that provide similar utilities, because not all the products were available or played the same role everywhere. Besides, the use of generic denominations such as wine, bread, fish or linen, to name some, hides many of the times the existence of an enormous variety of types and qualities that make pertinent a clear identification of those products composing the basket, especially when measuring consumption capacities rather than trends.¹⁰ Although the goal is not to reproduce any concrete pattern of consumption but to establish a baseline for a hypothetical minimum to guarantee subsistence and the simplicity of the budget does not leave very much room for disquisitions, we have introduced some variations in the Spanish baskets according to evidence of regional consumption patterns. There seemed to be a geographical divide together with a market segmentation as far as mutton and beef consumption is concerned. Beef was the characteristic meat in Atlantic Spain, and it was also widely consumed among the lower classes in cities such as Seville and Madrid. In the Mediterranean area, ovine was the most consumed¹¹. In consequence, we compute mutton prices in the baskets of Barcelona and Valencia, although the popular classes would not eat mutton but cheaper types such as sheep or goat meats. In the case of legumes, we use chickpeas in the baskets of Madrid, Valladolid and Seville and beans in the cases of Bilbao and Barcelona. On the other hand, rice substitutes for legumes in Valencia's indices. At least since Muslim domination times, rice was doubtless a staple for stews in combination with vegetables, other legumes and proteins of animal origin. As for prices, it was cheaper than chickpeas and more expensive than beans but the differences between all them diminish when we measure the cost in terms of calories. We have also altered the weighting of legumes in the North-western European baskets (see Table 2). The daily allowance of calories (187) imputed to legumes in the European *subsistence* basket (Allen, 2009, p. 137) would mean the use of a pulse that provided around 3,000 calories per kg. However, the prices included in the baskets of Amsterdam and Antwerp correspond to green peas that would only offer about a third of the calories for the same quantity/price. In the case of beans in London, we have maintained the values attributed by Allen (2001, p. 421) that results in about 46 kg (60.67 litres) of beans per year.

Yet the main change we propose regarding Allen's European subsistence basket is the inclusion of bread instead of crude grains (oats/wheat/rye) as the basic source of carbohydrates. Our ratios are estimated using prices for the lowest quality bread types available, those that sources commonly refer to as the type of bread consumed by the 'poor'¹².

¹⁰ See the example of wine prices in late 17th and 18th-century Spain in López Losa (2013, pp. 83-84).

¹¹ See, for example, Caballero (1998), pp. 283-284 or Hernández Franco (1981). pp. 88-89.

¹² We use rye bread prices in the baskets of Amsterdam and Antwerp and brown wheaten bread prices in the case of London and the Spanish cities in the sample.

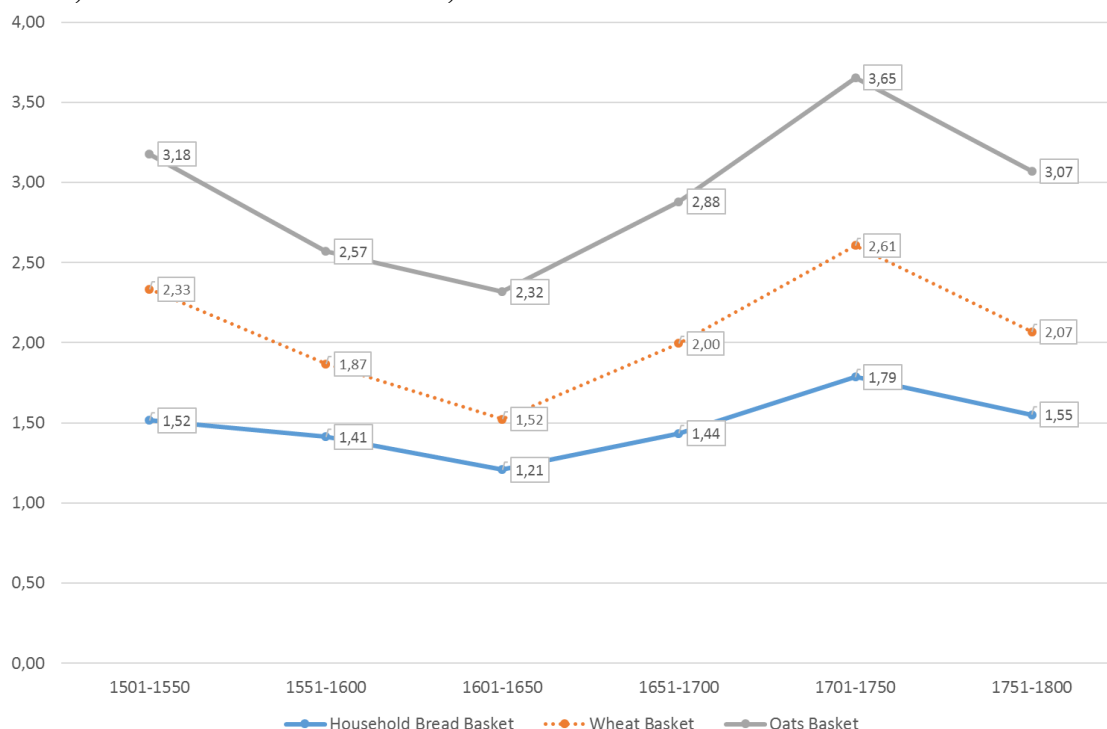
The 'oatmeal effect'. The unevenness of the oat-based basket comparisons and the case for bread.

The original computations of the European subsistence lines included a novelty that it is crucial to understanding the differences in the performance of real wages that they produce – no matter if they are measured according to daily wage rates or *subsistence ratios*. To estimate the cost of bare sustenance, Allen (2009, p. 35) proposes the computation of the cheapest grain hypothetically available in every place. This implies that oatmeal would replace bread in North-western European baskets, whereas for the rest of cities considered, rye or wheat would be the alternatives. However, we contend that this choice produces unbalanced comparisons and casts doubt on the real representativeness of the ratios obtained. Oatmeal was common in northern England and Scotland but was less so in the big cities of London or Amsterdam where wheat/rye bread was, more probably, the staple. Moreover, wheat or rye (or maize and rice) are either staples themselves or are the base for producing the staple (bread) with all it carries in terms of production, agricultural land distribution, commercialization, demand, and prices. Seemingly, the price for oats would not incorporate all the factors that shape wheat or rye price formation. Had the demand for oatmeal been so high as to substitute the bread on labourer's tables, it is doubtful that prices would have been maintained at such low levels with regard wheat or rye.

The outcome of the choice of oats, namely the 'oatmeal effect', is far reaching because it elevates the hypothetical welfare of the labourers significantly above the subsistence minimum in both cities and marks a clear divergence in levels with what would have been the performance of the same labourer's wages when measured in the staple they mostly consumed. Figure 2 illustrates this situation for London. According to our computations, an oats-based basket means subsistence ratios two times higher than those built on the consumption of household bread, the lowest quality type in the Assize, and 1.4 times higher than if the substitute for bread is wheat.

Figure 2

The ‘oatmeal effect’. Labourer’s bare bones subsistence ratios in London regarding brown bread, wheat and oat-based baskets, 1501-1800



*Ratios based on the new premises (4.2 baskets, 2,100kc each). Oatmeal basket implies 170 kg of oats as in Allen (2013a, b). *Wheat* and *Household* bread baskets use the kilograms of wheat (195) and brown bread (271) necessary to equal the number of calories attributed to oats. One litre of oats corresponds to 0.473 kg (estimating a bushel of oats weighing 38 British pounds). One litre of wheat corresponds to 0.78 kg and 1 kg gives 3,400 calories.

Source: Allen (2001). www.nuffield.ox.ac.uk/General/Members/allen.aspx. Prices for oats between 1703 and 1770 from Clark (2005) <http://gpih.ucdavis.edu/Datafilelist.htm>.

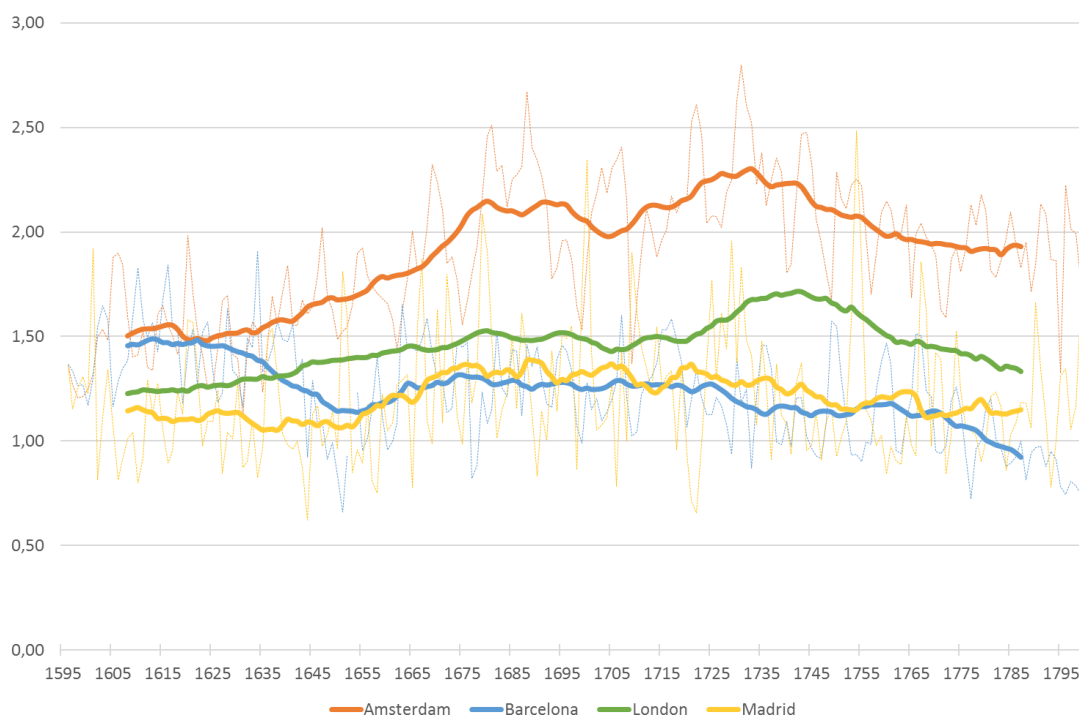
Furthermore, even if we accepted the use of prices of real staple grains as if they were food prices, and moved from oats to wheat/rye in North-western and Spanish baskets, some issues would still arise. The scarcity of bread prices frequently made researchers opt for grain prices as substitutes in price indexes, and purchasing capacities measured in litres of grain have served as rough estimates of real wages, allowing basic comparisons at different levels.¹³ Nevertheless, when we seek to measure consumption capacities through more comprehensive baskets, the use of grains would introduce some other distortions as the political economy on grain and bread trades varied between countries. In Spain, wheat bread was the basic staple for the urban population and its price, in its medium and low quality types, was a political issue of the first order. The concern of the authorities at all levels to maintain prices with reasonable margins caused them intervene in wheat and bread markets, at least from late medieval times.¹⁴ Figure 3

¹³ See, for example, Abel (1980); Söderberg (1987); Livi Bacci (1999); van Zanden (1999)

¹⁴ Examples in Andrés Ucendo and Lanza García (2012); Castro (1987); Caro López (1987), Pérez Aparicio (1975); Hernández Franco (1981); Palop Ramos (1977); Teston Nuñez, Rodríguez Cancho, and Pereira Iglesias (1987)

graphically depicts this situation in Barcelona where, as Feliu (1991, pp. 32-33) put it, protection over ‘poor’s bread’ prices, in particular after the end of the Catalan Revolt of mid-17th century, made them fluctuate less and grew at lower rates than those for wheat. In contrast to Spain, van Zanden stressed the diverging behaviour of rye and rye bread prices during the 17th and 18th centuries in Western Netherlands where ‘indirect taxation on milling increased sharply’ making bread/grain price ratios rise. As he concluded, ‘measuring real wages in terms of rye clearly gives a biased impression on their development’ (van Zanden, 2005, p. 176). Putting it into numbers, it would mean that, between 1701 and 1725 for instance, whereas a building labourer in Amsterdam was able to buy almost double the amount of grain/rye (22 litres), and one in London 30% more wheat (16 l.) than any of their Madrilean counterparts (12 l.), they all would have bought almost the same quantity of low-quality bread, about 10 kg.

Figure 3
Bread (kg) and grain (litre) price ratios in Barcelona, Madrid and London (Brown Bread/Wheat) and Amsterdam (Rye Bread/Rye), 1595-1800.
 (25-year moving averages)



Source: see Appendix.

In any case, the choice of bread is not free of problems. Prices do not abound and, often, it is hard to know with certainty the type of bread they are referring to. The world of bread in Early Modern Spain (and in Europe) was more complicated than the simple division between white and brown. In Madrid, around 1630, sources mention the existence of at least three types of bread for sale: high quality *white* bread, common bread and the one named *pan de cabezuela*, identified with poor’s (brown) bread (Castro, 1987,

p. 198; Real-Academia-Española, 1729). Nearly a century and half later, in 1767, thanks to some trials on the cost of producing bread promoted by the Town Council, there is detailed information on the different types of bread regularly sold in the city and the quantity of bread that a *regular fanega* of wheat produced. The report informs about four types in respect of the flour used in baking: *Pan de Flor (Candeal)*, French bread, Spanish or Common bread and Town's bread, also known as *Terciado* or Poor's Bread (Diario de Madrid, 1789, pp. 884, 1326; Ringrose, 1983, p. 147).

Table 1
Castilian pounds (0.460 kg) of different qualities of flour and bread obtained from one fanega of regular wheat in an experiment carried out in Madrid in 1767

	Wheat litres	Wheat lb	Wheat kg	Wheat kg per litre
One fanega of wheat equals	55.5	91	41.86	0.754
	Type of Flour/Bread	Flour lb	Bread lb	Extraction rate (%)
One fanega of wheat produces	<i>Candeal</i> or <i>de Flor</i>	63,56	80.75	70
	French	65,44	84.13	72
	Spanish/Common	66,94	87.13	74
	Town's	76,44	106.38	84

Source: *Correo Mercantil* 1795, pp. 355-356.

Broadly speaking, this distribution is repeated elsewhere. In Valladolid and Bilbao, sources provide almost identical descriptions of the types of flour and bread sold in both cities.¹⁵ However, when it comes to prices according to bread quality, the sources are often sketchy. Among the series available in the Spanish literature and the ones added in this paper, prices from Lorca (1750-1800) and, most probably those from Murcia (1675-1788) and Almadén (1763-1847), deal with brown types; instead, in Seville (1654-1800), Valladolid (1608-1754) and Madrid (1596-1800) they are prices for medium and high quality white breads. Only in the case of Barcelona do we find prices for both white and brown bread types (Feliu, 1991, pp. 52-56)¹⁶.

In order to estimate brown bread prices for the cities in our sample, we carried out three different simulations¹⁷. As Spanish historiography shows, bread/wheat prices were object of public intervention. In Madrid, for instance, the authorities normally fixed selling prices (the so-called *postura*) and for the second half of the 18th century we have

¹⁵ Archivo Municipal de Bilbao, Primera 0501/0008; *Memoria político-económica* 1789). On the other hand, in Barcelona, apart from the two basic types -*White* and *Brown*- there was a *medium* (quality) bread that, according to Pérez Samper (2002, p. 48), popularised in the 1750s.

¹⁶ Lorca in Hernández Franco (1981); Murcia, Caro López (1987); Almadén, Dobado (1989); Sevilla, AHUS, Colegio Mayor Santa María, Sº 79-191 and Ruiz Rivera (1977); Valladolid in Gutiérrez Alonso (1989); EHP, Box 5; AHN, Clero, Legajos 16913. Madrid: Andrés Ucendo and Lanza García (2014) Andrés Ucendo and Lanza García (2014); EHP, Box 7; Archivo General de Palacio, Colegio Santa Isabel, legajos 29-49.

¹⁷ See Appendix 1 for further details on the computation of brown bread prices.

notices of the prices set for different bread qualities from both official and private sources¹⁸. Price differentials were, apparently, stable over time. Depending on the price of wheat, the two-pound loaf of *Brown* bread was 3 to 4 cuartos cheaper than the *Candeal* type¹⁹. One of the issues in the case of Madrid is the identification of the type of bread in the existing price series. Hamilton (1947) did not give any clue on the subject whilst Andrés Ucendo and Lanza García (2014) entitled as common wheat bread the one they used for the 17th century, based on the records of the College of Santa Isabel and *La Inclusa* – the Founding Hospital of Madrid-. However, the high bread kg/wheat litre price ratios that both series produce, which are comparable to those obtained in Seville or Barcelona for the highest qualities, probably indicates that those are prices of breads of higher quality. This intuition is confirmed for the 18th century as the prices recorded in the same institutions fit perfectly with the quotations for *candeal* breads found in Hamilton's papers and with the prices set by the authorities for French or *candeal* breads during the second half of the century. They also replicate the prices recorded as for *Candeal* and *French breads* in other colleges of the same city, such as the *Colegio de Nuestra Señora del Loreto* or the *Real Seminario de Nobles*²⁰.

For the years without evidence on prices, either brown or white, we have followed two different but complementary paths. The first relies on the theoretical rule that links the price of the *common* wheat bread of two pounds to that of the *fanega* of wheat, the value of the latter in *reales de vellón* being equal to the value of the former in *maravedís de vellón*²¹. This was theoretically in use in the Kingdom of Castile for most of the Early Modern period, not without regular claims of fraud by bakers and failures in the fulfilment of the rule in times of shortage. Based on the averages of price differentials between types, the price for common bread was reduced by one third to estimate the price of brown bread. The second option relies on Barcelona's data. Assuming that protective policies were general all around the country and that they would not vary in their basics from how they were applied, Barcelona's brown bread kg/wheat litre prices coefficient would serve as a proxy to estimate brown bread prices elsewhere. The results confirm the validity of this option. The contrast of brown bread/wheat prices ratios in the places for which we have real prices (Murcia and Barcelona) for that class of bread displays remarkable resemblances. The similarity is also true for the comparison between the prices simulated using Barcelona's ratios and those obtained by applying the *cuartos* rule from white bread prices (Figure 4). Although perfect replication is obviously out of reach of this exercise, simulations help to gauge trends and levels of brown bread prices in the country.

For North-Western European bread prices, we rely on the evidence provided by the literature. In England, the Assize of Bread set prices for several types in terms of their quality. In 1709, they were reduced to three, named as *White*, *Wheaten*, and *Household*

¹⁸ Among others, Soubeyroux (1980, p. 52); *Memorial literario* 1785, pp. 274-275); *Diario de Madrid*, n. 211, 28 november 1789, p. 1325; 30 june 1792, p. 764.

¹⁹ Each *cuarto* equals four *maravedís*.

²⁰ AHN, Universidades, Libro 1305. Soubeyroux (1980, p. 52). EHP, Box 7.

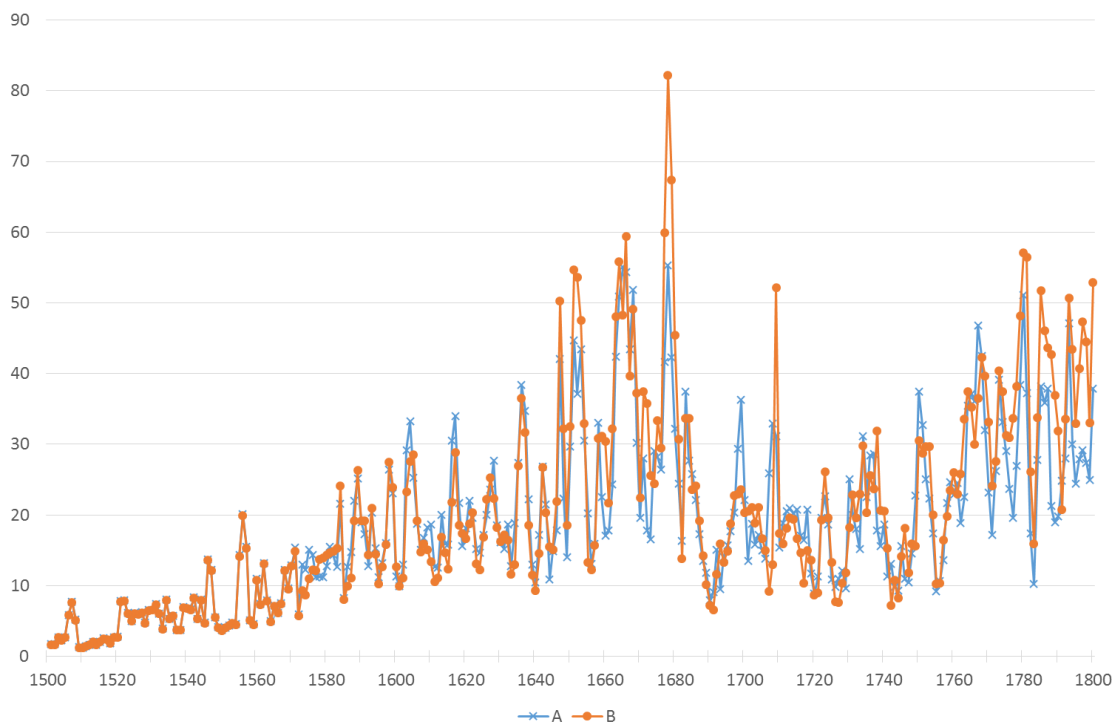
²¹ Escolano de Arrieta (1796, p. 303); *Ordenanzas Aranjuez* 1795, pp. 226-227). When it came to *candeal* breads, the same rule applied but adding one *maravedí* to the price of two-pound bread loaf.

(brown) breads. They corresponded to the *Wastell*, *Whole Wheat* and *Treet* types of prior times and although changed in names they maintain their basic relationships in terms of weights and prices, being *Household* one third cheaper than *Wheaten* bread. By 1758, the assized types were reduced to *Wheaten* and *Household* but, again, the relationship did not change. In 1773, a third type was reintroduced under the name of *Standard Wheaten Bread*. Apparently, this was similar to the *Wheaten* one prior to 1758, but with prices, in this case, being one eighth more expensive than the *Household bread* (*Report from the committee*, 1774, pp. 47-48). The series of bread prices for London published by Mitchell indicates that -'(t)he table relates to wheaten or household bread' (Mitchell, 1988, pp. 769-770) but there are few doubts that they are mostly prices for wheaten bread (Allen, 2007b; Kirkland, 1917). Consequently, applying that rule, we have converted them into household bread prices. On the other hand, baskets for Antwerp and Amsterdam were computed using rye bread prices. Here the issue of the bread's quality remains uncertain although rye bread was commonly of a whole grain type and so we assume it to be of a similar utility to that of wheat brown bread types.

Figure 4

Brown Bread prices in Seville (maravedís per kg), 1501-1800

Two simulations



A: 1501-1800, estimated with Brown Bread kg/Wheat l. price ratios of Barcelona calculated from Feliu (1991).

B: 1501-1653, *Maravedí per Real* in Wheat *Fanega*/l.33; 1654-1799, estimated from White Bread prices from Seville.

Sources: AHUS, Colegio Mayor Santa María, S.83-190; Ruiz Rivera (1977). The data for 1800 is from Álvarez Pantoja (1970).

Table 2
Spanish and NW European subsistence lifestyle: basket of goods

			SPAIN						NW EUROPE		
			Barcelona	Valencia	Seville	Madrid	Valladolid	Bilbao	London	Amsterdam	Antwerp
	Kc/day	Pr/day									
Brown Wheat Bread (kg)	1819	74.25	271	271	271	271	271	271	271		
Rye Bread (kg)	1819	74.25								271	271
Chickpeas (kg)	187	11.4			20	20	20				
Dry Beans (kg)	187	15	23.3					23.3			
Beans (l)	187								60.67		
Rice	187	66.7		18.5							
Green Peas (kg)	187									75.25	75.25
Beef (kg)	34	3			5	5	5	5	5	5	5
Mutton (kg)	34	3	5	5							
Olive Oil (l)	60	0	3	3	3	3	3	3			
Butter (kg)	60								3	3	3
Soup (kg)			1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Linen (m)			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Candles (kg)			1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Lighting oil (l)			1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
MBTU			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total	2100										

Kc – Calories; Pr – Grams of Proteins

Chickpeas 3400 calories and 208 gr of protein/kg as in <http://www.seh-lelha.org/alimento.htm>

Dry beans 2920 calories and 235.8 gr of protein/kg as in <http://www.seh-lelha.org/alimento.htm>

Beans: assuming the equivalences of calories per litre (1125) as in Allen (2001, p. 421).

Green peas: Assuming that prices refer to unpodded peas 907 calories and 68.75 gr of protein/kg were computed as in <http://www.seh-lelha.org/alimento.htm>. According to the Dutch Food Composition, Raw Peas would provide 650 calories and 40 grams of protein per kg. <http://nevo-online.rivm.nl/ProductenDetailsGetabt.aspx?zoekstring=&tabid=1>

*The remainder as in Allen (2009, pp. 36-37).

**1 litre of (..) in kg. Wheat = 0.78. Rye = 0.72. Oats = 0.46. Dry beans = 0.77. Chickpeas = 0.78. Green peas = 0.72. Rice = 0.82. Bringas Gutiérrez (1996, p. 248).

3.- The cost of subsistence and the price of labour in Early Modern Spain, 1500-1800

The use of the standardised basket answers the crucial question of how much money was necessary to buy an equivalent shopping basket in different places and helps compare the evolution of the cost of subsistence under the same premises. Moreover, if price levels (of both wages and commodities) say anything about the performance of an economy, the information they provide may also provide insights into rising and declining trends from comparative perspectives.

Prices rose fast in Western Europe during the 16th century and although the reasons behind this are still a matter for discussion, the impact of the windfall of American silver in commodity and labour prices in the Kingdom of Castile is undeniable. There, commodity prices increased more than anywhere in Western Europe, with the cost of subsistence multiplying 3.5 times in Valladolid and 3.6 times in Madrid during the period 1501/25-1601/25; but it was Seville where it reached the highest peak (4.6 times). The rising movement did not occur with the same intensity in the Mediterranean façade of the Kingdom of Aragon, where prices rose at slower pace (2.7 and 3.0 times in Barcelona and Valencia respectively).²² In any case, in the first quarter of the 17th century, subsisting in Madrid, Seville, Valencia, or Barcelona was between 1.6 to 2 times more expensive than in Antwerp, Amsterdam, or London. From then on, Spanish prices started falling without exception. In the hundred years after 1601-25, the cost of the basket reduced, on average, to around half. Prices hit the bottom in 1725-50, yet inflationist tensions quickly returned. In the second half of the 18th century, the cost of living experienced a sharp increase of around 90% in Seville, 60% in Barcelona, Valladolid, and Madrid, and 50% in Bilbao whilst in Valencia the rise was of a lesser magnitude (around 33%).

Table 3
The cost of subsistence baskets (grams of silver)
25-year averages

	Barcelona	Valencia	Seville	Madrid	Valladolid	Bilbao	London	Amsterdam	Antwerp
1501-25	188	183	125	128	120		133	124	116
1526-50	272	223	204	192	189		115	154	154
1551-75	333	347	280	263	282		175	231	210
1576-00	467	518	550	417	393		243	264	308
1601-25	500	542	563	464	425		320	304	331
1626-50	488	584	538	440	377		404	390	434
1651-75	394	511	541	376	339	407	407	427	354
1676-00	395	432	405	382	301	410	412	411	334
1701-25	389	375	279	294	234	271	364	389	320
1726-50	281	333	245	283	219	256	348	369	299
1751-75	355	405	338	371	305	293	410	407	325
1776-00	464	445	478	459	365	386	507	487	344

Source: see Appendix.

²² In Valencia the peak was reached in the period 1626-50 with prices multiplying then by 3.2 in the period 1501-25.

In comparison, the behaviour of prices in the North-west was significantly different. On the one hand, there was no boom- bust cycle such as the one experienced in Spain. Although there was a general increase in prices during the 16th century, this did not end so abruptly and the cost of subsistence seemed to plateau during most of the 17th century, and this was followed by a slight decline towards mid-18th century when prices started rising again. On average, the increase during the last half of the 18th century was also milder in the North-western region, with averages around 12% in Antwerp, but 32% in Amsterdam and 45% in London.

Table 4
Building craftsmen and labourers' daily wages in grams of silver, 1501-1800
25-year averages

Craftsmen - Masons										
	Barcelona	Valencia	Seville	Madrid	Valladolid	Bilbao	London	Oxford	Amsterdam	Antwerp
1501-1525	5.39	6.84	7.10	5.11	5.11		5.75	4.32	4.40	4.53
1526-1550	5.59	6.54	9.10	6.17	6.17		4.24	3.31	4.70	5.95
1551-1575	5.96	7.25	16.49	10.31	7.92		6.22	4.42	6.29	9.07
1576-1600	6.67	9.34	22.11	16.72	11.00		7.84	5.61	7.84	11.73
1601-1625	8.20	10.89	28.27	23.49	16.75		9.48	5.57	9.86	12.78
1626-1650	8.89	11.25	23.30	21.40	13.82		13.29	6.79	11.06	12.34
1651-1675	8.68	12.66	17.63	18.11	10.37	9.83	15.03	8.26	12.04	11.92
1676-1700	9.99	11.92	16.14	16.90	9.77	9.59	13.92	8.59	11.69	11.57
1701-1725	9.34	8.61	11.97	14.35	7.82	7.54	13.92	9.99	11.51	11.53
1726-1750	7.57	7.60	9.70	13.22	6.72	7.11	15.59	10.84	11.83	11.53
1751-1775	7.91	7.53	9.28	13.83	8.21	6.92	16.70	11.23	11.88	11.53
1776-1800	12.25	9.50	9.25	13.63	9.49	7.72	19.26	14.25	11.92	11.53
Labourers										
	Barcelona	Valencia	Seville	Madrid	Valladolid	Bilbao	London	Oxford	Amsterdam	Antwerp
1501-1525	4.67	4.38	3.29	2.64	2.64		3.60	2.88	2.93	2.73
1526-1550	4.68	4.15	5.06	3.31	3.31		2.67	2.13	3.20	3.29
1551-1575	5.13	5.30	7.22	5.11	5.29		4.34	3.24	4.00	4.88
1576-1600	5.57	7.41	9.58	7.51	6.78		5.04	3.74	5.46	7.04
1601-1625	6.22	8.39	13.20	11.34	10.87		6.48	3.71	6.79	7.68
1626-1650	6.00	8.44	10.89	9.86	9.13		7.87	4.64	7.73	7.40
1651-1675	7.09	9.41	10.40	8.07	6.61	7.41	9.28	5.57	8.35	7.15
1676-1700	7.05	9.26	7.92	8.15	6.37	7.41	10.06	5.70	8.59	6.94
1701-1725	6.08	6.46	6.08	6.48	4.55	5.65	10.24	6.84	8.87	6.92
1726-1750	4.78	5.69	5.20	5.82	3.83	5.18	10.80	7.28	8.99	6.92
1751-1775	4.80	5.75	5.03	5.66	4.20	5.38	11.14	7.48	9.18	6.92
1776-1800	7.36	6.16	5.52	6.08	5.04	5.74	12.12	9.27	9.23	6.92

Source: see Appendix.

As Table 4 reveals, the Spanish price revolution also applied to the cost of labour. It mirrored the evolution of subsistence prices, rising and falling steeply in the urban axis of Castile. At their peaks, around the 1620s, Castilian masons multiplied their wages by

a factor of almost four in Seville or 4.6 in Madrid compared to their earnings in the early 16th century, whilst, in a very similar fashion, labourers multiplied their wages by 3.8 in Seville and 4.3 in Madrid. Yet, between 1625-50/1725-50, wages plummeted, and only experienced a slight recovery, following price trends, during the last quarter of the 18th century. In contrast, wages in Barcelona and Valencia again followed a different path. The rise was slower during the 16th century and they remained practically stable during the following century. Instead, they fell in the central decades of the 1700s, then catching up with the descending Castilians. During the rest of the 18th century, labourers' rewards moved along at practically the same levels in the whole country –with the exception of Barcelona where the upturn was noteworthy in the last decades of the century. Instead, masons' data shows greater dispersion although the big trends did not vary, with the exception of Madrid during 18th where they were maintained almost without variation. The international contrast recreates, with some variations, the comparative scheme in prices related above. The rise of wages there was also stronger than anywhere in Europe during the 16th century and reached its heyday in the first decades of the 17th century, when both Castilian labourers' and masons' wages became the highest in Europe –almost double the earnings of their counterparts in the Northwest. However, they quickly lost ground, until they converged with north westerners in the second half of the same century. During the 18th century, they plunged against Amsterdam and London wages, these latter, on average, being twice those Spanish around 1800.

In the late 16th and the early 17th centuries in Seville and during the 17th century in Madrid, mason's nominal wages achieved the highest levels in Europe during the Early Modern Age. Even after the long decline experienced during the course of the 18th century, they still maintained among the highest wages of the continent in the case of the latter. At the same time, the skill premium in both cities city would show clear particularities regarding the rest of Spain and Europe. Apparently, high premiums went hand in hand with periods of urban expansion there. Llopis Agelán and García Montero (2011, p. 306) argued that Madrid received a continuous inflow of very flexible but unskilled rural labour, even in times of economic stagnation which, together with deficiencies in human capital formation, would hypothetically explain the high premiums (Appendix Table B).

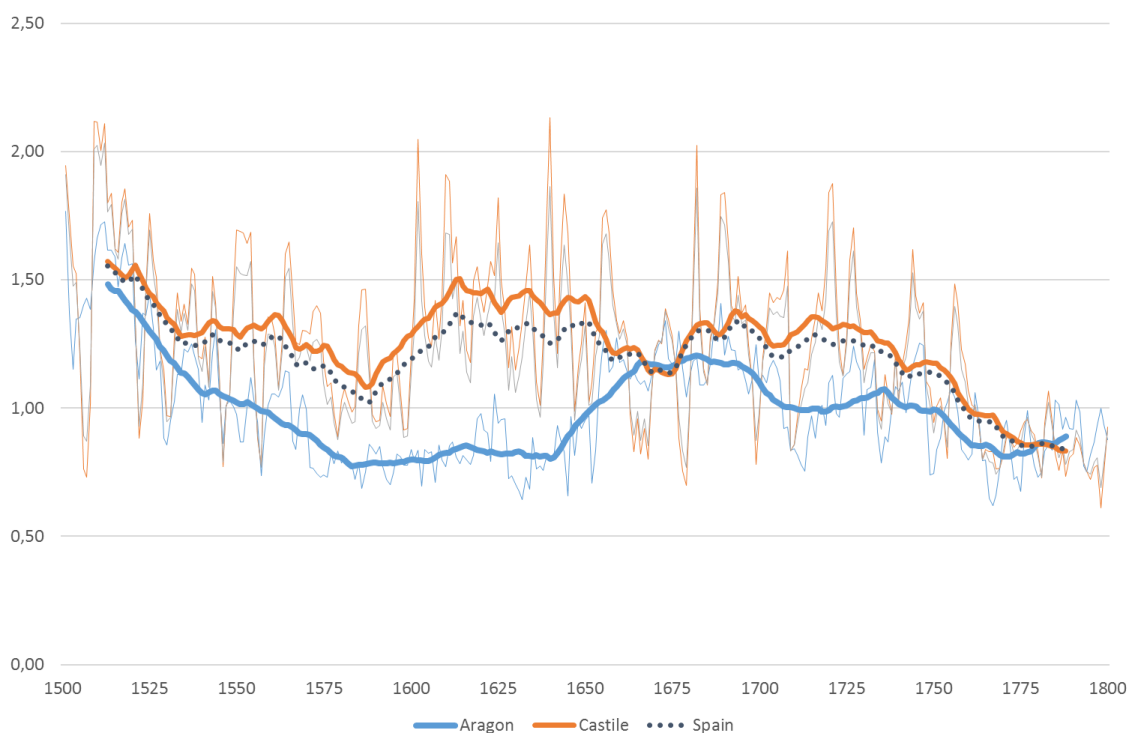
4.- Early Modern Spanish subsistence ratios in the European framework

The real wages indices available for Early Modern Spain provide a good snapshot to calibrate their performance through the identification of major trends. (Álvarez Nogal & Prados de la Escosura, 2013; Andrés Ucendo & Lanza García, 2013, 2014; Feliu, 2004; González Mariscal, 2013, 2015; Llopis Agelán & García Montero, 2011; Moreno Lázaro, 2002; Phelps Brown & Hopkins, 1959; Reher & Ballesteros, 1993; Serrano García, 1999). However, the methodological and chronological heterogeneity made them less useful to contrast different experiences and to estimate any kind of ratio regarding hypothetical

welfare or consumption capacity lines. This paper overcomes those limitations by using the model of standard baskets described above.

Figure 5 reproduces averages of subsistence ratios for urban unskilled building labourers in the Kingdom of Castile, the coastal region of the Crown of Aragón, as well as a tentative national average. Castile series are formed with the unweighted average of the subsistence ratios for the cities of Seville, Madrid and Valladolid, with the addition of Bilbao since 1651. If Hamilton's intuition was right, our extended sample of cities would be representative of a good part of the Castilian urban geography. The coastal urban centres of Barcelona and Valencia represent the Crown of Aragón.²³

Figure 5
Subsistence Ratios in Spain, 1501-1800
25-year centred moving averages



Source: Appendix. Subsistence ratios computed with the new premises (4.2 baskets, 2,100 kc each).

The series displayed in Figure 5 would not allow much room for readings other than destitution and precariousness in the living conditions of urban building labourers during the Early Modern centuries in Spain. Our results show that subsistence ratios computed under the conditions described above appear largely trend-less and moved, during the whole period, in ranges close to a situation that in actual standards would be regarded as extreme poverty (Allen, 2011, p. 12; 2013b).

²³ Spanish average has been calculated by weighting the population of the Kingdom of Castile and the Crown of Aragón 80/20 respectively. According to Nadal (1984), between 1500 and 1600 the relationship would have moved around 85/15 whilst in the second half of the 18th century the census of Aranda (1765) and Floridablanca (1787) it would be 77/23 approximately.

There are, in any case, differences between Castile and the Mediterranean. The failure of real wages in the first half of the 16th century revealed similarities in both areas but whilst Castilian data would show a certain stabilisation during the central decades, wages increasingly declined in Valencia and Barcelona, bottoming out in the last quarter of the century. Those levels under the subsistence frontier were maintained, unaltered, until the mid-17th century and mark the boundaries of the period of greater divergence levels with regard to the Castilian subsistence ratios. Meanwhile, during the first third of the 17th century Castilian wages witnessed a recovery and stabilised slightly above the levels reached in the previous century. Our computations for real wages in Castile, and Madrid in particular, suggest a geometry that it is in stark contrast to that depicted by the index for New Castile of Reher and Ballesteros (1993). Not only would the fall of wages have been shorter and of lesser intensity, but the starting point of the comparison at the beginning of the 16th century would show wages moving at significantly lower levels. Figure 6 also highlights the different behaviour during the 17th century. Whilst in our estimation the first quarter of the century would be one of recovery, according to Reher and Ballesteros' index, wages continued falling until the mid-century. On the contrary, whilst in the worst of the so-called *vellón* inflation, subsistence real wages would fall to almost a half, in the computations of the latter there would be a sustained rise that peaked in 1675-80 with wages, on average, being a 47% higher than in 1656-60²⁴.

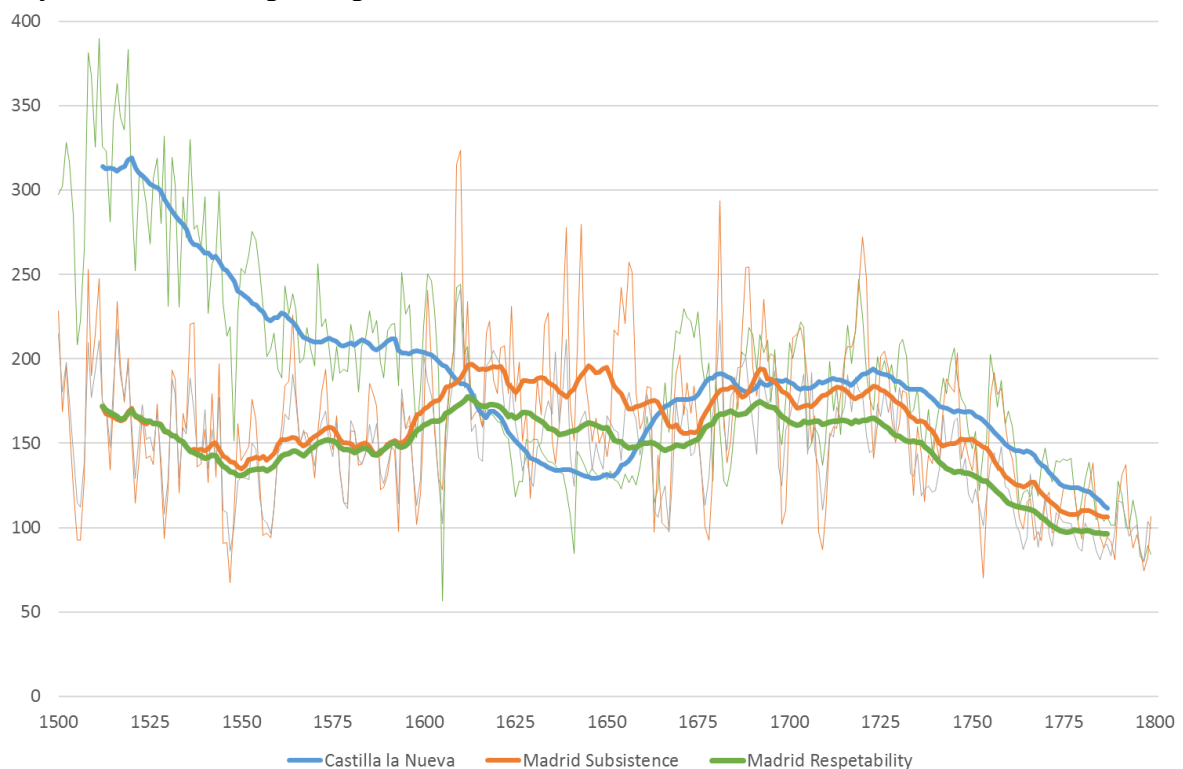
The second half of the 17th century appeared to be marked by the *vellón* inflation and the deflationist measures of the 1680s that resulted in the U-shape line that Castilian wages drew in the second half of the 17th century. The first half of the 18th century brought about a new plateau in Castile whereas the distances increased again in the Mediterranean area, but from approximately the 1740s a sort of negative convergence occurred with wages falling faster in Castile than in the Mediterranean until both met below subsistence levels in the last quarter of the century. Overall, the comparison shows differences between the two areas. On the one hand, the Mediterranean average of subsistence wages of Barcelona and Valencia does not deviate much from the conventional wisdom in the literature and they are placed below Castilian averages for most of the Early Modern Centuries. However, the series of the Kingdom of Castile provide a somewhat different picture in respect of trends and levels that opens the door to other more nuanced readings when this newly build dataset is inserted into the European framework.

²⁴Reher and Ballesteros: 1656-60 - 100, 1676-80 -147. Subsistence real wages for Madrid: 1656-60 – 100, 1676-80 – 57. We have also included an estimation of the evolution of labourers' real wages regarding a respectability line in Madrid as in Allen (2013b), a budget that would resemble more perhaps that of Reher and Ballesteros. Although both recovery and decline movements were of lesser intensity during the 17th century, the geometry of the index compiled of labourers' respectability ratios in Madrid is also in conflict with that of the New Castilian Index.

Figure 6

Real wages indices in Central Spain, 1500-1800: New Castile vs wage ratios to subsistence and respectability lines in Madrid, 1790-99 = 100

25-year centred moving averages



Source: New Castile in Reher and Ballesteros (1993). Madrid, see Appendix.

5.- Was the *Little Divergence* so great?

An issue arising in comparative studies concerns the element of comparison. Most of the time, it is the availability of sources, or of previous research, that determines the frontier of possibilities; yet there are choices, too. Both circumstances combined may produce different viewpoints and explanations, which, on the other hand, encourage debate and, subsequently, new research. In his path-breaking article, Allen (2001, p. 414) opted to base his European comparison on what he defined as leading cities ‘to hold the side effect constant’, a choice that he maintained in his research programme and that has been widely followed ever since. However, Malanima (2013) recently disputed the convenience of using London’s wages as the reference point in international contrasts since he considered them to be exceptional, even in English terms. In consequence, he made use of wages from other locations in southern England to compare them with those of Central-Northern Italy. On the other hand, he opted to compute wage ratios instead of replicating Allen’s model of welfare ratios, and to compare skilled rather than unskilled wages. In this paper, our choice is to compute subsistence ratios *à la* Allen with the modifications introduced in the composition of the basket of consumables described above. As Malanima (2013), our results give some different answers to the issue of the

timings, in this case that of the Spanish divergence. Nevertheless, here we also challenge the conventional wisdom on its magnitude.

In order to assess the chronology and scale of the divergence we develop a three-level approach. First, we use the leading cities perspective. We put together the North-western big cities of London and Amsterdam and what would be their counterparts of the kingdoms of Castile and Aragón. Although London and Amsterdam have always been the references for their territories, the question is more controversial in Castile. Phillip II installed the Court in Madrid in 1561 but the city did not become the political, demographic, and economic reference for the kingdom until, broadly speaking, the first decades of the 17th century. Before then, in the 16th century, other cities such as Toledo or Seville, ‘the heart of the world’ in the words of Braudel (1981, p. 84), may have been more representative of the Castilian economic and demographic leadership. In consequence, the Castilian leading-cities index is formed with data from Seville up until 1600 and, from then on, with Madrid’s ratios. In any case, real wages in both cities evolved very close to each other from the 1580s onwards. Second, we compare the performance of second- range Spanish cities, such as Valladolid and Bilbao, with Oxford. Third, we build and contrast regional aggregates. To that end, we compute averaged subsistence wages with the cities of the sample grouped in four theoretical geographic spaces: Southern England (Oxford, London), Low Countries (Amsterdam and Antwerp), Castile (Seville, Madrid, Valladolid and Bilbao), and the Mediterranean (Barcelona and Valencia). Figures 7-9 graphically display the evolution of subsistence real wages from these three viewpoints²⁵.

These figures portray a different view to that in the literature. According to that view, wages in Early Modern Europe would have evolved in a sort of a scissor-like movement, with the 15th century being the last moment in which real wages around the continent would have reached comparable levels. Since that time, the fall was general in Southern and Central Europe, and especially intense in the 16th and in the second half of the 18th century, while in the North-west declining trends were gentler and during the 17th and the first half of the 18th century levels sustained, or increased, as in London (Allen, 2001, 2009; Pamuk, 2007). However, our new computations offer a different picture. The trajectory of the Spanish Mediterranean fits, in broad terms, with that attributed to Valencia, the usual Spanish representative in the literature. Nevertheless, when we include the newly computed subsistence ratios for the Kingdom of Castile, we find developments that do not fit with the prevailing view. In general, Castilian subsistence ratios would have moved, if not in tandem, in a fashion that would not have differed very much from the North-western general evolution, whatever the perspective we choose. Although there are short-term variations, it is not until the early 18th century when the divergence would begin manifest. Before then, Castilian real wages revealed a trend visibly dissimilar to that described for non-NW Europe. In fact, during the first half of

²⁵ All ratios computed with the new premises (4.2 baskets, 2100kc each).

the 17th century, Castilian subsistence ratios would be placed slightly above those of the North-west.

Figure 7
Subsistence ratios in leading cities, 1501-1800
 25-year centred moving averages

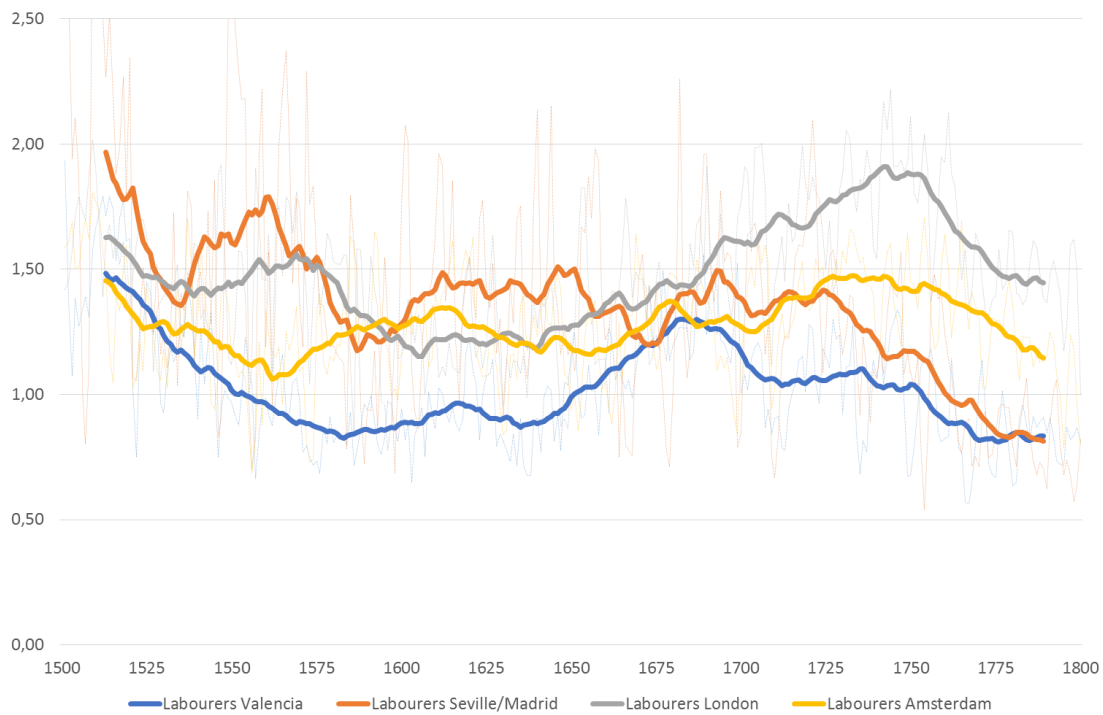


Figure 8
Subsistence ratios in *second-range* locations, 1501-1800. Valladolid, Bilbao and Oxford
 25-year centred moving averages

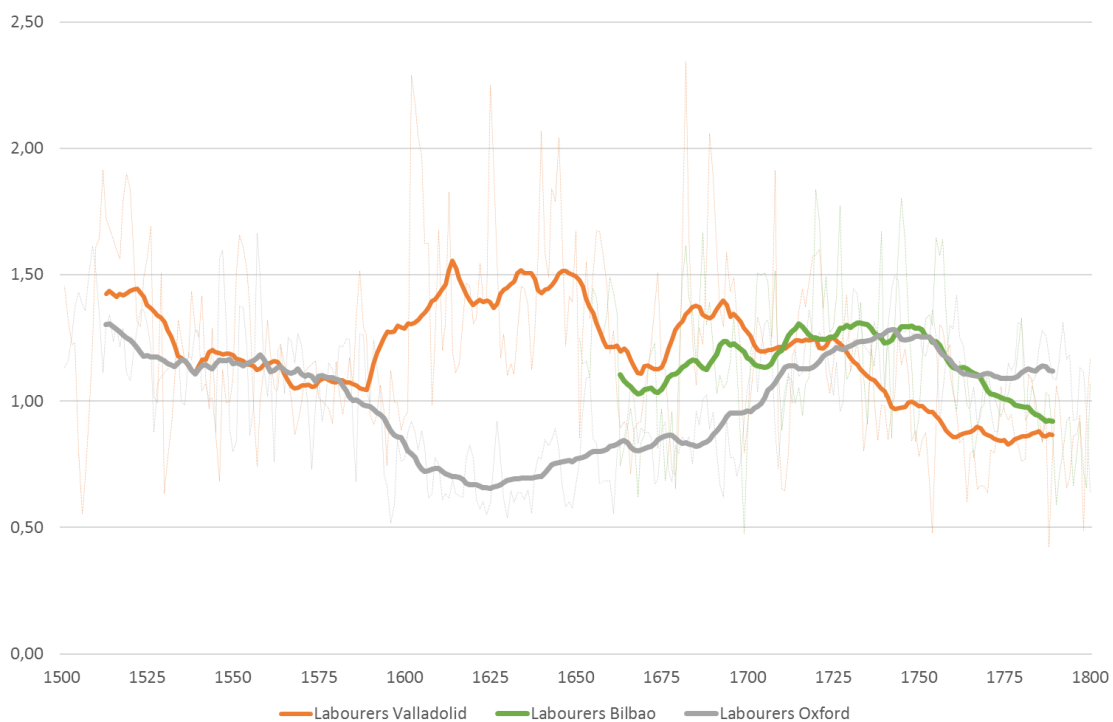
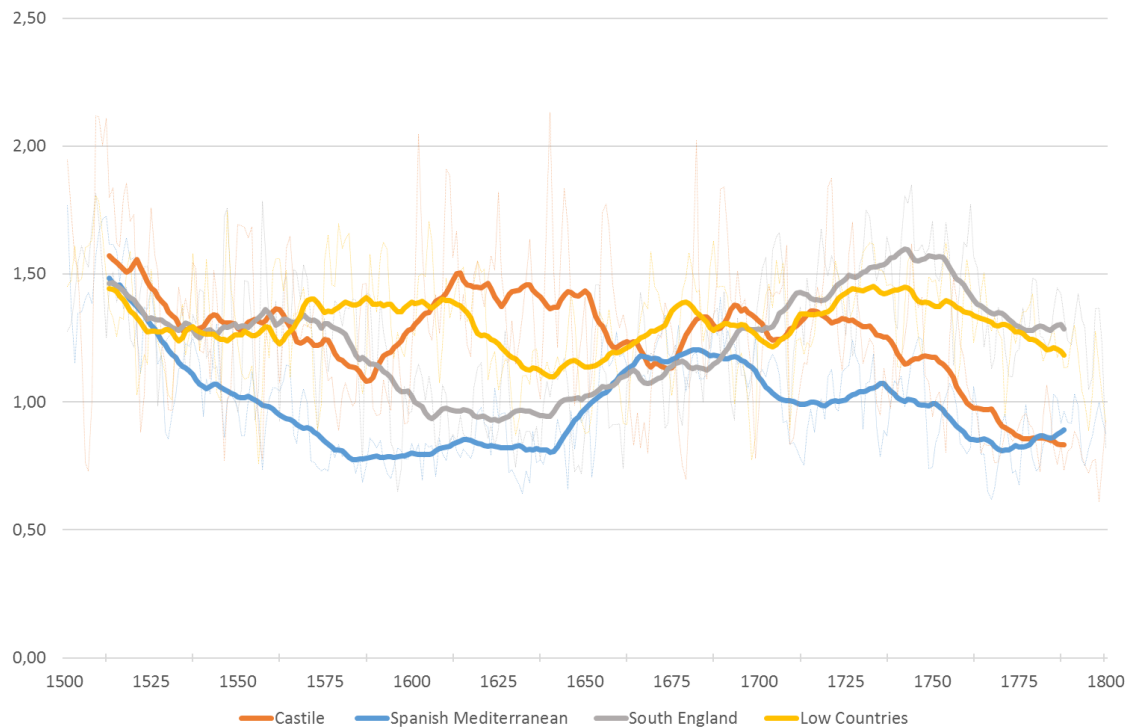


Figure 9

Subsistence ratios by economic areas, 1500-1800. Castile, Spanish Mediterranean, South England and Low Countries

25-year centred moving averages



On the other hand, the inclusion of Paris and Vienne in the comparative framework (Table 7 –Appendix, Figure C) broadens the view. Although the subsistence ratio computed for those cities are very tentative, real wages in Paris would not have evolved very differently to those of Castile, whilst Vienne would match the pattern already described for Central Europe and the Mediterranean areas. We may speculate, then, using the existence of a third space in Western Europe, bound to the Atlantic, between the *advanced* Northwest and the *declining* and *backward* Mediterranean and Central European large spaces, which would not have diverged against the North-western core until the beginning of the 18th century (first, with London; some decades later, with Amsterdam). Moreover, it would not be a matter of an apparent exceptionality of the capital cities –as in Allen (2001, p. 430)- since, at least in Castile, labourers’ subsistence ratios fluctuated at almost the same levels in all the cities of the sample, with the exception of Seville in the 16th century.

The new computations of subsistence wages propose other reading of the magnitudes. In contrast with what is suggested by the canonical *subsistence* basket model, the gap among the *high wage* economies (namely, Great Britain and the Netherlands) and the rest of Europe becomes not so big when brown bread substitutes oats. The first modification introduced in the budget, the increase of the calories per basket and the escalation from 3.15 to 4.2 to estimate the minimum of subsistence for the family, augment its cost by approximately 40% elsewhere; it affects the scale but not the geometry of the series. However, when we add the second variation, brown bread prices,

the situation changes dramatically, especially in the North-west. The accounting shows that, all things being equal, the upgrade from oats to the cheapest type of bread increases the cost of the basket a 69% in London and a 120% in Amsterdam²⁶. However, in Barcelona, Seville or Madrid, it only increases the cost of the basket about a 25%.

The outcome of both changes combined high subsistence ratios in London and Amsterdam vanish, with real wages being 2.1-2.5 times lower than those previously calculated (Appendix, Table C). During the most part of the Early Modern period, the earnings of European urban labourers in the cities considered would not have been placed very far from bare bones sustenance. In fact, albeit with fluctuations, in the North-west and Castile they moved between the hypothetical lines of 1-1.5 times the minimum of subsistence during the most of the three-hundred years that cover this exercise. In the Spanish Mediterranean, however, they fluctuated many times below that line. Seville in the first half of 16th century and London in the 18th century represent the only exception to that rule. In the latter, a labourer's consumption capacity experienced a sustained rise from approximately 1650 onwards that put them about 1.8 times above the bare bones budget at its peak around the mid-18th century, whilst in the rest of the continent, wages stabilised at around the 1.5 times line (Low Countries) or started declining fast (the rest). In any case, these new figures for London and Amsterdam vividly contrast with the approximated 4.2 times over the subsistence line that the first computations attributed to both cities in the same period.

6.- Conclusions

This paper uses the methodology of standardised baskets to estimate subsistence ratios in Early Modern Spain. The results obtained under the simulated premises display a picture of destitution and low options for urban unskilled labourers that does not deviate very much from the prevailing ideas, then and now, about the precariousness of life for a good part of the Spanish population of the time. However, they also offer another perspective on the evolution of unskilled real wages in Early Modern Spain. On the one hand, the decline of wages in 16th-century Castile appears to be of much lesser intensity, and shorter, than was previously believed, principally because wages were not so high at the beginning of that century. On the other hand, there is a clear distinction between the Mediterranean area and the urban axis of the Kingdom of Castile that results in a somewhat different behaviour to what was believed before. Subsistence, measured under the standard parameters used in this paper, was commonly more expensive in the Mediterranean façade than in urban Castile.

²⁶ Averages for the whole period (1500-1800). See Appendix Table A for a data. The comparison has taken as reference the cost of the North-western baskets as in Allen et al. (2012, pp. supplementary materials, p. 30). They have been multiplied by 1.05 to upgrade from the 1940 to the 2100 calories model and then by 4.2 to estimate the total cost of the family budget. However, in the case of London, our computations provide a cheaper *oat* basket and then the augment brought about by brown bread would be of a 99.8% as in Figure 2.

Table 5
Bread subsistence ratios in Europe for unskilled building workers, 1500-1800

	1501-1550	1551-1600	1601-1650	1651-1700	1701-1750	1751-1800
<i>South England</i>	<i>1.36</i>	<i>1.24</i>	<i>0.96</i>	<i>1.14</i>	<i>1.49</i>	<i>1.33</i>
London	1.52	1.41	1.21	1.44	1.79	1.55
Oxford	1.21	1.06	0.70	0.84	1.20	1.11
<i>Low Countries</i>	<i>1.36</i>	<i>1.32</i>	<i>1.25</i>	<i>1.25</i>	<i>1.39</i>	<i>1.26</i>
Amsterdam	1.36	1.17	1.27	1.23	1.42	1.26
Antwerp	1.36	1.47	1.22	1.27	1.35	1.25
<i>Spanish Med.</i>	<i>1.29</i>	<i>0.86</i>	<i>0.83</i>	<i>1.16</i>	<i>1.02</i>	<i>0.87</i>
Barcelona	1.26	0.83	0.74	1.12	0.98	0.88
Valencia	1.31	0.89	0.91	1.2	1.05	0.86
<i>Castile</i>	<i>1.43</i>	<i>1.21</i>	<i>1.45</i>	<i>1.26</i>	<i>1.28</i>	<i>0.90</i>
Seville	1.79	1.40	1.39	1.29	1.38	0.83
Madrid	1.22	1.14	1.45	1.36	1.33	0.89
Valladolid	1.27	1.10	1.50	1.26	1.15	0.87
Bilbao				1.11	1.27	1.03
<i>Paris</i>	<i>1.29</i>	<i>1.24</i>	<i>1.29</i>	<i>1.34</i>	<i>1.16</i>	<i>1.06*</i>
<i>Vienna</i>	<i>1.16</i>	<i>0.89</i>	<i>0.89</i>	<i>0.93</i>	<i>1.00</i>	<i>0.81</i>

*Paris is 1751-1786.

Source: See Appendix 1.

The paper also provides a different view of the evolution of real wages in Early Modern Europe. It does not call into question the Little Divergence itself. Nor does it deny the importance of some of the North-western particularities already stressed in the literature, such as their lower volatility (Sharp & Weisdorf, 2012), which appear again in our computations (see Appendix – Figure A), or their distinctive trend from approximately mid-17th century that van Zanden (2009, p. 98) pointed out, and that, in the case of England, Clark (2005, p. 1308) signalled as the departure moment from the Malthusian world. However, we here contest the timing and the magnitude of the divergence of subsistence real wages as it appears measured in the recent literature. On the one hand, the European division between the North-west and the *Rest* in terms of real wages becomes somewhat nuanced with the inclusion of the new and more complete Spanish dataset. On the other hand, the new composition of the subsistence budget described above shades the picture of exceptionally high real wages in North-western Europe before 1800. The simple upgrade from crude grain (oats/wheat/rye) to the cheapest types of bread, the staple of the labourer's diet in the cities of the sample, transforms dramatically the picture. According to this, real wages in the Northwest would not be very different from those estimated for Castile, at least, until the 18th century, nor that far from the hypothetical bare bones subsistence line. The four times over the minimum of sustenance attributed to wages in London or Amsterdam, which would have allowed labourers there to move their consumption towards more abundant goods of a better quality, reduces to averages that only in London in the first half of the 18th century would cross the line of 1.5 times over *bare bones* subsistence.

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APPENDIX. Supplementary material and Sources

Map 1
Map of Spain and cities of the sample



Table A. The original Subsistence Budget adapted to the new caloric requirements and compared with the brown bread subsistence basket.

The first subsistence basket provided 1940 kc and then it was multiplied by 3.15 (3 baskets of consumables plus a 0.5 each for housing). Total of calories, 5820. (Allen, 2009, p. 37). Later, the amount of calories per basket increased to 2100 and then it was multiplied by 4.2 (4 baskets of consumables plus 0.5 each). Total of calories, 8400 (Allen, 2013, pp. 3-4). For Amsterdam and London, it meant to increase the kg of oats from 155 to 170. For the rest of the locations, the augment would go from 177 kg to 195 kg of wheat and, from 179 to 197 kg, in the case of rye. The augment of the kg of grain increases the price of the basket in a 5% on average. The first table for London has taken as reference the cost of the basket computed in Allen, Murphy, and Schneider (2012, p. supplementary materials p. 30). It is adapted to the new requirements increasing the cost of the basket in a 5%. The second bases its calculations on the dataset for this paper.

Table A-1. LONDON A – Cost of Oat Basket (in grams of silver) as in Allen et Al. (2012)

	1501-50	1551-00	1601-50	1651-00	1701-50	1751-1800	Average
Original Oat Basket 1940 kc	67.00	128.00	201.00	220.00	201.00	264.00	
Original Oat Basket 2100 kc	70.35	134.40	211.05	231.00	211.05	277.20	
Household B. Basket 2100 kc	124.15	208.65	361.84	409.42	356.19	458.30	
Oat Basket - 1940 Kc (a)*3.15	211.05	403.20	633.15	693.00	633.15	831.60	
Oat Basket -2100 kc (b)*4.2	295.47	564.48	886.41	970.20	886.41	1164.24	
Household B. Basket 2100 kc (c)*4.2	521.42	876.35	1519.71	1719.55	1496.02	1924.87	
Price Increase (c to b) %	76.47	55.25	71.45	77.24	68.77	65.33	69.08

Table A-2. LONDON B - Cost of the Oat Basket (in grams of silver) as in this paper's dataset with data from Allen's database.

	1501-50	1551-00	1601-50	1651-00	1701-50	1751-1800	Average
Oat Basket 1940 kc	58.6	112.7	186.9	201.0	172.0	232.0	
Oat Basket 2100 kc	61.6	118.3	196.2	211.0	180.6	243.6	
Household B. Basket 2100 kc	124.1	208.7	361.8	409.4	356.2	458.3	
Oat Basket - 1940 Kc (a)*3.15	184.7	354.9	588.6	633.1	541.7	730.9	
Oat Basket -2100 kc (b)*4.2	246.2	473.2	784.9	844.1	722.3	974.6	
Household B. Basket 2100 kc (c)*4.2	521.4	876.3	1519.7	1719.5	1496.0	1924.9	
Price Increase (c to b) %	111.7	85.2	93.6	103.7	107.1	97.5	98.8

Table A-3. AMSTERDAM - Cost of the Oat Basket (in grams of silver) as in Allen et AL. (2012)

	1501-50	1551-00	1601-50	1651-00	1701-50	1751-1800	Average
Original Oat Basket 1940 kc	66	104	152	158	172	202	
Original Oat Basket 2100 kc	69.3	109.2	159.6	165.9	180.6	212.1	
Oat Basket - 1940 Kc (a)*3.15	207.9	327.6	478.8	497.7	541.8	636.3	
Oat Basket -2100 kc (b)*4.2	277.2	436.8	638.4	663.6	722.4	848.4	
Rye Bread Basket 2100 kc (c)*4.2	521.4	876.3	1519.7	1719.5	1496.0	1924.9	
Price Increase (c to b) %	88.1	100.6	138.0	159.1	107.1	126.9	120.0

Table B
Skill premium in Spain, 1500-1800

	Barcelona	Valencia	Seville	Madrid	Valladolid	Bilbao
1501-1550	17	57	98	90	90	
1551-1600	18	31	130	112	56	
1601-1650	40	32	114	112	53	
1651-1700	32	35	87	116	55	32
1701-1750	56	33	92	124	74	35
1750-1800	66	43	76	134	92	32

Sources: Table 5.

Table C
Two Computations of Subsistence Ratios in North-western Europe (oat-based basket vs Brown bread-based basket)

	1501-1550	1551-1600	1601-1650	1651-1700	1701-1750	1751-1800
London (1) Oats	3.73	2.96	2.83	3.49	4.16	3.51
London Brown Bread (2)	1.52	1.41	1.21	1.44	1.79	1.55
Amsterdam Oats(1)	3.80	3.64	3.84	4.33	4.20	3.77
Amsterdam Rye Bread (2)	1.36	1.17	1.27	1.23	1.42	1.26
<i>London (1/2)</i>	<i>2.45</i>	<i>2.10</i>	<i>2.34</i>	<i>2.42</i>	<i>2.32</i>	<i>2.26</i>
<i>Amsterdam (1/2)</i>	<i>2.79</i>	<i>3.11</i>	<i>3.02</i>	<i>3.52</i>	<i>2.96</i>	<i>2.99</i>

(1) Allen et al. (2012, pp. supplementary materials, p. 30)

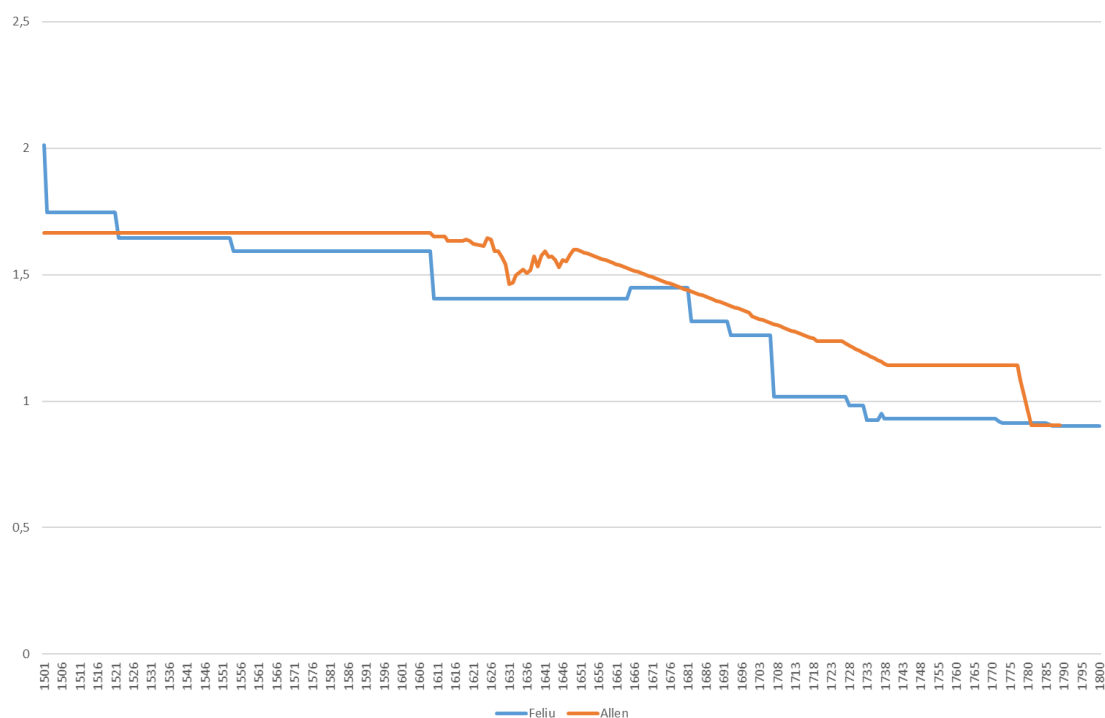
(2) This paper

Table D
Spanish Subsistence Real Wages in comparative perspective (London, Amsterdam, Northwest = 1). Our computations

	1501-1550	1551-1600	1601-1650	1651-1700	1701-1750	1751-1800
Madrid-Seville/London	1.13	1.03	1.19	0.94	0.74	0.57
Madrid-Seville /Amsterdam	1.26	1.24	1.13	1.10	0.93	0.71
Valencia/London	0.86	0.63	0.75	0.76	0.59	0.55
Valencia/Amsterdam	0.96	0.77	0.72	0.88	0.74	0.68
Castile/South England	1.02	0.99	1.52	1.11	0.86	0.68
Castile/Low Countries	1.02	0.93	1.16	1.00	0.92	0.72
Spanish Med./South England	0.94	0.70	0.87	0.97	0.68	0.65
Spanish Med./Low Countries	0.94	0.65	0.66	0.88	0.73	0.69
Spain/Northwest	1.00	0.90	1.19	1.03	0.86	0.69

Source: See Table 7.

Figure A
The *Silver Premium* in Valencia. Value of Valencian *Sous* in grams of silver. Two different estimates



Sources: Feliu (1991); Allen (2001).

Figure B
Subsistence Ratios in Leading Cities, 1501-1800
 25-year centred moving averages

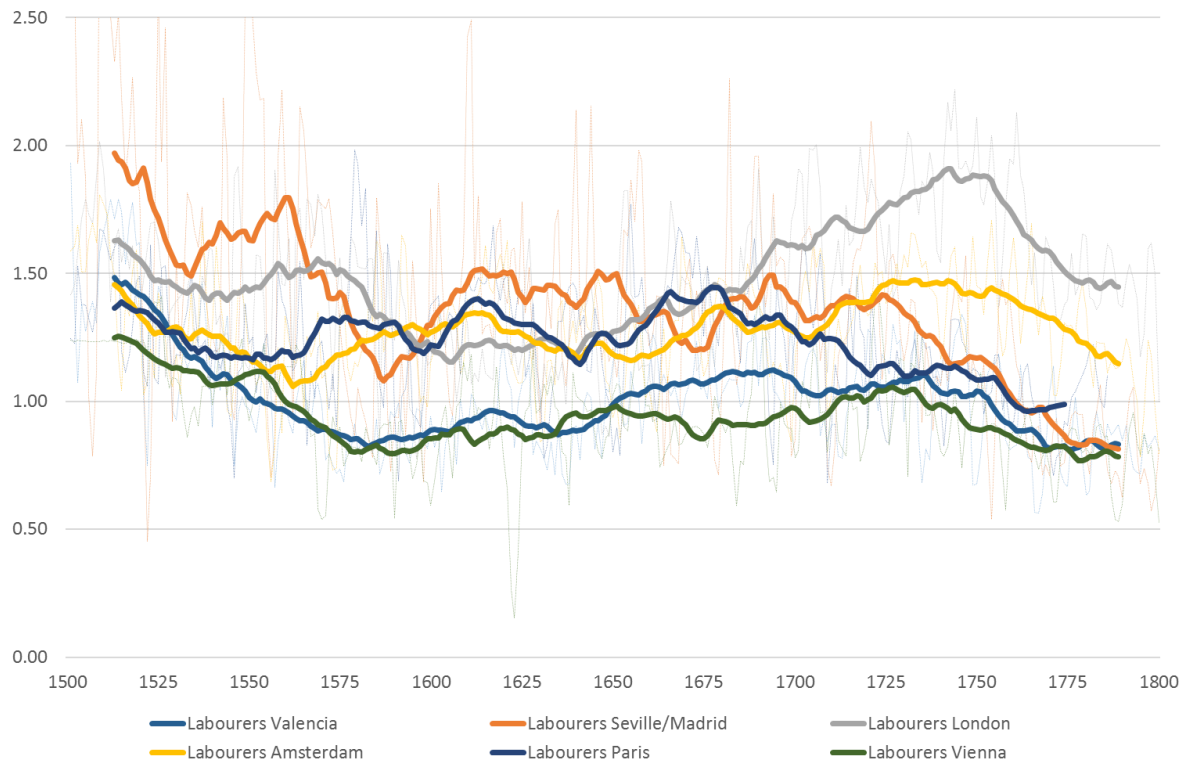
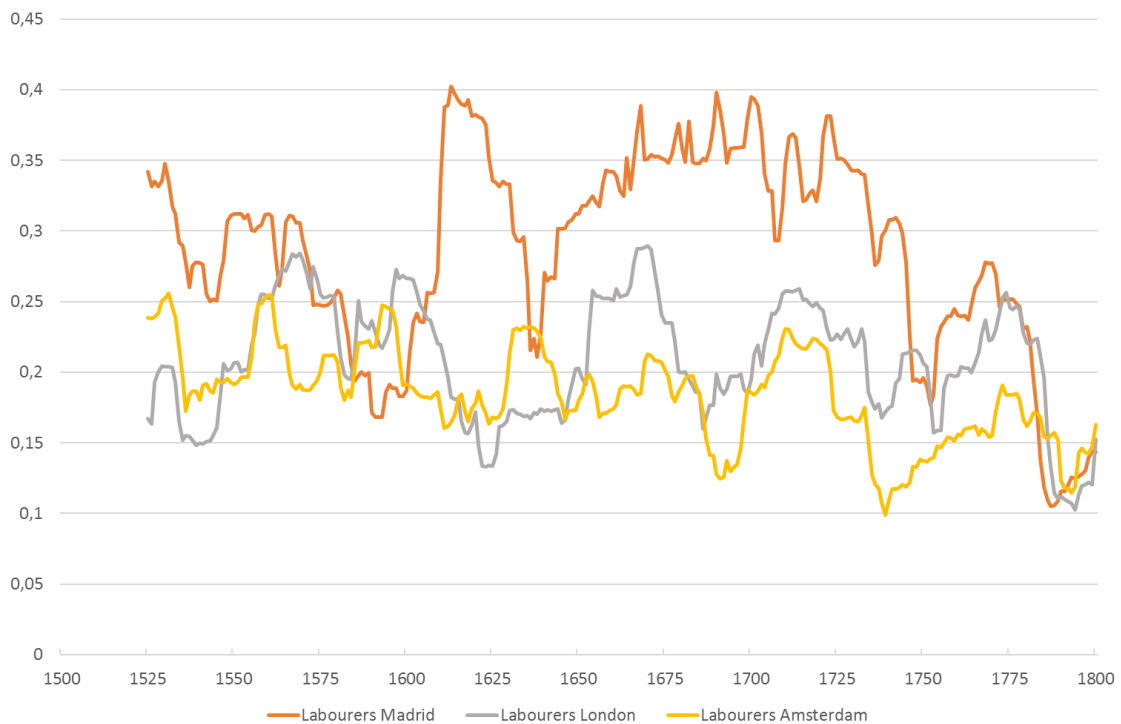


Figure C
Volatility in Subsistence Ratios, 1500-1800
 25-year Standard Deviation to the mean



Sources and Notes on Prices

Note: Unless specified, missing data has been filled through ratios and linear interpolations

Complete reference for Earl Hamilton's unpublished dataset: Duke University, Rare Book and Manuscript Rubinstein Library, Earl Hamilton's Papers, Major Works Series, 1350-1961 and undated, Boxes 5 and 7. http://library.duke.edu/rubenstein/findingaids/hamiltonearl/#c01_5

BARCELONA

SOURCES: (Prices and wages) Feliu (1991).

BROWN BREAD: 1500-1571 is litre of wheat*1.34. Until 1571 prices for brown bread are very scarce and there is only a short sample for the years 1533-1540. The ratio of the brown bread kg/wheat litre gives 1.34. For 1571-1600 this ratio maintains in a very similar figure, 1.35.

BEANS: Between 1501 and 1567 missing prices were estimated (litre of beans = litre of wheat *1.25).

OLIVE OIL: Between 1501 and 1553 missing data were filled with the ratio estimated to Valencia's oil prices (Olive oil in grams of silver*0.8)

LINEN: is Valencia

SOAP (pound): Between 1501-1573, it is olive oil litre * 0.96 (ratio 1590-1614) and for 1796-1800, olive oil litre * 0.83 (ratio 1771-1795)

VALENCIA

SOURCES: (Prices and wages) Hamilton (1934, 1947); Earl J. Hamilton's Papers, boxes 5 and 7; López Losa (2013).

WAGES: the series of wages for the 18th century from Palop Ramos (1977) (1700-1800) and Archivo del Reino de Valencia, Clero, 334; Seminario de Nobles, sig. 50-6 (1747-1800).

BROWN BREAD: estimated using bread kg/wheat l. ratios in Barcelona

TALLOW CANDLES: Prices estimated using the ratio (kg of mutton *1.6) in Barcelona.

LINEN: 1501-1551 prices interpolated from Toledo

SEVILLE

SOURCES: (Prices and wages) Hamilton (1928, 1929, 1934, 1947); Ponsot (1986); Borrero Fernández (1991); González Jiménez (1976); Álvarez Pantoja (1970); Ruiz Rivera (1977); Earl J. Hamilton's Papers, boxes 5 and 7. López Losa (2013); Archivo de la Universidad de Sevilla, Colegio de San Telmo, Libros 91-126; Colegio Mayor Santa María, Libro de gastos ordinarios, Sº 79-191; Libros de gastos extraordinarios, Sº 204-278; Libro de cuenta y razón de las salidas del Colegio, Sº. 310; Libro de cuentas de cargo y data, Sº. 285-297; Recado de cuentas, Sº 315. Archivo de la Catedral de Sevilla, Archivo Capitular, Sección V, Colegio San Isidoro, Libros 5623-5773. Sección VI, Contaduría, 06802, 06808, 06785, 06786, 06792, 06797.

WAGES: González Mariscal (2013, 2015) was helpful to cover part of the gaps in the Hamiltonian series for the 16th century

BROWN BREAD: 1501-1650, estimated using the rule of *maravedís* per *real* in *fanega*, then divided by 1.33 to simulate brown bread prices. 1650-1760, white bread prices from the *Colegio Mayor Santa María*. Annual price is the average of the first price for every month. 1760-1799, Ruiz Rivera (1977). The data for 1800 from Álvarez Pantoja (1970). Brown bread prices fluctuated between four and six cuartos less than common white bread's one. See Campomanes (1768, p. 91). Prices between 1651 and 1800 were estimated by resting four *cuartos* to the price of the white bread when it was equal or below the average of the period, and six cuartos when it was above.

CHARCOAL: 1501-1550 is Toledo

LINEN: is Toledo

TALLOW CANDLES: 1685-1753, beef kg* 1.82 (ratio tallow candles kg/beef kg – 1640-1684)

SOAP: 1501-1550, one pound of soap equals one litre of olive oil (1551-1600 - ratio olive oil litre/soap kg = 1.004)

MADRID

SOURCES: Hamilton (1934, 1947); Earl J. Hamilton's Papers, box 7. Bennassar (1961). López Losa (2013). Andrés Ucendo and Lanza García (2014). Llopis Agelán and García Montero (2007, 2011) Archivo General de Palacio, Colegio Santa Isabel, legajos 29-49; Colegio Nuestra Señora del Loreto, legajos 30, 31, 33, 35-37, 42, 46-48; Archivo Histórico Nacional, Universidades, legajos 394, 614-18, 620-21, 624, 628, 632, 635, 636, 640, 644. Libro 1305, 1308, 1310-1312, 1317, 1319, 1321, 1323, 1325, 1327.

WAGES: Between 1501 and 1550 the series has been estimated from the wages Bennassar (1961) recorded for Valladolid. 1550-1700, Andrés Ucendo and Lanza García (2014). 1680-1800, Llopis Agelán and García Montero (2011). For the last quarter of the 18th century, wages also from Archivo Histórico Nacional, sección Universidades (see above)

WHEAT: Between 1651 and 1738, and for the missing years thereafter until 1774, prices derived from Hamilton's papers where increased in a 10% based on the differences between New Castile prices (Casarrubios) compiled by Hamilton and purchasing prices of wheat in Madrid in Castro (1990).

BROWN BREAD: 1501-1595, estimated using the rule of *maravedís* per *real* in *fanega*, then divided by 1.33 to simulate brown bread prices. 1596-1800 estimated from Andrés Ucendo and Lanza García (2014) and candeal bread prices from the Colleges of *Santa Isabel* and *Nuestra Señora de Loreto* using the three-four less *cuartos* rule. For the years 1626-1800, when the recorded *Candeal* prices place below the average (31 mrs. for the two-pound bread loaf) *brown* bread prices are estimated by subtracting three *cuartos* to the former. When it was above the average, they are calculated by subtracting four *cuartos* then. There are some scattered references for the late 1720s and early 1730s that would match with this option. In one upper-class Madrilean college (AHN, Universidades, legajo 394), the bread for the students and servants moved in those ranges. In 1729 and 1730 whilst the bread loaf for the students oscillated between 28 and 32 *maravedís* each, the bread loaf for the servants was valued in 16 *maravedís* (3-4 *cuartos* less).

Between 1596-1625, we used the reference of one and two cuartos with regard the average since bread/wheat ratios raise doubt on the type of bread they refer to, apparently being closer to what would be a common white bread. Prices for the last decade of the 18th century were computed using the references of prices set by the local authorities that regularly put city's (brown) bread five cuartos below candéal bread. See, for example, *Diario de Madrid*, 14-10/1790; 25-8-1791; 30-6-1792.

CHICKPEAS: 1501-1595, chickpea kg is wheat litre per 1.4 (ratio 1601-1650)

BEEF: 1596-1728, pound of beef is pound of mutton less two *cuartos* (8 maravedís). 1729-1746, the same rule applied for the missing years. Between 1747 and 1800, missing years were filled with pound of mutton less one *cuarto* (4 maravedís).

OLIVE OIL: 1722-26 and 1785-89 prices are estimated adding to Toledo's prices Madrilean taxes (374 maravedís) per arroba, as computed in the ledgers of the *Colegio de Santa Isabel*

TALLOW CANDLES: 1501-1552 is Valladolid (ratio Valladolid/Toledo 1552-75 – 0.98)

SOAP: 1501-1650, soap kg estimated from the ratios soup pound/olive oil litre of Seville. (1551-1600, 1; 1601-1650, 1.4). In Madrid, the ratio between 1651 and 1700 is 1.4.

LINEN: 1551-1650 is Valladolid. For the years 1651-1800, Hamilton renounced to include linen in his indices for New Castile (1651-1800) due to the difficulties to distinguish between grades and the irregularity of the quotations. Using his notes, we have elaborated a conjectural proposal for coarse linen trying to discriminate between different qualities, but the level of uncertainty is still high.

CHARCOAL: 1501-1550, charcoal kg is wheat litre * 0.5 (ratio 1551-1600)

VALLADOLID

SOURCES: (Prices and wages) Hamilton (1934, 1947); Earl J. Hamilton's Papers, boxes 5 and 7. Bennassar (1989); Gutiérrez Alonso (1989); López Losa (2013). Archivo Histórico Nacional, Convento San Joaquín y Santa Ana, Clero, Libros 16891, 16893, 16092, 16901, 16913, 16919. Wages between 1760-1800 estimated from Serrano García (1999).

BROWN BREAD: BROWN BREAD: 1501-1608, 1754-1800 calculated using the rule of maravedís per real in fanega, then divided by 1.33 to simulate brown bread prices. 1608-1715, white bread prices from Gutiérrez Alonso (1989) and EHP, Box 5 and French Rolls prices (as Hamilton named the original *panecillos*). They were estimated a quarter of the cuartal of bread of 2.5 Castilian pounds (1.15 kg) as in Gutiérrez Alonso (1989, p. 248). Then they were divided by 1.5 to estimate brown bread prices. From 1716 to 1754 the series of common white bread from the Monasterio de San Joaquín and Santa Ana of Valladolid was added. In that case, prices were divided by 1,3 since, apparently, they referred to a middle quality bread, similar to the Madrilean common white bread.

WHEAT: 1501-1505 estimated using as reference Toledo's indices for those years

OLIVE OIL – 1501-1650, 1751-1800 León *0.9. (ratio of Mansilla (León)/Valladolid between 1651 and 1750).

TALLOW CANDLES: 1701-1800, beef pound * 1.3 (ratio 1676-1700).

CHARCOAL: 1501-1550 is wheat litre* 0.7 (ratio of 1551-1600)

LINEN: 1751-00 is New Castile as in EHP, box 7. Ratio Valladolid/New Castile in 1701-50 = 1.01

BILBAO:

SOURCES (Prices and wages): Archivo Municipal de Bergara: Libro de cuentas del Colegio de los Jesuitas, 1597-1679, 1672-1722. Libros de cuentas del Hospital de la Magdalena, 1547-1584, 1596-1645, 1643-1693, 1693-1722, 1721-1800. Libros de Cuentas cuatrimestrales del Real Seminario de Bergara: 1780-1784, 1785-1787, 1798-1800; libros de cuentas 1782-1794, 1794-1796.

Archivo municipal de Oñate: Libros de cuentas de la memoria de N. Pérez de Lazárraga (1553-1759); Libros de Cuentas de la memoria de J. Abad de Zaldivar, (1548-1750); Archivo del Convento de Vidaurreta de Oñate: 1530-1800. Libros de cuentas número 2 al 17; Archivo Diocesano de Gipuzkoa (SS): Libros de fábrica de las parroquias de San Andrés de Elosua (1758-1800); San Miguel de Oñate (1513-1553, 1554-1616, 1617-1717), San Miguel de Araoz (1670-1756, 1756-1800), San Juan Bautista de Mondragón (1653-1714, 1714-1787, 1787-1800), San Pedro de Bergara (1507-1571, 1648-1775, 1659-1665, 1768-1775, 1776-1800), Asunción de Urrejola (1589-1657, 1658-1722, 1723-1781, 1781-1800);

Bizkaiko Foru Artxiboa/Archivo Foral de Bizkaia: Bilbao Antigua: 0143/002/001, 0161/001/001, 0163/001/001, 0164/002/001; Bilbao Primera 0501/0008, 0502/007.

Archivo Histórico Eclesiástico de Bizkaia/Bizkaiko Elizaren Histori Artxiboa: 0990/005-01, 0694/002-01. Libro de Fábrica del Cabildo Unido de Bilbao. Cuentas de libranzas y recibos, 9A-297-01, 9A-297-02, 9A-297-03, 9A301-01, 9A-301/006 y 9A301/007 (Elena Catalán gave us this last reference as well as some data on wages it contained)

Gobierno Vasco/Eusko Jaurlaritza: Archivo, Osakidetza, Hospital de Basurto, Hospital de los Santos Juanes. Cuentas, 1693-1785 – OSDHB-00028 (kindly provided by Emiliano Fernández de Pinedo).

Legarreta Irigarri (1974); Mauleón Isla (1961)

BROWN BREAD: estimated using bread kg/wheat l. ratios in Barcelona

BEANS: missing years have been filled with broad beans prices (1651-1681) and with bean prices from Villaro (1767-1800) in Legarreta Irigarri (1974).

LINEN: is Valladolid

LONDON

SOURCES: Allen (2001).

<http://www.nuffield.ox.ac.uk/People/sites/Allen/SitePages/Biography.aspx>

OATS: Prices for oats between 1703 and 1770 from Clark (2005).

<http://gpih.ucdavis.edu/Datafilelist.htm>

AMSTERDAM

SOURCES: Prices of bread, peas, meat and butter from van Zanden (2005) <http://www.iisg.nl/hpw/brenv.php>. The rest as in Allen (2001)

<http://www.nuffield.ox.ac.uk/People/sites/Allen/SitePages/Biography.aspx>

ANTWERP

SOURCES: Allen (2001)

<http://www.nuffield.ox.ac.uk/People/sites/Allen/SitePages/Biography.aspx>

RYE: 1701-1707 and 1711-1771 estimated using as reference Amsterdam's indices for those years – 1676-1700 = 100 (the average price of the litre of rye between 1676-1700 is 0.49 grams of silver in Antwerp and 0.46 in Amsterdam)

BROWN BREAD: 1663-1707, 1764-1771, 1797-1800 prices were estimated with Allen's bread equation

PEAS: 1741-1800, rye litre*1.35

BTUs: 1501-1611, charcoal prices. 1612-1800, coal prices.

PARIS

SOURCES: Allen (2001)

<http://www.nuffield.ox.ac.uk/People/sites/Allen/SitePages/Biography.aspx>

BROWN BREAD: Sources refer to three generic types (*pain blanc*, *pain bis-blanc*, *pain bis/de ménage*...) that would correspond to high, medium and low quality breads. Though sketchy, references point to stability in price ratios among different qualities, being white bread two times dearer than the brown type in the 16th and 17th centuries (de Lamare, 1722 [1710], p. 431). The series of bread prices built through Allen's *bread equation* has served as reference to estimate *Pain Bis* prices. We assume that those simulated prices would correspond to white bread and then converted into brown type's prices dividing by two until 1699. For the 18th century, instead, we made use of the *Tariff du prix du pain, Proportionné aux differens prix du Bled* of 1709 to calculate the price of brown bread (*Pain Bis*). Available at <http://gallica.bnf.fr/ark:/12148/btv1b8606363z.r=Tarif%20du%20prix%20du%20pain>

VIENNE

SOURCES: Allen (2001)

<http://www.nuffield.ox.ac.uk/People/sites/Allen/SitePages/Biography.aspx>

BROWN BREAD: Prices of Rye Bread as in Allen's database