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*Builders' Wages in Southern England and the Southern Low Countries, 1346 -1500:
A Comparative Study of Trends in and Levels of Real Incomes*

by

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Abstract for: Builders' Wages in Southern England and the Southern Low Countries, 1346 - 1500: A Comparative Study of Trends in and Levels of Real Incomes

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The traditional and almost universal method of expressing real wages is by index numbers, according to the formula: $RWI = NWI/CPI$: i.e., the real wage is the quotient of the nominal (money) wage index divided by the consumer price index, all employing a common base period (here: 1451-75 = 100). This method is very useful in comparing long-term trends, and in ascertaining whether changes in nominal (money) wages or changes in the price level were paramount in determining changes in real wages. But it does not permit us to make any judgements about the levels of real wages and thus does not permit us to make comparisons of real wages amongst different regions. This paper presents a new method of presenting and comparing real wages, and one that may also be independent of any common base period. This particular paper compares the actual changing levels of real wages for building craftsmen and their journeymen-labourers in southern England, Flanders, and Brabant, in the late medieval era (1346-1500): and the real wage is expressed here as the number of very similar 'baskets of consumables' that a craftsman and his journeyman could each purchase with his annual money wage income, based on 210 days of employment each year. Using the working papers for Phelps Brown & Hopkins' very famous price and real-wage indexes for England (1264-1954), which were presented only in disembodied index numbers, I was able to compute the annual values of all commodities in their 'basket of consumables' and thus the total value in pence sterling. Herman Van der Wee had constructed a price-index for the Antwerp region (1400-1700), with annual values in pence *groot* Brabant (but still converted into index numbers); and I have produced a similar price index for Flanders (1348-1500), with annual values in pence *groot* Flemish. All three baskets have very similar contents. All wages and prices are expressed in terms of quinquennial (five-year) *harmonic means*.

The results of this comparative analysis are best expressed in the nine graphs that accompany this paper. But some brief conclusions may be stated here. First (as I had contended in two recent articles) the Black Death did not usher in a 'golden age of the labourer' in either England or Flanders, but was instead followed by a quarter century of falling real wages, because rampant inflation erased and countered the gains in nominal (money) wages. Real wages rose in the very late 14th and early 15th century because of a combination of institutional wage-stickiness and deflation. In the Low Countries, beset with war-induced and very inflationary coinage debasements, real wages again fell until the late 1430s, rising thereafter only with monetary stability, deflation, and 'wage-stickiness; but then falling once more from the 1460s, because of warfare and debasement-induced inflations (to the 1490s). This evidence refutes the almost universally accepted axiom that the real wage is determined entirely by the *marginal revenue product* of labour. I do not, however, completely rule out the role of changes in productivity, though I offer the hypothesis that regional differences in Total Factor Productivity (and some degree of factor immobility) must be called upon to explain marked differences in real wages.

The most striking difference is that, at the time of the Black Death, real wages for master building craftsmen in southern England were only a third of those enjoyed by master craftsmen in Bruges; but by the 1480s, when inflation was far more serious in Flanders than in England, that gap had narrowed to just about 80 percent of that for the Bruges craftsmen, still the best paid in north-west Europe. In Bruges, the craftsmen's journeymen did not fare as well, however, earning only half the master's wage, while the English journeymen came to earn two-thirds of their masters' wage by the 15th century – and sometimes, during periods of severe debasement-induced inflations in Flanders, the English journeyman's real wage was slightly higher than that for his Bruges counterpart. In general, English building craftsmen fared better than their counterparts in Antwerp, earning somewhat less in the early 15th century, but more in the last third of the century, when inflations from severe coinage debasements again reduced real wages in the Low Countries.

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The wages of building craftsmen in medieval, early-modern European economic history

In medieval and early-modern Europe no occupation was more ubiquitous than that of building craftsmen: principally masons (brick and stone), carpenters, thatchers, tilers, plasterers, and pavers. Unlike almost all other widespread occupations – such as butchers and bakers – building craftsmen have left us abundant records of their daily or weekly wages: in England, for about eight centuries. Very few other medieval occupations have, in fact, provided us with any evidence on daily wages, since the vast majority of craftsmen, artisans, journeymen, and labourers then earned piece-work wages – i.e., payment by the quantity of work produced. Those wages are obviously much more difficult to use, since there is rarely any accurate indication of the period of time in which that paid work was accomplished. Thus builders' wage rates are of incomparable historical importance for medieval and early modern Europe. They are very important for yet another reason: that the building crafts underwent no significant technological changes before the later nineteenth century, when mechanically powered machinery was introduced.

As Robert Allen has justly commented, in a very recent prize-winning article: 'Wages and prices have long been central concerns of economic historians, for they bear on such fundamental issues as the pace of economic development, economic leadership, and the standard of living'.¹ For medieval economic historians, in particular, the two fundamental questions to be asked are: did the Black Death and the subsequent fall in population usher in a prolonged Golden Age of rising and then high living standards, one that evidently ended

¹ Robert C. Allen, 'The Great Divergence in European Wages and Prices from the Middle Ages to the First World War', *Explorations in Economic History*, 38:4 (October 2001), 411. His study also uses the daily wage data for building craftsmen and their labourers. Since his study covers a later period, from 1500 to 1913, with 50-year means for prices and wages (based on silver contents) in 17 European towns, it is not really relevant for this study, covering the period 1346-1500. My disagreements with his methodology will be presented in a separate article.

shortly after 1500? Second: were there significant regional variations in changes in real incomes and living standards after the Black Death?²

Historians of England and the southern Low Countries are blessed with an unparalleled abundance of both wage data for building craftsmen and commodity prices, in a virtually unbroken series from the thirteenth century in England and from the fourteenth century in the Low Countries. Those data, therefore, permit us to answer this question far more effectively than for most other regions in later-medieval and early-modern Europe. Indeed, such evidence should also allow us to measure possible differences, and fluctuating changes in those differences, in the living standards of building workers in the towns of southern England, Flanders, and Brabant following the Black Death. This current study, in focussing on these three regions, is confined to the period 1346 to 1500.

Nominal wages, consumer prices, and real wage indexes for medieval England and the Low Countries

In measuring changes in living standards, one must consider both wages and prices together, in the context of three economic variables: the nominal wage – the actual money wage, paid in current coin; the level of prices, as measured and portrayed by some agreed-upon weighted price index, as a ‘basket of consumables’; and the real wage. The real wage is a function of the first two variables: it thus represents the quantity of goods (and services), those measured in that ‘basket of consumables’, that can be purchased with the given or stipulated money wage, per day, week, or year. All three variables are represented by indexes – index numbers expressed in terms of a pre-defined base period.

By far the most famous and most widely used set of index numbers for prices and real wages is the one that Sir Henry Phelps Brown and Sheila Hopkins constructed (in 1955-56) for the Oxford-Cambridge

² See James E. Thorold Rogers, *Six Centuries of Work and Wages: the History of English Labour* (London, 1903), p. 325: stating that, ‘the fifteenth century and the first quarter of the sixteenth were the Golden Age of the English labourer, if we are to interpret the wages which he earned by the cost of the necessities of life’. See also Gustav F. Steffen, *Studien zur Geschichte der englischen Lohnarbeiter mit besonderer Berücksichtigung der Veränderungen ihrer Lebenshaltungen*, 3 vols. (Stuttgart, 1901-05).

region of southern England, covering the almost seven centuries from 1264 to 1954.³ For their index base, in which the mean of nominal wages and prices equals 100, they chose the 25-year period from 1451 to 1475, 'because it lies within a long period of stability in the history of prices'.⁴

The real wage is usually represented by an index number calculated from the other two index numbers, in the following equation: $RWI = NWI/CPI$. In simple words, that means that the Real Wage Index is the quotient of the Nominal Wage Index divided by the Consumer Price Index. Thus for building craftsmen in southern England in 1352, when the nominal wage index was 58.33 and the consumer price index (price-relative for the 'basket of consumables') was 152.94, the real wage index was: 38.14 (i.e., $58.33/152.94$), indicating that the 'real wage' or the purchasing power of the nominal money wage in that year was only 38.14 percent of the mean real wage for the base period, 1451-75.

In 1975, twenty years after the publication of the Phelps Brown and Hopkins English index, Herman Van der Wee published a seemingly similar set of indexes for consumer prices and wages – again wages for building craftsmen – for the region of southern Brabant: principally the Antwerp-Lier-Mechelen region, for the three-century period from 1400 to 1700.⁵ Using the same base period of 1451-75, Van der Wee constructed a 'basket of consumables' modelled as closely as possible on the Phelps Brown and Hopkins index, with

³ E.H. Phelps Brown and Sheila V. Hopkins, 'Seven Centuries of Building Wages,' *Economica*, 22:87 (August 1955), 195-206; and E.H. Phelps Brown Sheila V. Hopkins, 'Seven Centuries of the Prices of Consumables, Compared with Builders' Wage Rates', *Economica*, 23:92 (November 1956), 296-314: both reprinted in E.M. Carus-Wilson, ed., *Essays in Economic History*, 3 vols. (London, 1954-62), vol. II, pp. 168-78, 179-96, and in E.H. Phelps Brown and Sheila V. Hopkins, *A Perspective of Wages and Prices* (London, 1981), pp. 1-12, 13-59 (with additional tables, providing sub-indexes of commodity groups).

⁴ Phelps Brown and Hopkins, 'Prices of Consumables', p. 305.

⁵ Herman Van der Wee, 'Prijzen en lonen als ontwikkelingsvariabelen: Een vergelijkend onderzoek tussen Engeland en de Zuidelijke Nederlanden, 1400-1700,' in *Album aangeboden aan Charles Verlinden ter gelegenheid van zijn dertig jaar professoraat* (Gent, 1975), pp. 413-47; reissued in English translation (without the tables) as 'Prices and Wages as Development Variables: A Comparison Between England and the Southern Netherlands, 1400-1700,' *Acta Historiae Neerlandicae*, 10 (1978), 58-78; republished in Herman Van der Wee, *The Low Countries in the Early Modern World*, trans. by Lizabeth Fackelman (Cambridge and New York, 1993), pp. 223-41.

identical quantities, by weight or volume, of the same commodities — or rather, as many commodities whose price series were available for this period. Since his basket contains only ten of the thirteen in the Phelps Brown and Hopkins basket, for the common base period 1451-75, some commodity weights were adjusted to provide approximately the same proportional expenditures for each of the six major commodity groups in the basket: farinaceous (grains), drink, meat/fish, dairy products, fuel/light, and textiles.

Finally, in 1984, I myself published a price-index for Flanders, for just the 150-year period from 1350 to 1500, using the same base period, 1451-75, but presented only in five-year or quinquennial means (and without wages). In 2002-03, I published a modified version of that Flemish price-index (slightly adjusting the weights of the ‘basket of consumables’), along with a wage index, for the same period, but again only in quinquennial means.⁶ The Flemish price index was also based as closely as possible on both the Phelps Brown & Hopkins and the Van der Wee ‘baskets of consumables’, using the same quantities of the same commodities, though fewer in number (eight), with approximately the same weights or expenditure shares for the base period 1451-75. The fact that the expenditure shares are not exactly the same in the three baskets largely reflects regional difference in relative prices during the base period. The composition of the three ‘baskets of consumables’, the values of the component commodities (unit price times quantity), and their weighting for the base period 1451-1475, are provided in Table 1.⁷

⁶ John Munro, ‘Mint Outputs, Money, and Prices in Late-Medieval England and the Low Countries,’ in Eddy Van Cauwenberghe and Franz Irsigler, eds., *Münzprägung, Geldumlauf und Wechselkurse/ Minting, Monetary Circulation and Exchange Rates*, Trierer Historische Forschungen, 7: *Akten des 8th International Economic History Congress, Section C-7, Budapest 1982* (Trier, 1984), pp. 31-122; and John Munro, ‘Gold, Guilds, and Government: The Impact of Monetary and Labour Policies on the Flemish Cloth Industry, 1390-1435’, *Jaarboek voor middeleeuwse geschiedenis*, 5 (2002), 153 - 205 (but appearing only in 2003); John Munro, ‘Wage Stickiness, Monetary Changes, and Real Incomes in Late-Medieval England and the Low Countries, 1300 - 1500: Did Money Matter?’ *Research in Economic History*, 21 (2003), 185 - 297.

⁷ The Phelps Brown and Hopkins index contains thirteen commodities in the base period, 1451-75: wheat, rye, barley, and peas (for farinaceous), mutton (sheep), herrings, barley malt (drink), charcoal, candles, lamp oil, canvas, linen shirting, and woollens. For this period, their English basket lacks prices for butter and cheese; and to compensate for their absence (with a weight of 12.5% for other periods), they increased the weight of meat and fish products from 25% to 37.5%, on the grounds that most of these (except fish) are

As similar as the three price indexes may appear to be, there is, however, a very significant difference between the original Phelps Brown & Hopkins index for England, on the one hand, and the two Low Countries' price indexes – those for southern Brabant and Flanders – on the other. Phelps Brown and Hopkins presented their composite price index for southern England only in terms of disembodied index numbers, with no actual money values attached to those numbers, even though they did supply the quantities, by number or weight, of the commodities in their baskets – four baskets, 'centred' supposedly on the years 1275, 1500, 1725, and 1950. They also did not indicate how many persons would consume this entire basket, nor how long they would take to do so. They merely stated that their 'basket of consumables' represents 'what a hundred pence [sterling] would buy in 1451-75'.⁸ My calculations indicate, however, that the mean value of the basket for this period is 112.08d (Table 1).

Furthermore, for each year, over this almost 700-year period, their commodity weights are unvaried for each of six major groups (though varying within them): 20.0 percent for farinaceous (wheat, rye, barley, peas, to 1725; wheat and potatoes thereafter); 21.0 percent for meat (from pork, mutton, beef); 4.0 percent for fish (herring and then cod); 12.5 percent for dairy products (cheese and butter); 22.5 percent for drink (barley malt, later supplemented with hops, sugar, and tea); 7.5 percent for fuel and light (charcoal, candles, oil); and 12.5 percent for textiles (canvas, linen shirting, woollen cloth, and subsequently cotton). Thus 80 percent of the basket consists of food and drink, though only 20 percent is based on cereal grains.

Phelps Brown and Hopkins justified their allocation of expenditure shares in the basket by citing the proportional outlay of such expenditures in the household accounts of William Savernak, in Bridport,

livestock products. Subsequently (from 1584) they gave beef the same weight as mutton. Van der Wee's basket for the Antwerp region contains ten commodities: rye (for farinaceous), barley (for drink), beef, herrings, butter, cheese, charcoal, candles, linen, and woollens. My basket for Flanders (Ghent and Bruges) contains eight commodities: wheat, rye, barley, peas (for farinaceous); barley (for malt: drink); butter and cheese; woollens (two varieties of cheap cloth). The commodity weight for dairy products was increased to 35% to compensate for the absence of meat and fish prices, on the grounds stated above.

⁸ Phelps Brown and Hopkins, 'Prices of Consumables', p. 298.

Dorsetshire in the years 1453-1460 (and thus within their base period). The Savernak budget allocated the following percentage shares (with those in the Phelps Brown & Hopkins basket given in square brackets): farinaceous products (cereal grains and peas), 20.0 percent [20.0]; meat and fish together, 35.0 percent [25.0]; dairy products, 2.0 percent [12.5]; drink (beer or barley malt), 23.0 percent [22.5], totalling 80 percent [80.0]; fuel and light, 7.5 percent [7.5]; but textile expenditures were not clearly given. The share of 12.5 percent in the Phelps Brown & Hopkins index was justified by similar shares allocated to textiles in the consumer studies that David Davies and Frederic Eden produced in 1795-97 [11.5 percent] and by the UK Board of Trade estimate for 1904-1913 [13.5 percent].⁹ Indeed, they justified their use of constant proportional outlays by citing ‘the similarity between Savernak’s budget and that of the wage-earners four-and-a half centuries later’.¹⁰ Such a price index, with fixed these commodity proportions, over these seven centuries, is a standard Laspeyres index.¹¹

Statistical differences in constructing price indexes for the medieval Low Countries

The two price indexes for the southern Low Countries differ from the English index in that they are both based upon actual commodity prices, in current money-of-account and thus current silver coin (i.e., in silver pence *groot* Brabantine and Flemish), for each component of the ‘basket of consumables’ and thus for

⁹ Phelps Brown and Hopkins, ‘Prices of Consumables’, Table 1, pp. 297-98; based upon K.L. Wood-Legh, *A Small Household of the Fifteenth Century* (Manchester, 1956).

¹⁰ Phelps Brown and Hopkins, ‘Prices of Consumables’, p. 298. The distribution of expenditures in the Savernak budget is indeed fairly close to the estimates of the UK Board of Trade, 1904-13, but not to the consumption accounts of 60 poor households recorded by David Davies and Frederic Morton (*State of the Poor*) in 1795-97 (Table 1, p. 297), which allocates 53% to cereal grains, when grain prices were very high.

¹¹ See Allen, ‘Great Divergence’, pp. 423-24, which also uses as Laspeyres index. He notes that: ‘As a further check on my Laspeyres index, a geometric index was also computed. With the Laspeyres index, the relative quantities consumed are fixed and independent of relative prices. In contrast, the geometric index is a weighted geometric average of the price relatives in which the weights equal budget shares. Consequently, the geometric index allows consumption to vary with price. He also notes that the Laspeyres index corresponds to Leontieff fixed-proportion preferences, while the ‘geometric index corresponds to Cobb-Douglas preferences’.

the entire basket, each year. These two price indexes are constructed by computing the mean value of each commodity in the basket, in current money-of-account, and then the mean value of the entire basket, for the common 25-year base period, which again is 1451-75. For this base period, the commodity shares of the Van der Wee basket for southern Brabant, by value, are as follows: cereal grains (rye only), 18.24 percent; drink (barley alone), 17.08 percent; meat (beef), 23.53 percent; fish (herrings), 4.30 percent; dairy products (butter and cheese), 11.05 percent; fuel and light (charcoal, candles), 7.82 percent; textiles (linens, coarse woollens), 10.68 percent. Van der Wee justified his choice of commodity weights – i.e., his reliance on Phelps Brown and Hopkins commodity weights (expenditure shares) – by citing the proportions of expenditures detailed in various early-modern expenditure budgets: those for the Beguinage Infirmary of Lier (1526-1602); the St. James Hospice at Lier (1450); an Antwerp orphanage, 1586-1600 (listing food expenditures for Antwerp labourers employed there); the soldiers of the Antwerp garrison (1568); and the soldiers of the Frisian expeditionary corps sent to Brazil (1648).¹²

I provided no such justifications in constructing my ‘basket of consumables’ for Flanders (Ghent-Bruges region), for 1346-1500, since, as noted, I necessarily modelled it as closely as possible, in terms of commodities, their quantities, and proportional expenditure outlays, on the Phelps Brown & Hopkins and Van der Wee indexes.¹³ For the same base period, 1451-75, the commodity expenditure shares of this Flemish basket are as follows: farinaceous (wheat, rye, barley, peas), 24.19 percent; drink (barley), 20.43 percent; dairy

¹² Herman Van der Wee, *The Growth of the Antwerp Market and the European Economy, 14th - 16th Centuries*, 3 vols. (The Hague, 1963), vol I: *Statistics*, Appendix 47:1, pp. 533-37; Herman Van der Wee, ‘Voeding en Dieet in het Ancien Régime’, *Spiegel Historiae*, 1 (1966), 94-101, republished in translation: as ‘Nutrition and Diet in the Ancien Régime’, in Herman Van der Wee, *The Low Countries in the Early Modern World*, trans. by Lizabeth Fackelman (Cambridge and New York, 1993), pp. 279-87.

¹³ It was largely based on the commodity prices provided in Charles Verlinden and E. Scholliers, et al, eds., *Documents pour l'histoire des prix et des salaires en Flandre et en Brabant/Dokumenten voor de geschiedenis van prijzen en lonen in Vlaanderen en Brabant*, 4 vols. (Bruges, 1959 - 65); and textile prices from the annual treasurer’s accounts in the Stadsrekeningen van Gent, 1349-1500, Stadsarchief Gent, Reeks 400: nos. 7-35.

products (cheese and butter), 35.37 percent; textiles (two varieties of cheap woollens), 20.01 percent. Regrettably, no Flemish meat prices are available; therefore, the dairy products, as related livestock products, must ‘carry the weight’ for both sets of commodities.¹⁴

The major consequence of this very different statistical method is that the components of these two price indexes for the southern Low Countries do not have fixed shares of the total basket, as they would in a Laspeyres index. Instead, the proportions accounted for by each commodity group vary over time with changes in relative prices.¹⁵ Understanding both the short and long-term behaviour of the relative prices in these ‘baskets of consumables’ – the change in one commodity’s nominal price in relation to changes in other commodity prices – is crucially important in understanding the utility of these baskets as a Consumer Price Index. In all of these baskets, grain prices are the most important, because of both their weight in the basket and especially the amplitude of their fluctuations. Thus, during prolonged periods of population growth, and consequent diminishing returns in agricultural production (i.e., in the absence of any significant technological changes and/or expansions in the area of cultivated arable land), especially when combined with monetary inflation, we find that the *relative* price of grains rose more than did those of animal products, which in turn rose considerably more than did the prices of labour-intensive industrial products.

Conversely, during prolonged periods of population decline, especially with the absence of any inflationary factors, such as coinage debasement, and disruptions from warfare or other ‘supply shocks’, grain prices tended to fall, and fell more so than did other commodity prices. But disruptions from warfare, climatic and other ‘supply shocks’, and debasement-induced inflations were rather frequent in late-medieval western Europe, even with declining population; and they generally did cause grain prices to soar more than other prices, especially more than industrial prices.

¹⁴ See the justification given in n. 7 above.

¹⁵ See Munro, ‘Gold, Guilds, and Government’, Table 3, pp. 197-98; Munro, ‘Wage Stickiness’, Tables 8-9, pp. 249-51.

The periodic later-medieval inflations, in particular those induced by coinage debasements, also contributed to these shifts in relative prices, when nominal money wages did not change. Thus, faced with suddenly rising prices, and with a fixed money income, a typical building craftsman would have been forced to spend proportionately more of his fixed and limited budget on cereal grains, and thus to reduce the share spent on meat, dairy products, and especially on those industrial goods whose purchase he could readily postpone. Conversely during peaceful, non inflationary periods, when food prices, and especially those for cereal grains, did fall sharply, the typical craftsman, as a consumer, could then have well afforded to spend proportionately more of his fixed budget on meat, dairy products, and industrial goods. Thus these relative shifts in consumer demand would be reflected in some changes, if not necessarily proportional, in relative commodity prices, and thus in their price-relatives..

The obvious statistical consequence is that, during such periods of sharply rising grain prices, cereals and beer had to account for a larger share of the ‘basket of consumables’ price index, while meat, dairy, and industrial products consequently accounted for a somewhat smaller share; and conversely, during such periods of falling grain prices, the reverse was true, with a smaller share allocated to bread grains . For this reason, one may certainly contend that this method of variable commodity shares much better reflects normal consumer behaviour than does the Laspeyres fixed-shares index.¹⁶ The ‘proof of the pudding’, so to speak, may be found in Van der Wee’s analysis of an Antwerp labourer’s food budget in the years 1586-1600: it demonstrates that the share for bread (or cereal grains) was only 25 percent in years of low grain prices (1561-62) but as much as 70 percent in years of high grain prices (1586-87).¹⁷ Although these are shares of a food

¹⁶ In ‘Prices of Consumables’, p. 303, Phelps Brown and Hopkins conceded that ‘one of [the] limitations’ of their price-index is that ‘it takes the relative quantities of the main heads [of expenditures] as constant, whereas in such a fall, for instance, in the purchasing power of the wage as the sixteenth century brought, the proportion of meat to bread surely must have fallen’.

¹⁷ Van der Wee, ‘Nutrition and Diet’, pp. 284-85 and figure 15:1. For the period 1526 to 1602, the average shares of the food budget in the Beguinage Infirmary in Lier was: 44% for bread, 16% for beer, 1% only for wine, 20% for meat, 3% for fish, and 10% for dairy products.

budget only, and not those for a total household budget, these data may indicate, that in estimating real wages for labourers — as opposed to, say, entrepreneurial craftsmen — the share allocated to cereal grains is possibly too low, in the three price indexes utilised in this study.

Bread and beer in other consumer price indexes, medieval and early-modern

If man lives not by bread alone, bread was certainly a vital component of daily consumption for the lower-income strata of these societies. Indeed, in Robert Allen's newly-constructed consumer price index (1500-1913), bread accounts for a much greater share of the basket than in the three indexes utilised here: 30.4 percent.¹⁸ Allen also makes the valid point that bread prices are more useful than grain prices, since the latter represent only raw materials. Bread prices, of course, contain some labour and capital costs (including fuel) in processing the grain into flour and then into the bread itself. We may assume that, during periods combining a declining population with deflation, bread prices declined less than did grain prices, because the real labour processing costs were probably rising, and would thus account for a greater share of the price. Conversely, during periods in which a rising population and monetary inflation were combined, bread prices presumably rose less than grain prices, because the real labour processing costs were probably falling, thus accounting for a smaller share of the price.

Gregory Clark, however, has cited a document that Lord Beveridge published: to demonstrate that, in 1767, wheat accounted for over 90 percent and labour only 3.0 percent of the cost in producing loaves of white bread.¹⁹ My own calculations differ slightly, perhaps because we have used a different price for wheat

¹⁸ See Allen, 'Great Divergence', Table 3 and p. 421. His basket has 182 kg of bread, valued at 0.693g silver per kg., in Strasbourg (price mean: 1745-54). In the Phelps Brown and Hopkins, basket, farinaceous products (wheat, rye, barley, and peas) account for 20.0 percent; and in my revised version of this index, they account for 19.33 percent of the basket. The Van der Wee basket index contains only one bread grain, rye, which accounts for 18.2 percent of the basket; and barley is included only under 'drink', as a proxy for barley malt. In my Flemish basket for the Bruges-Ghent region, the three cereal grains and peas together account for 24.19 percent of the basket. See Table 1, below, pp. .

¹⁹ Gregory Clark, 'Work, Wages, and Living Conditions: Building Workers in England from the Magna Carta to Tony Blair', in Simonetta Caviococchi, ed., *L'Edilizia prima della rivoluzione industriale*,

in 1767; the price used here is 52.620 shillings per quarter.²⁰ In gross terms, the costs of transforming one quarter of wheat (8 bushels = 290.95 litres) into 518 lb 5 oz of bread (= 235.10 kg) were 6.979s, thus accounting for 11.71 percent of the total (59.599s), so that the wheat itself accounted for the remaining 88.29 percent of the costs. Since, however, the by-products of bran (80 lb. 2 oz = 36.34 kg), ashes, and wood were sold for 2.438s, the net transformation costs were thereby reduced to 4.542s, resulting in a net cost of 57.162s per quarter of wheat transformed into bread. Of this net amount, the transformation costs accounted for 7.95 percent and thus the wheat for 92.05 percent of the total costs. The labour costs (wages for the baker and his labourer), however, accounted for only 2.88 percent of the gross costs and just 1.87 percent of the net costs (i.e., after sale of the by-products).²¹

One would assume that these proportions would change with annual fluctuations in the price of wheat; but if so, the consequences seem to be negligible, when London bread prices are regressed against national wheat prices for the years 1770 - 1919 (in decennial means). The regression results for this period, which certainly combine several alternating periods of inflation and deflation, indicate a very high degree of correlation: for, the R-Square (co-efficient of determination) is 0.942.²²

The use of actual bread prices is, furthermore, highly problematic for England, for two related reasons:

secc. XIII-XVIII, Atti delle "Settimana di Studi" e altri convegni, no. 36, Istituto Internazionale di Storia Economica "Francesco Datini" (Florence, 2004), pp. and Table 5, citing the source in n. 21 below.

²⁰ Sir William Beveridge, *Prices and Wages in England from the Twelfth to the Nineteenth Centuries*, vol. I: *Price Tables: the Mercantile Era* (London, 1939; republished London, 1959), p. 569: Table of Navy Victualling - London, adjusted annual average prices for wheat in London. Clark does not give the price of wheat, nor indeed any other prices, presenting figures only in percentages.

²¹ Beveridge, *Prices and Wages in England*, pp. 542-43: the baker's wage was 1s. 2.75d, and for his labourer, 5d; wood fuel cost 1s 7.5d, and coals cost 2.5d; salt, 5.25d; yeast, 6.25d; grinding the wheat, 1s 6.5d; dressing the meal, 7.5d; and measuring and transport, 4.5d. See, however, n. 24 below, for Antwerp in the 16th century.

²² Grain and bread prices in B.R. Mitchell and Phyllis Deane, *Abstract of British Historical Statistics* (Cambridge, 1962), pp. 488-89 (Prices table 10), 497-98 (Prices table 14), respectively. Adjusted R-Square = 0.937, with a standard error of 5.21 and a t-statistic of -1.832.

uncertainties about the size and quality of the bread whose prices appear in various lists; and the enforcement of the Assize of Bread, dating from 1266 (Henry III: *Assisa Panis et Cervisie*). Until its repeal in 1709, the Assize regulated the size and weight of three loaves of bread – those selling for a farthing, half-penny, and penny – according to the price of wheat, ‘so that, the higher the price of corn [wheat], the smaller the weight of a loaf of a given kind [nine are listed] and a given price’.²³ The assize did not do so, however, in a linear fashion, so that extrapolating bread prices per pound is fraught with many difficulties.

For all these reasons, both Gregory Clark and myself have used wheat and rye prices as a highly reliable proxy for bread prices. Furthermore, a closer inspection of Allen’s data sources reveal that his London bread prices before 1545 were extrapolated from the same wheat prices used in this study (those from Thorold Rogers); and for Antwerp, bread prices, those calculated and published by Scholliers, were similarly extrapolated from rye prices, without taking into account any production costs other than wages.²⁴

Similar observations apply to Allen’s use of beer prices. For London, his beer prices before 1649 were extrapolated from barley- malt prices; and for Antwerp, he used beer prices from Amsterdam, similarly extrapolated from barley prices. Needless to say commodity prices are relevant only for the exactly same region from which wage data are taken, a principle strictly followed in this study, which therefore eschews any use of so-called ‘national averages’ (in an era without national market economies).

²³ See Alan Ross, ‘The Assize of Bread’, *Economic History Review*, 2nd ser., 92 (1956), 332-42. After the assize was repealed in 1709 (by 8 Anne c. 19), it was replaced by other measures, which were repealed in London in 1822 and in the rest of the country in 1836. Allen’s article makes no mention of this Assize of Bread, nor of Ross’s article.

²⁴ Allen, ‘Great Divergence’, pp. 435 -36. His source for Antwerp bread prices, from 1426 to 1600 is E. Scholliers, *Loonarbeid en honger: de levensstandaard in de XVe en XVIe eeuw te Antwerpen* (Antwerp, 1960), p. 31 (table); and Appendices II and III, pp. 186-88. Bread prices were extrapolated by the formula: rye price per *viertel* + baker’s wage/140, in that 140 lb. [470.156 grams per lb] of bread were baked from a *viertel* of rye [79.627 litres, with 112 lb. per *viertel*]. When wages were not known, but assumed to average 10% - 11% of the price of the rye *viertel*, the formula becomes: price per lb. of rye bread = price per *viertel* of rye/Y, when Y = lb. of rye bread obtained for the price of the *viertel* of rye, averaging 126 lb. (according to an 11-year moving average of rye prices): 140 lb. \times (100/111) = 126. If the price was 58.5d and the wage 6d (totalling 64.5d), then 140 lb \times 58.5/64.5 = 127 lb of bread for the price of rye per *viertel*.

Clark has also chosen to use beer prices rather than those for barley malt and then hops, as used in the Phelps Brown & Hopkins index. His beer prices (along with others) are evidently ‘national means’, without clearly accounting for likely variances in quality. Furthermore, as Clark strongly stresses, the most significant difference between his consumer price index and the Phelps Brown & Hopkins index is the weight given to the ‘drink’ component: namely, 8.0 percent vs. 22.5 percent in the latter; and his 8.0 percent share is divided between beer, with 4.7 percent, and tea, with 3.3 percent. In my revised Phelps Brown & Hopkins index for Cambridge-Oxford, for the base period alone (1451-75), the weight for beer (barley malt) is 21.48 percent. In Van der Wee’s Brabant index, drink (in the form of barley alone) has a somewhat lower weight of 17.08 percent; and in my Flemish index, drink (again barley alone) has a weight in between the two: 20.43 percent. Allen has assigned a virtually identical weight to drink, in the form of beer alone, for northern Europe (wine for southern Europe): 20.6 percent (= 182 litres in annual per capita consumption), which thus closely corresponds to its share in the Phelps Brown and Hopkins index.²⁵

Clark’s weight, therefore, seems to be the singular ‘outlier’. His justification for assigning such a very low weight to beer is the evidence that he found in published accounts of eighteenth- and nineteenth-century household expenditure lists, with the following shares accorded to beer: by Vanderlint (1734), a 12.5 percent share; by Horrell (1787-96), a 2.8 percent share; and by Horrell (1850-54), just a 1.7 percent share. As noted earlier, Phelps Brown and Hopkins based their weight for the drink (beer) component on the Savernak household budget for 1453-61, which allocated a 23 percent share for beer or barley malt.²⁶ Perhaps, therefore, English or northern European consumption of beer diminished between the fifteenth and eighteenth centuries. For, in that earlier era, when water and milk were frequently unsafe to consume, beer was certainly by far the

²⁵ Allen, ‘Great Divergence’, Table 3, p. 421: southern Europe, 68.25 litres of wine p.c. per year. A weight of 20% has also been given to drink (ale/beer) for a consumer price index for London, for the period 1490 to 1609, in: Steve Rappaport, *Worlds Within Worlds : The Structures of Life in Sixteenth-century London* (Cambridge-New York, 1989), p. 125 (Table 5.1).

²⁶ See above, p.

favoured drink in north-west Europe; and Van der Wee 's analysis of the accounts for Lier's Beguinage Infirmary (1586-1600) indicate that, on average, wine accounted for only 1 percent of consumption expenditures, while beer accounted for 16 percent (i.e., close to the 17 percent weight in his index). He also notes that in 1472, the annual per capita beer consumption in Lier (near Antwerp) was about 310 litres – well more than double the Belgian per capita consumption in 1958 (115 litres).²⁷ From statistics that Richard Unger has compiled, we can calculate mean annual per capita beer consumption in the following cities, during the fifteenth and sixteenth centuries, as follows: Leuven, 257 litres; Antwerp, 319 litres; Bruges, 263 litres; Ghent, 202 litres; Leiden, 255 litres; Haarlem, 236 litres; and Hamburg, 313 litres. Unger further notes that beer was also used in cooking.²⁸

If the relative consumption of beer did decline by the eighteenth century, especially when tea, coffee, and gin were added to the north European diet, such a change would be a strong argument against allocating a fixed share for beer consumption over such a long period. In the Phelps Brown & Hopkins index, the component weights of the drink index do, of course, vary over time: that index contains barley malt alone until 1559, when hops are added; then in 1660, sugar is added; and finally, tea, after 1815.²⁹ But as noted earlier, the drink expenditures continue to account for 22.5 percent of their 'basket of consumables' for the entire seven centuries (1264-1954).

Furthermore, beer continued to be predominant in working-class consumption, well into the nineteenth

²⁷ Van der Wee, 'Nutrition and Diet', pp. 282-84, and Figure 151.; and p. 286 (on water consumption). See also Erik Aerts, *Het bier van Lier: de economische ontwikkeling van de bierindustrie in een middelgrote Brabantse stad, einde 14de - begin 19de eeuw* (Brussels, 1996).

²⁸ Richard Unger, *A History of Brewing in Holland, 900 - 1900: Economy, Technology, and the State* (Leiden, 2001), Table III-4, pp. 90-1, noting also that the daily beer ration for English and Hanseatic sailors was then about 5 litres. For Leuven, see also Raymond Van Uytven, *Stadsfinanciën en stadseconomie te Leuven van de XIIde tot het einde der XVIde eeuw* (Brussels, 1961), pp. 313-36, especially p. 335.

²⁹ See Phelps Brown and Hopkins, 'Seven Centuries of the Price of Consumables', Table 1, p. 297; Table 2, p. 303. Their basket for 1500 contains 4.5 bushels of barley malt; that for 1750, 3.5 bushels of malt; 3 lb. of hops; and 1.5 lb. sugar; for 1950, 2.5 bushels of malt; 2.5 lb. hops, 5 lb. sugar; and 4.5 lb. tea.

century; and compelling evidence to justify its higher weight in the ‘basket of consumables’ of Phelps Brown & Hopkins, Van der Wee, Munro, and Allen can be found in a recent study on the modern British brewing industry. Its authors, T.R. Gourvish and Richard Wilson, contend that around 1870 ‘beer was the largest item of working-class expenditure, ranking well above amounts spent on meat or bread’. Furthermore, citing evidence of Victorian observers, they estimate that ‘between 14 and 25 percent of working-class incomes was spent on beer’, with a mean per capita beer consumption, in England and Wales, during the years 1875-79, of about £4.36 in expenditures, and 40.5 gallons (184.12 litres) in physical consumption, which, however, fell to 29.4 gallons (133.66 litres) per person annually, in 1910-13.³⁰ All this evidence should be taken into account in considering Clark’s statement that the major difference between his price index and the Phelps Brown & Hopkins index, in terms of both price fluctuations and real wage trends, is to be explained by these weights given to beer in particular and drink in general.³¹

A new approach to the history of real-wages in late-medieval Europe with ‘baskets of consumables’

Robert Allen has also rightly criticized the Phelps Brown and Hopkins index, and indeed the traditional method of computing real wages with index numbers -- by the formula: $RWI = NWI/CPI$: in observing that ‘the real wage shows [only] proportional changes and relative levels’, and thus ‘it has no absolute interpretation’.³² He has provided an intriguing alternative method (for the period 1500-1913), in terms of relative ‘welfare ratios’, which he defines as: ‘average annual earnings divided by the cost of a poverty line consumption bundle [basket of consumable commodities] for a family’. Thus, ‘a welfare ratio greater than one

³⁰ T.R. Gourvish and Richard G. Wilson, *The British Brewing Industry, 1830 - 1980* (Cambridge and New York, 1994), tables 2.1, p. 30, table 2.5, p. 34, and data and quotation on p. 36.

³¹ Phelps Brown and Hopkins, ‘Seven Centuries of the Prices of Consumable’, Table 1, p. 297, also note that the British Board of Trade, in a survey of consumption expenditures for the years 1904-1913, found that ‘drink’ then accounted for 24% of household expenditures.

³² Cf Allen, ‘Great Divergence’, p. 424.

indicates an income above the poverty line, while a ratio less than one means the family is in poverty'.³³ For many complex reasons, I find his method unsatisfactory, in particular in converting nominal or current 'money-of-account' prices and wages into supposedly equivalent grams of silver.³⁴

Yet there is a far simpler method that fully meets Allen's criticism, and one that now permits us to measure and compare absolute levels of real wages, as well changes in their trends, in the three regions of this study during the later Middle Ages: southern England, Flanders, and Brabant. We merely calculate the number of the 'basket of consumables' that a master mason, his journeyman labourer, and also other wage-earners (including policemen) could each purchase with their annual money wages.³⁵ Indeed, one may well contend that this is by far the best method of demonstrating such changes in the purchasing power of money wages. As noted earlier, Van der Wee had also made such a method available in constructing his commodity price index for the southern Brabant region. Nevertheless he did not utilise that potential technique, but continued to rely on the standard format of index numbers. Although I had used this new method in two very recent articles (2002-03), my application was then limited to the late-medieval Low Countries.³⁶

It could not then be applied England, to permit a broader comparison of real wages, because, as also noted earlier, the English index that Phelps Brown and Hopkins published contains only 'disembodied' index numbers, unrelated to actual commodity prices. To resolve this problem, I gained access to their working papers, now housed in the Archives of the British Library of Political and Economic Science (Robbins

³³ *Ibid.*, p. 425.

³⁴ For a good critique of the once-common method of using 'silver-based' prices, see Van der Wee, *Growth of the Antwerp Market*, vol. I, pp. 115-22. For a fuller critique of Allen's methodology, see the online version of this paper, at: <http://www.economics.utoronto.ca/ecipa/archive/UT-ECIPA-MUNRO-04-01.html>. I intend to develop this debate in a future article.

³⁵ For the difference between journeymen labourers and common labourers, see below, pp. Note that a mason's or carpenter's journeyman had a much higher level of skills than a common labourer; and he was not an apprentice seeking someday to become a master.

³⁶ Munro, 'Gold, Guilds, and Governments', pp. 150-205; Munro, 'Wage Stickiness', pp. 185-297.

Library).³⁷ Over several summers, I collected the actual prices for every item in their price index, and thus the commodity values in their ‘basket of consumables’, up to about 1800 (consisting, to that date, of 22 commodities). A great deal of statistical work on the computer was also required, in finding remedies for missing data: either by statistical interpolation from adjacent prices in the series or by extrapolation from related data.³⁸ For this reason the values presented here do not generally correspond to those that Phelps Brown and Hopkins published (many of which were further changed, in correcting computational errors).

This method is particularly valuable when wage and/or commodity price data are lacking for the base period, thus making it impossible to calculate the real wage by the standard formula ($RWI = NWI/CPI$), with index numbers necessarily calculated from both price and wage data in the base period. If such data are available, then that traditional method – virtually the only one used by historians – is perfectly valid, but only on one condition: that the nominal wage, as the daily wage in current silver coin, be unvarying during the base period (here 1451-75). If that condition is met, then the calculation of real-wage index numbers must produce identical results by either method.

For reasons that I have discussed elsewhere, any computation of, say, five-year averages (quinquennial means) of real wages, must be calculated by using the *harmonic* mean, and not the standard arithmetic mean.³⁹

³⁷ Archives of the British Library of Political and Economic Science (Robbins Library), the Phelps Brown Papers Collection: in Boxes Ia.324 and J.IV.2a.

³⁸ Phelps Brown and Hopkins had almost always refused to supply missing values by interpolation, preferring to let other components ‘carry the weight’ when data for a series were missing. Thus if, for example, rye prices were missing for some years, the relevant index numbers would be based on other available grain prices, consequently giving wheat, barley, and peas a greater weight in that index number. The most serious problem was the lack of any butter prices from 1401 to 1561, and of cheese prices from 1430 to 1572. As explained in n. 7 above, their remedy was to increase the weight or share for meat and fish from 25.0% to 37.5%. My remedy was to extrapolate butter and cheese prices by a mean of their ratios to meat prices (excluding fish) before and after these lacunae in their prices.

³⁹ For an explanation of its use, see John Munro, ‘Money, Wages, and Real Incomes in the Age of Erasmus: The Purchasing Power of Coins and of Building Craftsmen’s Wages in England and the Southern Low Countries, 1500 - 1540’, in Alexander Dalzell and Charles G. Nauert, Jr., eds., *The Correspondence of Erasmus*, Vol. 12: *Letters 1658 - 1801, January 1526- March 1527* (Toronto, 2003), pp. 592-94. See also

The harmonic mean is defined as ‘the reciprocal of the arithmetic mean of the reciprocals of the individual numbers in a given series’.⁴⁰ That inflexible rule, requiring the harmonic mean, applies to calculations of real wages both by the traditional method of index numbers ($RWI = NWI/CPI$) and by this new method based on the actual nominal or money-of-account values of both wages and the commodities in all the ‘baskets of consumables’.

Finally, this newly-revised Phelps Brown and Hopkins ‘basket of consumables’ price index, in using actual commodity values, differs from the original index in that the components of the ‘basket’ do not have fixed weights or expenditure shares, for the reasons already elucidated in the analysis of the two price indexes for the Low Countries (Brabant and Flanders). Thus, again, the proportions of expenditure outlays for each commodity group in the basket change with shifts in relative prices from year to year.

The problem of annual money wages (and other sources of income)

Obviously another problem in calculating real wages in the manner used here (and also in Allen’s study) is the estimate of annual money-wage incomes, because the relevant documents supply information only for daily or weekly wages (six times the daily), but not on monthly or annual incomes. Thus we really do not know with any certainty the actual number of days of the year for which a craftsmen received a money wage income; and undoubtedly the actual number and thus the annual income varied from year to year. Fortunately, however, we do know, from the research and publications of Herman Van der Wee, the actual number of days

the online version of this paper in n. 34 above.

⁴⁰ F.C. Mills, *Introduction to Statistics* (New York, 1956), pp. 108-12, 401. The mathematical equation is: $HM = 1 / [\sum (1/r_1 + 1/r_2 + 1/r_3 + \dots + 1/r_n)] / N$. The letter ‘r’ indicates the prices or wages in a series, so that $1/r$ means the reciprocal of that price or wage for each year in the series. These reciprocal values in the series are then summed; the reciprocal of that value is then taken (i.e. 1 divided by the result); and that result is divided in turn by the number of items (N) in the series (thus 5, for a quinquennial or five-year mean) to obtain the harmonic mean. For index numbers of real wages, the harmonic mean of these numbers for the base period – here, 1451-75 – must also be calculated, i.e., as a 25-year mean. It does not appear that either Allen or Clark used the harmonic mean in calculating their real-wage averages (50-year means in Allen’s paper; 10-year means in Clark’s paper).

of employment in the building trades in the Antwerp-Lier region of Brabant, from 1437 to 1660. For both the base period, and also for century 1450-1550, the average number of days of paid employment was 210.⁴¹ In thirteenth-century England, the chronicler Walter of Henley stated that the normal working year for agricultural labourers was 264 days;⁴² and for fifteenth- and early sixteenth-century Antwerp, Scholliers has given that same number of 264 days as the *maximum* number of workdays in the building trades, with conditions of ‘full employment’ (after deducting holidays).⁴³ For fifteenth-century England, Knoop and Jones state that the maximum number of working days was slightly higher: 272 days.⁴⁴ For this study, annual money-wage incomes in the building trades have been estimated by multiplying Van der Wee’s figure of 210 days by the mean daily wage for each craftsmen or labourer.⁴⁵ One may justify the lower bound estimate of annual paid employment, not just because of Van der Wee’s well documented study, but also because of another reasonable assumption: that, sometime in the course of a year, if only for short periods, employment would have been disrupted by bad weather and/or by discontinuities in supplies of bricks, stone, wood, and other materials. Furthermore, most master building craftsmen worked for a variety of employers and thus could not count on sustained, continuous employment through the year. For that reason in particular, we might further assume that when real wages were high, many craftsmen would have chosen not to work on some occasional days: i.e., they would have substituted more leisure for less income. But as I have contended elsewhere, it is difficult to

⁴¹ Van der Wee, *Growth of the Antwerp Market*, Vol. I: *Statistics*: Appendix 48, pp. 540-4).

⁴² Doreatha Oshinsky, ed., *Walter of Henley and Other Treatises on Estate Management and Accounting* (Oxford, 1971), pp. 314-15: *Hosbondrye*, c.30: after ‘holydayes and for such other lettes .. there remayne 44 weekes woorkable’, so that $44 \times 6 = 264$ days.

⁴³ Scholliers, *Loonarbeid en honger*, pp.84- 88: ‘is dus wel een maximum’ (p. 87).

⁴⁴ Douglas Knoop and G.P. Jones, *The Mediaeval Mason: An Economic History of English Stone Building in the Later Middle Ages and Early Modern Times*, 3rd edn. (Manchester, 1967), p. 107.

⁴⁵ Allen, ‘Great Divergence’, p. 425, uses a paid employment year of 250, as ‘5 days per week for 50 weeks’. The normal working week in the pre-modern era was, however, six days, while employment was for much less than 50 weeks a year, as indicated by all sources in the previous notes.

find evidence for this choice in the late-medieval Low Countries. For the full century from 1436 to 1535, there is absolutely no statistical correlation between real wages and the number of days worked in the Antwerp-Lier region⁴⁶

The problem of seasonal money wages

Seasonal differences in wages presents yet another problem, in calculating a mean daily wage. In medieval and early modern Europe, craftsmen and labourers normally did indeed work ‘from sun to sun’; and that of course meant proportionately more hours of effective work in summer than in winter months: about twelve to thirteen hours in the summer, and eight to nine hours in the winter. Typically, in such regimes, the winter wage, usually applied in the three months from late November or early December to early March, was 75 percent of the summer wage. Seasonal wages had certainly been common in medieval England before the Black Death (1348), but not so much after the subsequent imposition of the Statute of Labourers (1350-51), a largely vain attempt to impose maximum wages based on the pre-Plague level. The abolition of the lower winter wage (a wage not specified in the Statute) in some English districts may have been a necessary response: to maintain a higher mean wage without raising the summer wage to the extent of inviting intervention by local justices of the peace, empowered to enforce the Statute.⁴⁷ The extensive wage data that Thorold Rogers supplied from the Oxford and Cambridge college accounts provide only a few, sporadic indications of a lower winter wage; and the London Bridgemaster accounts record only a few, in the 1430s; but none can be found in the various London guild accounts (for brewers, bakers), which record payments made to building craftsmen

⁴⁶ Data in Van der Wee, *Antwerp Market*, vol. I, Appendix 48, pp. 540-44. For this regression, in which we would expect a negative correlation, R-Square = 0.00002943; adjusted R-Square = -0.01017; F = 0.002885. See also John Munro, ‘Urban Wage Structures in Late-Medieval England and the Low Countries: Work-Time and Seasonal Wages’, in Ian Blanchard, ed., *Labour and Leisure in Historical Perspective, Thirteenth to Twentieth Centuries*, *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte Beiheft* series no. 116 (Stuttgart, 1994), pp. 65-78; and especially Munro, ‘Wage Stickiness’, pp. 185 - 297.

⁴⁷ See Munro, ‘Urban Wage Structures’, pp. 65-78; and Munro, ‘Wage Stickiness’, pp. 185 - 297.

repairing guild properties; nor in the Bishop of Winchester's accounts for his London manor of Southwark.⁴⁸ Knoop and Jones also found only a few instances of lower winter wages (some Oxford colleges, York Minster, Vale Abbey, Adderbury).⁴⁹ In the absence of any definitive patterns, a uniform annual daily wage has been employed for the southern English building workers in this study.

For late medieval Flanders, the wage data presented in this study are chiefly for Bruges, since only four wage accounts are available for Ghent. In two of them (1363-64 and 1370-71), very minor winter wage reductions, of 14.2 percent and just 10.0 percent respectively, are indicated; but none in the other two (for 1392-93, and 1410-11), nor in some construction expenditures in the Ghent mint accounts of the 1430s.⁵⁰ In Bruges, some scattered evidence of seasonality may be evident from the 1430s, but in the form of increased summer wages, from 10d to 12d *groot*, and only for some masters, while some continued to receive just 10d in the summer, and some others were still paid 12d in winter months. I have calculated a mean annual wage

⁴⁸ J. E. Thorold Rogers, *A History of Agriculture and Prices in England, from the year after the Oxford Parliament (1259) to the Commencement of the Continental War (1793): Compiled Entirely from Original and Contemporaneous Records*, 7 vols. (Oxford, 1866-1902), vol. I (for raw wage data); Vol. II-III, for wages in decennial means; Corporation of London Record Office: Bridge Master's Account Rolls, 1381-1398; Bridge Master's Accounts: Weekly Payment Series, 1404- 1510 (Vols. I - III); London Guildhall Manuscripts Library: Armourers' Company Accounts (1499-1557): MS 12.065, vol. I; Bakers' Audit Books (1505-1547), MS 5174, vol. 1; Brewers' Guild, Warden's Accounts (1424-1562): MS 5440; Carpenters' Guild, Warden's Accounts (1456-1573): MS 4326, vols. I and II; Cutlers's Guild Accounts (1442-1497): MS 7146, roll 1; Grocers' Guild, Warden's Accounts (1452-1578): MS 11,570-571, vols. I - VI; Ironmongers' Guild Accounts (1455-1561): MS 11,698: Vols. I - II; Pewterers' Company Accounts (1474-1500): MS 7086, Vol. I; Archives of the British Library of Political and Economic Science, the Beveridge Price and Wage History Collection: Southwark (Bishop of Winchester), 1406-1454 (Box A.34).

⁴⁹ Knoop and Jones, *Mediaeval Mason*, pp. 104-06, noting for example that Eton college paid a uniform wage of 6d daily throughout the year from 1442 to 1454, but a higher rate of 6.67d in the summer months in 1456-60.

⁵⁰ Stadsarchief Gent, Stadsrekeningen 1359/50-1499/1500, Reeks 400: nos. 7 - 35: town accounts; Algemeen Rijksarchief, Rekenkamer, Rolrekening nos. 827-31 (Ghent mint accounts, 1410-19); Acquits de Lille, liasses no. 936-37 (Ghent mint accounts, 1419-1447).

of 11d for this period (5.5d for journeymen).⁵¹ For the Brabantine towns, the wage records are much clearer. In Antwerp and Mechelen, the winter wage was, as indicated earlier, usually 75 percent of the summer wage; and I have constructed the mean annual wage based on the stipulated summer wage for 157.5 days and the stipulated winter wage for 52.5 days (of the total of 210 days).⁵²

The economists' approach to real wages: the marginal productivity of labour after the Black Death

A focus on real wages involves a number of other complicating problems in terms of micro-economic theory. First and foremost, most contemporary economists, and not just the Classical economists of the nineteenth century, subscribe to the theorem that the real wage is determined by the marginal productivity of labour.⁵³ According to this theorem, alterations in real-wage trends offer a valuable guide to more general changes in productivity in the economy. For the later-medieval period, such a theorem also serves to vindicate the view that Black Death ushered in a Golden Age for the wage-earning artisan and labourer, a view first propounded by Thorold Rogers as early as 1867.⁵⁴ That view was made even more popular, from the mid-twentieth century, in the various publications of Michael Postan, Georges Duby, and Wilhelm Abel.⁵⁵

⁵¹ Stadsarchief Brugge, Stadsrekeningen 1360-61 to 1484-85; Algemeen Rijksarchief, Rekenkamer, registers nos. 32,461-564 (Bruges town accounts, 1406-1502).

⁵² The Mechelen wage data are taken from Verlinden and Scholliers, *Documents pour l'histoire des prix et des salaires*, vol. II:ii, pp. 1244-99. The Antwerp wage data come from Van der Wee, *Growth of the Antwerp Market, I: Statistics*, Appendix nos. 27/1 - 30/3, pp. 333-92.

⁵³ See John Maynard Keynes, *The General Theory of Employment, Interest and Money* (London, 1936), p. 5: stating that one of the most basic postulates of Classical Economics is that 'the wage is equal to the marginal product of labor'; and of course by that statement he meant the real wage.

⁵⁴ Rogers, *History of Agriculture and Prices*, Vols. I and II: 1259-1400 (Oxford, 1866-67); Vol. III-V: 1401-1582 (Oxford, 1881). Vols. I and IV consist of the raw price and wage data. See also Thorold Rogers, *Six Centuries of Work and Wages*, and n. 2 above.

⁵⁵ See in particular Michael Postan, 'Some Economic Evidence of Declining Population in the Later Middle Ages,' *Economic History Review*, 2nd ser. 2 (1950), 130-67, reprinted in his *Essays on Medieval Agriculture and General Problems of the Medieval Economy* (Cambridge, 1973), pp. 186 - 213 (with the revised title of 'Some Agrarian Evidence of Declining Population in the Later Middle Ages'); Michael M. Postan, 'Medieval Agrarian Society: England,' in M. M. Postan, ed., *Cambridge Economic History*, Vol. I:

According to their models, influenced by the Classical economics of David Ricardo, the drastic decline in Europe's later-medieval population, especially after the Black Death and subsequent attacks of bubonic plague, drastically altered the land-labour ratio, so that the marginal productivity of agricultural labour necessarily rose – and rose strongly. In a fundamentally agrarian economy, many high-cost marginal lands, which had been subject to diminishing returns during the prior era of population growth, were soon abandoned, so that arable husbandry became concentrated on much better quality, higher-yielding lands that produced much more grain and livestock products with proportionately much less labour. Labour was therefore now able to command a much higher real wage, all the more so when agricultural labour became even more scarce, as formerly landless labourers took up abandoned tenancies, and as labour migrated to towns offering higher wages. Real wages presumably rose all the more, after living costs had fallen – i.e., from the decline in the relative grain prices – after this agrarian reorganization had improved the productivity of both land and labour. Housing costs presumably also fell, with so much more available land.

One major caveat concerning the Classical theory of real wages must, however, be introduced here: the more refined and sophisticated concept is that the real wage is determined not by the marginal product alone, but rather by the *marginal revenue product* (MRP) of labour: i.e., the market value of the last unit of output produced by the last unit of labour employed (in whatever unit of enterprise). Thus, if, according to the Postan-Duby-Abel models, the late medieval decline in population inevitably led to a fall in the *relative* price of cereal grains and some other agricultural prices, then the effects on real wages for agricultural workers may have been a wash: in that any rising productivity may have been offset by a reduction in marginal revenues.

That refinement, concerning the MRP of labour, might better explain the apparent paradox of urban

The Agrarian Life of the Middle Ages, (2nd rev. edn. 1966), pp. 560-70; Michael M. Postan, *The Medieval Economy and Society: An Economic History of Britain, 1100-1500* (Cambridge, 1972); Georges Duby, *Economie rural et la vie des campagnes dans l'occident médiéval*, translated by Cynthia Postan, as *Rural Economy and Country Life in the Medieval West* (Philadelphia, 1968); and Wilhelm Abel, *Agrarkrisen und Agrarkonjunktur*, 3rd edn. (Berlin, 1978; 1st edn. 1966): translated by Olive Ordish as *Agricultural Fluctuations in Europe from the Thirteenth to the Twentieth Centuries* (London, 1980).

wages, especially building wages. For it is not clear how the simple demographic model itself would explain why the marginal product of urban labour should have risen in later-medieval Europe. That is especially a problem for the urban building trades, because there is no evidence of any technological changes, especially those involving water-power, which so improved productivity in late-medieval metallurgical and some other manufacturing industries.⁵⁶ But the Postan-Duby-Abel model does posit the corollary argument that, while late-medieval grain prices fell, prices for livestock and especially industrial products should conversely have risen. Thus, according to this model, artisans and labourers, after finding that lower cereal prices had left them with greater disposable real incomes, evidently chose to increase their available spending on more meat, dairy products, and especially industrial goods, thereby driving up the relative prices of such commodities. Hence the marginal revenue product of industrial labour should have risen, to permit and justify higher real wages in industrial towns. Furthermore, we may assume that a reasonably fluid and unified labour market would have required that rising real wages be matched in urban areas, and within urban economies, lest the towns lose hired labour to the agricultural sector (or to other industrial sectors, such as rural textiles). If labour did in fact flow in the reverse direction, from rural to urban areas, we might also assume that towns were able to maintain higher real wages – but possibly only by employing more productive artisans.

The problem of nominal wage stickiness over long periods

This Classical micro-economic model implicitly assumes not just that relative prices would always behave in this matter but also that money wages were and are always flexible. As John Maynard Keynes so caustically observed, ‘the Classical Theory has been accustomed to rest the supposedly self-adjusting character of the economic system on an assumed fluidity of money-wages; and when there is rigidity, to lay on this

⁵⁶ See John Munro, ‘Industrial Energy from Water-Mills in the European Economy, 5th to 18th Centuries: the Limitations of Power’, in Simonetta Cavaciocchi, ed., *Economia ed energia, secoli XIII - XVIII*, Atti delle ‘Settimane di Studi’ e altre Convegni, Istituto Internazionale di Storia Economica, ‘Francesco Datini da Prato’, vol. 34 (Florence, 2003), pp. 223-69.

rigidity the blame of maladjustment'.⁵⁷ The historical evidence, at least for late-medieval and early-modern England and the Low Countries, demonstrates that money wages and thus real wages did not behave as Classical theory and the Postan-Duby-Abel models require; nor did the movements of relative prices.⁵⁸

The comparative data on real wages for southern England and the southern Low Countries, for the limited period 1346-1500, are presented in the two sets of accompanying graphs. The first set depict the trends – but not the actual levels – of real wages in the familiar, traditional pattern, with three indices (base 1451-75=100): the consumer price indexes for the Oxford-Cambridge region, for the Bruges-Ghent region, and for the Antwerp-Lier-Mechelen region; the nominal wage index for each of the craftsmen and their journeymen labourers, and thus their real wage index, based on the formula: $RWI = NWI/CPI$. What is most striking about these graphs is the behaviour of nominal wages, which were often fixed for relatively long periods of time, especially in England. Indeed, in some Oxford colleges, the nominal daily wage for master masons was consistently 6d sterling from 1362-63 to 1536 (though the overall means of urban wages in southern England indicate a rise from 5d to 6d in the early fifteenth century, c. 1410).

That historical behaviour of money wages has led some historians to doubt their utility, if not their validity. Peter Lindert, for example, has criticized Phelps Brown's and Hopkins' presentation of English wage data on the grounds that 'it is constructed in such a way as to overstate wage stickiness'; and Lindert defines wage-stickiness as a condition in which 'wages do not change rapidly enough to keep the labor market in equilibrium' (as Classical theory would require).⁵⁹ Phelps Brown and Hopkins themselves conceded that the wage-stickiness that appears in their data probably reflects the fact that 'payments were made not by employers to wage-earners but by customers to craftsmen working on their own account; and these customers were

⁵⁷ Keynes, *General Theory*, p. 257.

⁵⁸ See Munro, 'Wage Stickiness', in n. 5 above.

⁵⁹ Peter Lindert, 'English Population, Wages, and Prices: 1541-1913', *Journal of Interdisciplinary History*, 15 (Spring 1985), 618-26.

generally institutions and not private persons who had to put their hands into their own pockets'.⁶⁰ Nevertheless, in discussing wages in the eighteenth century, Adam Smith commented that 'in many places [in Great Britain] the price of labour remains uniformly the same sometimes for half a century...'.⁶¹ Indeed, the wage evidence for master masons and carpenters in southern England indicates that the predominant wage (for those highly skilled) was an unvarying 24d a day from 1736 to 1773.⁶²

In two recent studies, I have examined this phenomenon of wage-stickiness and sought to explain why it was a prevalent feature of labour markets in late-medieval England and the Low Countries, though much more so during deflationary than in inflationary periods. Thus, from the 1370s, most wages did not fall with declining consumer prices; and, subsequently, when consumer prices were rising strongly, increases in money wages lagged well behind prices. Furthermore, for medieval London, my evidence indicated that such wage-stickiness prevailed for building craftsmen who had three different sets of employers: some of the various London guild houses (brewers, carpenters, cutlers, grocers), who hired various craftsmen on an occasional basis – for a few days or weeks at a time – to make repairs on their urban properties; the London Bridge Masters, who employed a number of masons and carpenters on long-term or life-time contracts; and the Bishop of Winchester's London manor of Southwark, which also employed various craftsmen on an occasional, purely temporary basis (craftsmen evidently hired by other employers as well). During the early to mid fifteenth century, when comparable data are available from all three sources, the wages paid to these building craftsmen were virtually identical. That evidence contradicts the common view that institutional craftsmen, employed on such long-term contracts, were willing to accept a lower daily wage, in return for employment security.⁶³

⁶⁰ Phelps Brown Hopkins, 'Seven Centuries of Building Wages,' pp. 201-02.

⁶¹ Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations* (1776), ed. with introduction and notes by Edwin Cannan (New York: Modern Library, 1937), p. 74.

⁶² Phelps Brown and Hopkins, 'Seven Centuries of Building Wages', p. 205.

⁶³ See n. 48 above; and Munro, 'Wage Stickiness', pp. 185-297, especially pp. 217-30.

I have also supplied, in this and other studies, evidence to show that wage stickiness also prevailed in the employment of textile fullers and policemen, in late-medieval Flanders: in Ghent, Kortrijk, and Bruges, respectively.⁶⁴ Such evidence, along with the testimony of Adam Smith, thus permits to ignore the criticisms that Peter Lindert, and many others in a similar vein, have expressed about Phelps Brown's wage data.⁶⁵

Medieval real wages: as a function of wage-stickiness and changes in the price level

As I concluded in those two studies, when nominal wage-stickiness or rigidity prevailed, then changes in the real wage were largely determined by fluctuations in the price level as measured by the consumer price index; and, as I further contended, fluctuations in the level of the consumer price index – periods of inflation, alternating with periods of deflation – were largely the result of monetary factors and forces, and not, as is so commonly assumed, of demographic changes or of changes in other real forces. On at least the first issue – the determination of real wages – Adam Smith had evidently reached a similar conclusion (in 1776), in further commenting that: if ‘the labouring poor can maintain their families in dear years, they must be at their ease in times of moderate plenty, and in affluence in those of extra-ordinary cheapness’.⁶⁶ That lesson was not observed by his Classical School followers, and by many contemporary economists.

It would be difficult to deduce from all these price and wage graphs that the often considerable fluctuations in the real wages of building craftsmen – of masters and journeymen alike – were the consequences of changes in the marginal productivity of labour. Nor does it seem likely that solace can be found in a more refined view: that real-wage changes reflected changes in the *marginal revenue product* for industrial craftsmen that may in turn be attributed to changes in industrial prices, since the fluctuations in those

⁶⁴ Munro, ‘Wage Stickiness’, pp. 185-297; Munro, ‘Golds, Guilds, and Governments’, pp. 153-205.

⁶⁵ See the two previous notes, and n. 61.

⁶⁶ Smith, *Wealth of Nations*, p. 74.

prices are of much lower amplitudes than the fluctuations in real wages.⁶⁷

Prices and builders' wages in England: the evidence, from the Black Death to c.1500

These graphs also provide an answer to the question posed at the beginning of this study: whether or not the Black Death (from 1348) ushered in a supposed Golden Age of wage-earning craftsmen and labourers. In the case of southern England, we find that real wages for building craftsmen had been falling before the Black Death, and continued to fall after the onset of that plague, reaching a nadir in the quinquennium 1351-55, when the harmonic mean RWI = 46.55 for master masons and only 34.91 for their labourers (1451-75=100), a level not appreciably higher than that experienced during the Great Famine (1315-20). Not until a quarter-century after the Black Death, not until the quinquennium of 1376-80, did these craftsmen's real wage finally succeed in surpassing the earlier pre-Plague peak, attained in 1336-40 (i.e., four decades earlier). The fundamental reason why post-Plague trends in real wages had been so dismal was the sudden eruption of quite horrendous inflation after the Black Death — 'men were dying, but coins were not', as David Herlihy so aptly commented (for the contemporary Tuscan inflation);⁶⁸ and quite obviously that inflation swamped and then obliterated any gains from the well-known rise in nominal wages. From that quinquennium of 1376-80, real wages for building craftsmen in southern England began an inexorable rise, which, despite several significant fluctuations, reached their apogee in the quinquennium 1441-45, when the harmonic mean RWI = 108.02, for both masters and their journeymen labourers. Despite some ensuing fluctuations, real wages remained high for another three decades, and in 1476-80, they were not appreciably less: the harmonic mean RWI = 107.91. Though declining thereafter, the steep and inexorable fall in real wages commenced only after

⁶⁷ See Munro, 'Wage Stickiness', Table 5, pp. 240-41; Tables 8-9, pp. 249-51.

⁶⁸ David Herlihy, *Medieval and Renaissance Pistoia: The Social History of an Italian Town, 1200-1430* (New Haven, 1967), p. 125. In Florence, inflation was aggravated by coinage debasements that reduced the silver content of the *lira*, as measured by the *grosso*, by 27.3% from 1345 to 1402; as measured by the *denario piccioli*, by 38.8% from 1345 to 1371 (but overall 37.5% by 1402). See Mario Bernocchi, *Le monete della repubblica Fiorentina*, 3 vols. (Florence, 1976), vol. III: *documentazione*, pp. 180-209.

1515: that is, they began to plunge only with the onset of that 130-year period of sustained monetary inflation known as the Price Revolution.⁶⁹ The intervening era, the ‘Golden Age of the Labourer’, in the century from 1376 to 1476, and with a diminished sheen until 1515, was due precisely to the opposite phenomenon: prevailing deflationary trends in prices (but occasionally interrupted by short bouts of war-induced inflation), in which monetary factors were again predominant.⁷⁰

Monetary factors cannot, however, explain absolutely all of these changes. Thus, when we find, in the course of the early to mid fifteenth century, in both England and the Low Countries (see figures 1-3), that nominal money wages did enjoy a slight increase while commodity prices were falling, we may then entertain the view that some increase in the *marginal revenue product* may have been responsible for some increase in real-wage levels. Even so, the fluctuations in real wages that ensued thereafter continued to be chiefly, if not entirely, the product of this same combination: institutional wage stickiness and changes in the price levels. Are we seriously to believe, for example, when the real wages of English building craftsmen during the ensuing Price Revolution era reached their nadir of a miserable 41.01 in the quinquennium 1621-25, that the marginal revenue product of labour, let alone its marginal physical product, had, for some mysterious reasons, fallen by such a magnitude?

Prices and builders’ wages in the Low Countries: the evidence, from the Black Death to c.1500

A similar story, with even more dramatic fluctuations – fluctuations that absolutely defy any rational belief in the role of labour productivity in determining real wages – may be found in the late-medieval, cross-

⁶⁹ For my explanation of the monetary forces that largely determined that inflation of the Price Revolution, see in particular John Munro, ‘The Monetary Origins of the “Price Revolution.”’ South German Silver Mining, Merchant-Banking, and Venetian Commerce, 1470-1540’, in Dennis Flynn, Arturo Giráldez, and Richard von Glahn, eds., *Global Connections and Monetary History, 1470 - 1800* (Aldershot and Brookfield, Vt: Ashgate Publishing, 2003), pp. 1-34. In 1511-15, the harmonic RWI = 94.33; in 1516-20, the harmonic RWI = 80.76. The nadir during the Price Revolution era was reached in 1621-25, when the harmonic RWI = 41.01, for both master craftsmen and their labourers in southern England.

⁷⁰ See Munro, ‘Wage Stickiness’, pp. 207-30; and studies in Munro, *Bullion Flows and Monetary Policies* (1992).

Channel Low Countries.⁷¹ Unfortunately, we not possess usable price and wage data, not enough to justify the creation of these real wage indices, before 1348-49 for Flanders, and before 1399 for southern Brabant (the Antwerp-Lier-Mechelen region). Nevertheless those data that we do possess for Flanders demonstrate that immediately after the Black Death, real wages (RWI = 100 for 1451-75) for master building craftsmen in Bruges plunged – not rose – falling by as much as 31 percent from 1346-50 (RWI = 89.88) to 1351-55 (RWI = 62.31). As in England, almost three decades passed before the real wages of Bruges building craftsmen made even a partial recovery, reaching a harmonic mean RWI of 77.38 in 1386-90. Thereafter, they soared steeply, reaching a peak of 102.69 in 1401-05.

The underlying reasons for these real wage trends in post-Plague Flanders are fundamentally the same as those in England, though with some important monetary differences. The Black Death was followed by a horrendous inflation, as the Flemish CPI rose from a mean of 50.57 in 1346-50 to 124.72 in 1386-90; and that inflation not only wiped out any apparent gains from the rise in nominal wages, but then depressed real wages. The chief difference in the two inflations was the series of drastic silver-coinage debasements in Flanders, while England experienced only one, rather minor debasement, in 1351.

Similarly, the steep rise in real wages for Flemish building craftsmen – and for Bruges policemen as well – from 1386-90 into the early fifteenth century was again the consequence of a drastic deflation, so that prices fell so much more steeply than did wages. The chief difference between the Flemish and English experiences again lay in monetary policy. To be sure, the late fourteenth-century deflations, in many parts of western Europe, had much deeper underlying causes (which I have also examined elsewhere); but in Flanders, a monetary reform undertaken in 1389-90, in the form of a severe coinage *renforcement* that increased its silver contents by 31.6 percent, greatly exacerbated the underlying deflation. The second difference is that the Flemish government also intervened to prevent wage-stickiness: by decreeing a general wage cut (for building craftsmen,

⁷¹ For the following, see Munro, ‘Wage Stickiness’, pp. 213-69; Munro, ‘Gold, Guilds, and Governments’, pp. 153-205; studies in Munro, *Bullion Flows and Monetary Policies* (1992).

textile workers, and ultimately policemen) of 25 percent. The formula that relates the theoretical relationship between coinage changes and prices demonstrates that this wage reduction was slightly more than proportional to the change in the silver coinage.⁷² Nevertheless, because consumer prices fell to a much greater extent, from 1386-90 to 1401-05, real wages for Flemish building craftsmen, policemen, and textile fullers rose considerably: by 32 percent, for Bruges master masons and journeymen, 17 percent for Bruges policemen (after peaking in 1391-95), and 27 percent for Kortrijk's journeymen fullers.

Thereafter, as the graph for early fifteenth-century Flanders indicates, real wages fell, from the 1401-05 peak to its nadir, in 1436-40: by 31 percent for Bruges' building craftsmen, 37 percent for Bruges' policemen, and 30 percent for Kortrijk's journeymen fullers. In Brabant, real wages fell even more, during this very same period: those for master masons and their journeymen labourers in Antwerp, by 33 percent. Since wage rates in Mechelen were roughly comparable, real wages for building craftsmen probably fell as much; but the wage data are not yet available before 1420.⁷³ Again, the fundamental explanation for this drastic fall in real wages, during this so-called Golden Age of the artisan and labourer, can be found in the relationship between relatively fixed or 'sticky' nominal wages, whose value was thus diminished by the serious inflation that ensued, from both warfare and coinage debasements (despite the coinage *renforcement* of the mid-1430s). Although building craftsmen in Antwerp and Mechelen had enjoyed a small increase in their nominal or money wages during the 1420s and 1430s, those increases were again swamped and nullified by the inflationary effects of Brabant's coinage debasements, which were more severe than those in Flanders, until Philip the Good, duke of Burgundy, imposed that coinage *renforcement* in a monetary unification of the Low Countries, in 1433-

⁷² See John Munro, 'Mint Policies, Ratios, and Outputs in England and the Low Countries, 1335-1420: Some Reflections on New Data,' *The Numismatic Chronicle*, 141 (1981), 71-116. According to this monetary formula: $[1/(1 + x)] - 1$, where x = the percentage change in the silver content of the *groot* (*gros*). Thus $[1/(1.316) - 1] = 0.760 - 1 = - 0.240$ or 24.0 percent.

⁷³ See Verlinden-Scholliers, *Documents pour l'histoire des prix et des salaires*, vol. II:ii, pp. 1244-99. I myself have collected Mechelen wage entries from the stadsrekeningen, in the Mechelen Stadsarchief, from 1360 to 1420, but have not yet processed these data on my computer.

35.⁷⁴

Thereafter, from 1436-40, real wages rose once more, indeed soared to achieve their late medieval peak in the Low Countries, during the quinquennium 1461-65. Monetary factors were again chiefly responsible. In essence, a combination of that coinage *renforcement* and subsequently even more powerful factors created a veritable ‘bullion famine’ that brought minting virtually to a halt and produced a severe deflation in both regions.⁷⁵ Yet deflation was not the only factor in the rise of real wages, not everywhere; for, in Antwerp, building craftsmen again received another increase in nominal wages, a very substantial one of 18 percent, thus allowing them to achieve even greater gains in real wages than those for other urban craftsmen. In the Oxford-Cambridge region, Bruges, and Mechelen, however, the nominal wages for craftsmen remained rigidly fixed throughout this period, thus allowing real wages to rise by at least the extent of deflation. For this 25-year period, real-wages for building craftsmen in the Low Countries rose, as follows: in Antwerp, by an astonishing 63 percent; in Mechelen, far less so, by 41 percent for carpenters and 38 percent for masons; and in Bruges, by 58 percent (with the same rise in policemen’s real wages). In England, the period from inflationary peak (apogee) to deflationary trough (nadir) was longer – from 1436-40 to 1476-80. During this period real wages for building craftsmen in the Oxford-Cambridge region rose by a more modest 34 percent; more modest, because earlier bouts of inflation, in the 1430s, had not reduced real wages to the same extent as inflation had done in the Low Countries. In London, money wages had risen from 7d to 8d by the 1430s, and did not rise further thereafter in the fifteenth or early sixteenth century.⁷⁶

⁷⁴ See Munro, *Wool, Cloth, and Gold*, pp. 65-126; and studies in Munro, *Bullion Flows and Monetary Policies* (1992); Peter Spufford, *Monetary Problems and Policies in the Burgundian Low Countries, 1433-1496* (Leiden, 1970), pp. 1-28, 147-63; Van der Wee, *Growth of the Antwerp Market*, vol. I, Tables XIII-XV, pp. 123-28; and vol. II, pp. 31-87. The exchange value of the Brabant *pond groot* was thereafter frozen at £0.667 *pond groot* Flemish; or £1 Flemish = £1.5 Brabant.

⁷⁵ See sources in nn. 63-65, 67; and especially Munro, ‘Wage Stickiness’, pp. 213-30.

⁷⁶ See Corporation of London Record Office: Bridge Master’s Accounts: Weekly Payment Series, 1404- 1510 (Vols. I - III); Vanessa Harding, ‘Employment and Opportunity: the Building Trades in London,

Thereafter, in the final quarter of the fifteenth century, the combination of nominal wage-stickiness and renewed inflation once more reduced real wages, but far less so in England than in Flanders and Brabant, because coinage debasements and warfare proved to be so much less inflationary, and because countervailing deflationary forces were stronger in England. In the final quinquennium, 1496-1500, real wages in England were 94 percent of the peak level achieved in 1476-80; in Antwerp, however, they were only 81 percent of the peak level that had been achieved in 1461-65, but in Mechelen, 90 percent of that level.

As noted earlier, a far more detailed analysis of how the combination of institutional wage-stickiness – especially downward wage-stickiness during inflation – and monetary forces acted together to produce these changing trends in real wages in late medieval England and the Low Countries has been presented in two recent publications, in part based on my earlier studies of these countries’ monetary histories. More emphasis was therefore given to a socio-economic analysis of the nature of institutional wage-stickiness (while providing some evidence of greater nominal wage flexibility in some other occupations).⁷⁷

Changing levels of real wages: baskets of consumables earned in England and the Low Countries

The major contribution of this study is in offering, for the first time, a comparison of the actual level of real wages for building craftsmen (and of policemen and textile fullers) in late-medieval England and the Low Countries. That comparison is based, as indicated earlier, upon the number of baskets of very similar commodities that could have been purchased with an individual craftsman’s or journeyman labourer’s annual money wage income. Of course we are unable to assess anyone’s total income in any given year; but for the reasons examined in my earlier articles (and in many other studies), we may doubt that any of these craftsmen received any significant additional incomes, from this employment, in the form of food, drink, and clothing.

1450-1600', in Simonetta Caviococchi, ed., *L'Edilizia prima della rivoluzione industriale, secc. XIII-XVIII*, Atti delle "Settimana di Studi" e altri convegni, no. 36, Istituto Internazionale di Storia Economica "Francesco Datini" (Florence, 2004), pp. ; Rappaport, *Worlds Within Worlds*, pp. 85 (Table3.6), 145-53.

⁷⁷ Munro, 'Wage Stickiness', pp. 185-297; Munro, 'Gold, Guilds, and Governments', pp. 153-205.

In my examination of English manorial wage data I was able to differentiate between those whose wages were paid fully in money and those who were paid partly in kind. The latter received only half the money wage of the former before the Black Death and generally about two-thirds of their money wage thereafter.⁷⁸ In later-medieval and early-modern Holland (if not in Flanders and Brabant), however, craftsmen and labourers evidently did derive somewhat more of their real incomes from such supplementary sources.⁷⁹

In comparing real-wages, in terms of these commodity basket purchased with an annual money-wage income, we find striking contrasts and changes, over this 150-year period in both England and the Low Countries. It is a commonplace of economic history that, during the later Middle Ages, Flanders enjoyed the highest living standards to be found in northern Europe. This study provides fairly accurate statistics to justify this conclusion. Thus, as Figures 5, 7-9, and Table 2 demonstrate, the real incomes of building craftsmen in Bruges were remarkably higher than for those in southern England and in southern Brabant (at least until the Bruges series unfortunately ends in 1485). But as the graphs and tables also demonstrate, the differences in real incomes between southern England and the Low Countries were much smaller during those several periods when inflation ravaged real incomes more seriously in the latter than in the former.

Within Flanders itself a better perspective on wages for building craftsmen may be gained by comparing them with those for other occupations (with daily wages). Thus, in Bruges, during the turbulent second half of the fourteenth century, the real wages for policemen in terms of commodity baskets were usually

⁷⁸ See Munro, 'Wage Stickiness', pp. 200-04. See also n. 37.

⁷⁹ Jan de Vries, 'An Inquiry into the Behaviour of Wages in the Dutch Republic and the Southern Netherlands, 1580-1800,' *Acta Historica Neerlandica*, 10 (1978), 79-97; reprinted in Maurice Aymard, ed., *Dutch Capitalism and World Capitalism* (Amsterdam, 1982), pp. 37-62; Jan de Vries, 'An Employer's Guide to Wages and Working Conditions in the Netherlands, 1450-1850,' in Carol Leonard and Boris Mironov, eds., *Hours of Work and Means of Payment: The Evolution of Conventions in Pre-Industrial Europe*, Proceedings of the Eleventh International Economic History Congress, Milan, September 1994, Session B3b (Milan, 1994), pp. 47-63. See also Jan Luiten van Zanden, 'Wages and the Standard of Living in Europe, 1500 - 1800', *European Review of Economic History*, 3:2 (August 1999), 178: contending that 'we we should still regard the money-wage as the paramount factor in estimating an artisan's annual household income'.

equal to those paid to master masons and carpenters, but sometimes higher – 20 percent higher in 1361-65, and 1381-85; and 16 percent higher in 1391-95. Then, during the somewhat more peaceful fifteenth century, the policemen's real wages declined to just 79 percent of the master building craftsmen's real wages by the 1430s, a gap of 21 percent that remained static until the wage data terminate in the 1480s.⁸⁰ The only other daily-wage earners for whom we have evidence are journeymen textile fullers. In 1371-75 (when such comparisons can first be made), Ghent journeymen fullers enjoyed a real wage that was one third higher than that for journeymen masons in Bruges: 7.620 commodity baskets a year (210 days employment) vs. 5.772 baskets. By 1386-90, however, the Ghent journeymen fuller's real wage had shrunk to only 91 percent of that for the Bruges journeymen masons; and by the early fifteenth century, these fullers' real wage was only 75 percent of that for journeymen masons: 7.012 baskets a year compared to 9.391 baskets for the latter. By 1426-30 (when the comparative data terminate) the gap had narrowed to just 93 percent, while the actual level of real wages had fallen for both sets of wage-earners: 6.589 commodity baskets a year for Ghent journeymen fullers, compared to 7.059 baskets for Bruges' journeymen masons.⁸¹

Even more interesting observations can be made about the over all trend of differences between these three regions. On the eve of the Black Death, real wages for master building craftsmen in southern England were only a third of those in Bruges; and thereafter, in the second half of the fourteenth century, the real wages for English building craftsmen varied (according to monetary fluctuations) between about one half and two-thirds of the real-wage levels for master building craftsmen in Bruges. But from the 1420s, the gap generally narrowed, so that English craftsmen's real-wage levels ranged from two-thirds to three-quarters of the corresponding real-wage levels in Bruges – and were 79 percent of the Bruges master-craftsmen's real-wage

⁸⁰ Policemen were on call for 365 days a year, and paid for each day in the year; but presumably most did not actually work so many days. If their real wage were computed for a year of 210 days, it would be correspondingly less. For annual incomes, the method employed here seems to be the best.

⁸¹ Table 7b also provides comparison of real wages, in annual commodity baskets, for Kortrijk journeymen fullers; and for craftsmen in small Flemish towns near Ghent.

during the final quinquennium for which comparative data are available, in 1481-85. Does such a convergence reflect economic decline in Flanders and economic growth in England, as a comparison of the fortunes of the two countries' textile industries and trades might suggest?⁸²

In the later fifteenth century, however, even a declining Flanders was still wealthier (with higher overall real incomes) than was southern England; and certainly it was still much wealthier than the Antwerp-Lier-Mechelen region of southern Brabant. From the beginning of the fifteenth century, when wage and price data permit adequate comparison, the real-wage level of master building craftsmen in Antwerp was only 53 percent of the level for Bruges craftsmen; and in the final quinquennium permitting a comparison, in 1481-85, the real wage level for building craftsmen in Antwerp had not appreciably changed: it was still just 56 percent of the level in Bruges.

Why such a disparity prevailed for so long is puzzling. Evidently, however, these imperfections in labour markets – involving craftsmen speaking the same Flemish language, and separated by only short distances – must reflect serious impediments to mobility, involving *inter alia* difficulties of migrating to obtain *poorterrecht* or citizenship rights and then guild entry in very different political jurisdictions. It is therefore difficult to accept Wim Blockman's statement that in the fifteenth-century Low Countries 'labour mobility was considerable ...' and that 'the Bruges building industry recruited high numbers of labourers from outside the city', as much as '75 to 80 percent' from outside of Flanders.⁸³

The price-and wage data, however, permit a much longer span of comparison between real wage levels

⁸² See John Munro, 'Medieval Woollens: The Western European Woollen Industries and their Struggles for International Markets, c.1000 - 1500', in David Jenkins, ed., *The Cambridge History of Western Textiles*, 2 vols. (Cambridge and New York: Cambridge University Press, 2003), Vol. I, chapter 5, pp. 228-324, 378-86 (bibliography); John Munro, *Textiles, Towns, and Trade: Essays in the Economic History of Late-Medieval England and the Low Countries*, Variorum Collected Studies series CS 442 (Aldershot, Hampshire; and Brookfield, Vermont: Ashgate Publishing Ltd., 1994).

⁸³ Wim P. Blockmans, 'The Low Countries', in Peter N. Stearns, ed., *Encyclopedia of European Social History from 1350 to 2000*, 5 vols. (New York, 2001), vol. I, pp. 299-300.

in southern England and southern Brabant (continuing in fact, well beyond the terminus of this study, in 1500). Not surprisingly, the comparisons are now somewhat more favourable for Antwerp building craftsmen. Indeed, at the beginning of the fifteenth century, their real wages were – albeit very briefly (in 1401-05) -- 22 percent higher than those for the Oxford-Cambridge craftsmen. Subsequently, however, the ravages of debasements and war-induced inflations took their toll on living standards in the Antwerp region during both the first and the final thirds of the fifteenth century, when England was free from such debasements. Thus the level of real wages for Antwerp's master craftsmen was only 68 percent of that for the Oxford-Cambridge master craftsmen in 1426-30, but then rose to just above equality, to 101 percent, in 1461-65, sinking to a level of just 57 percent of the English master craftsmen's real wage in 1486-90, and recovering to 80 percent in the final quinquennium of 1496-1500. Do the rather greater similarities in real wages in southern England and southern Brabant – apart from intermittent distortions produced by monetary factors – reflect more similar levels of economic development (i.e., than in a comparison with Flanders), if perhaps surprisingly a greater degree of English development?

Finally, the most interesting and instructive observations concern the differences and changes in real incomes for those journeymen labourers employed by masters in the building trades, in these three regions. In general, the real wages of journeymen labourers are more useful for economic historians than those of their masters, because we can be more confident that their total incomes were derived almost entirely in the form of money-wages, while some master masons, carpenters, pavers, tilers, and thatchers acquired additional incomes from their role as entrepreneurial building contractors.⁸⁴ Yet the journeyman also differed significantly from the common labourer, because the former was skilled and specialized in his task, as a carpenter or mason, while the latter was basically unskilled and performed a variety of menial tasks.

⁸⁴ Certainly some of them earned profits from sales of raw materials and related products in construction projects; and some also functioned as entrepreneurs in other occupations (brewers, drapers), as can be determined from the *werken* accounts in the *stadsrekeningen* for the Flemish and Brabantine towns (those for Bruges and Leuven in particular).

The difference between the experiences of journeymen labourers in the two major cross-Channel regions is quite striking. In southern England, the wages (money and real) for a mason's journeymen labourer rose from 50 percent of his master's wage before the Black Death, to 60 percent of that wage in the later fourteenth century, and then to 67 percent thereafter (and briefly to 75 percent of the master's wage from 1551 to 1575). In medieval Bruges, however, with the highest recorded real wage for masters in the building trades in north-western Europe, the wages for their journeymen labourers were continuously fixed at just 50 percent of their master's wage. Thus, in 1481-85, when serious deflation had eroded real wages in Bruges, a mason's journeymen earned only 5.830 commodity baskets a year, while in the Oxford-Cambridge region, a mason's journeyman, although experiencing some real-wage erosion from inflation, earned 6.135 commodity baskets a year, i.e., 5.23 per cent more per year. More generally, from 1421-25 to 1446-40, the English journeyman labourer's real wage varied from only 92 percent to 100 percent (equality) of the real wage for the Bruges mason's journeymen labourer, but then fell to a low of just 71 percent of the latter's real wage in 1462-65 (then rising, as just indicated, to 105 percent of his real wage in 1481-85).

In Brabant, the mean real wage for a mason's journeyman labourer in Antwerp fluctuated more so than in Flanders and England, so that his real wage ranged from a low of 47 percent of his master's real wage in 1399-1409 to a high of 64 percent in 1436-40, but hovered about 58 to 61 percent of the master's real wage for the rest of the century. In comparison with the real wage for a mason's journeyman labourer in Bruges, the real wage for the mason's journeyman labourer in Antwerp ranged from a low of 48 percent in 1426-30 to a high of 72 percent in 1441-45; and when the comparative series ends in 1481-85, it was 65 percent of the real wage for the mason's journeyman labourer in Bruges.

The comparison with the real wages for journeymen labourers in the southern English building trades was somewhat more favourable. Nevertheless, throughout the fifteenth century, the Antwerp journeymen labourer's real wage was almost always lower than that for the Oxford-Cambridge journeymen labourer, exceeding it only in the initial quinquennium 1401-05, when it was 102 percent of the English real wage. For

the fifteenth century as a whole, the real wage of an Antwerp mason's labourer was just 71 percent of that for his English counterpart; and in the inflationary 1420s and the later 1480s, only 52 and 51 percent, respectively, of the English labourer's real wage. Faring even worse in both periods were common labourers employed by the *Onse Lieve Vrouw* hospital in Mechelen: their real wages were just 39 percent of the Oxford-Cambridge journeyman labourer's real wage in 1421-25 and 40 percent, in 1486-90 (and averaging 58 percent for the period 1421-1500). In both periods, inflation was much more severe in the Low Countries than in England – further proof of the central theorem that alterations in real wages in the pre-modern era were largely determined by changes in the price level.

Real-wage determination: marginal productivity of labour and Total Factor Productivity

If this study provides further proof that changes in real wages were not determined – certainly not in the medieval era – by changes in the marginal revenue product of labour, nevertheless we must still presume that differences in Total Factor Productivity, with some degree of factor immobility, did play a major role in explaining the differences in the actual levels of real wages for comparable occupations in different regions, but not differences in marginal revenue products for individual groups of craftsmen and journeymen labourers.

A contemporary analogy may be relevant: in 1997-98 (latest available data), the average salary for a full professor at the University of Toronto (\$102,800 CAD), generally regarded as Canada's leading university, was only 77 percent of the mean of average salaries for full professors in ten comparable public universities in the U.S. (\$133,220 CAD).⁸⁵ It would be very difficult to contend that the marginal revenue

⁸⁵ All figures in thousands of Canadian dollars: UC Berkeley (139.1), UCLA (138.9), Michigan (137.9), Virginia (136.4), Rutgers (134.4), Connecticut (132.0), Delaware (129.5), Georgia State (129.5), North Carolina (129.1), Illinois (125.4): from University of Toronto Faculty Association, News Bulletin (9 April 1999): <http://www.utfa.org/html/newsbul/html/apr0999.htm>. For another less relevant comparison: average salaries of full professors at the leading private American universities, expressed in thousands of Canadian dollars, were: Harvard (175.2), Stanford (166.5), Princeton (165.5), Cal Tech (165.3), Yale (162.0), NYU (159.6), Chicago (159.0). These values, however, may be distorted by then current exchange rate, which, in June 1999, was \$1.00 CAD = \$0.68 USD. If some measure of purchasing-power-parity were used, at say

product of full professors at the University of Toronto is so much inferior to that of professors in these ten comparable American universities. Yet no one can possibly deny that Total Factor Productivity in the Canadian economy is significantly inferior to that of the American economy; and that such a difference plays a major if not the only role in explaining the difference between these Canadian and American salaries.

Such an explanation involving Total Factor Productivity and factor immobility must be sought in explaining the differences between real wages in Bruges and those in the Oxford-Cambridge region. This model, however, does not readily explain why the labourers employed by English building craftsmen generally fared so much better than equivalent labourers in the fifteenth-century Low Countries; nor in particular why Bruges master craftsmen treated their journeymen labourers relatively less well than did the English master craftsmen. Such an explanation must await further studies.

\$1.00 CAD = \$0.83 USD, these values would differ.

Appendices

Robert Allen's alternative approach to the problem of real-wage indexes: the silver problem

Robert Allen's method of constructing his price and wage indexes and his 'welfare ratios' (as an alternative to real-wage index numbers) involves two problems. He has constructed price indexes for 17 European towns, from 1500 to 1913; and has presented them only as 50 year means, from 1500-49 to 1850-99, with a final mean given for the years 1900-13.⁸⁶ Do mean prices for half-century periods convey any useful meaning, in view of the enormous monetary and other economic shorter-term fluctuations that occurred over this long four-century period? Surely decennial means would have been preferable, certainly for graphs.

The greater concern lies with his presentation of commodity prices and wages in terms of grams of pure silver, for two reasons. His method was as follows: in order to eliminate the confusing differences in local or regional moneys-of-account across western Europe, he converted all such money-of-account values for both wages and prices into the equivalent grams of pure silver. For each of the 17 urban consumer price indexes, he has multiplied the fixed quantities of 12 commodities by the price per commodity unit, in these grams of pure silver. The base for each of his consumer price indexes is the mean (arithmetic average) silver value of the basket in Strasbourg from 1745 to 1754 – i.e., the total value of the baskets' contents; and thus, all the price indexes are expressed as a percentage of this value.⁸⁷

This method of presenting prices and wages in 'silver equivalent' (grams of pure silver) is, of course, not new, and is still commonly used, though some objections were raised in the past.⁸⁸ First, the implicit assumption involved in this conversion is that the value of pure silver is relatively stable; but over this period,

⁸⁶ Allen, 'The Great Divergence', Table 4, p. 426.

⁸⁷ *Ibid.*, Table 3, p. 421: the mean value of the basket in this period is 414.899 grams of pure silver.

⁸⁸ See Jean Meuvret, 'Histoire des prix des céréales en France dans la seconde moitié du XVIIe siècle: sources et publication', *Mélanges d'histoire sociale*, 5 (1944), 27-45; Van der Wee, *Antwerp Market*, vol. I, pp. 115-22.

the value of silver varied enormously. For just the 160 year period from 1500 the value of silver, in terms of the gold:silver ratio, fell from about 1:10.5 in 1500 to 1:16 by the 1660s; and that change of course reflects the consequences of the influx of vast quantities of silver from the America, even though large quantities also flowed out in trade with the eastern Baltic, the Levant, and especially south-east Asia.⁸⁹

Second, this technique also incorrectly assumes that the inflationary consequences of silver-coinage debasements, so very common from the late thirteenth to late seventeenth centuries, were exactly proportional to the degree of debasement: i.e., to the extent to which the silver contents of the coins were thereby reduced. My own extensive studies of later-medieval and sixteenth-century coinage debasements demonstrate that the ensuing and consequent price changes were never proportional; and thus they indicate that this technique of converting money-of-account prices into silver gram 'equivalents' exaggerates and distorts the consequences of coinage debasements.⁹⁰

Indeed, the economic history literature presents some considerable confusion about the theoretical relationship between coinage debasements (or the opposite, a *renforcement*): in failing to observe that the percentage changes involved are in fact reciprocals. If we assume, *ceteris paribus*, that the debasement of the silver coinage – the *reduction* in the quantity of silver represented in the unit of money-of-account – will result in a proportional increase in the money-of-account value of silver bullion at the mint, then the percentage changes must be in accordance with this equation: $\Delta T = [1/(1 - x)] - 1.0$. In this equation, the symbol Δ represents the percentage change; the letter T represents the mint *traite*, or the money-of-account value of the bullion so coined, in terms of the *marc* mint weight (244.753 grams); and *x* represents the percentage reduction in the quantity of pure silver represented in the money of account — pence (d), shillings (s) and pounds (£).

⁸⁹ See Kurti N. Chaudhuri, 'Treasure and Trade Balances: the East India Company's Export Trade, 1660-1720', *Economic History Review*, 2nd ser. 21 (Dec. 1968), 497-98.

⁹⁰ See John H. Munro, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350 - 1500*, Variorum Collected Studies series (Aldershot, Hampshire; and Brookfield, Vermont, 1992). See also John Munro, 'Gold, Guilds, and Government', pp. 153 - 205.

By this formula, a 10.0 percent reduction in the silver contents of the coinage would result in a 11.11 percent rise the coined value of silver bullion, though not necessarily in commodity prices.⁹¹

In any event, the concept of silver prices and silver wages is inherently absurd. Artisans and labourers received their daily wages not in silver (or gold) but in current coin, and they used coins, not bullion, to purchase goods and services that were priced in terms of a current money-of-account based upon the currently circulating silver penny: e.g., the pound sterling in England, the *pond groot* in Flanders and its variant in Brabant, and the *livre tournois* in France.⁹² Therefore, in estimating real wages and living standards we need to observe the continually fluctuating relationships between nominal (money) wages and commodity prices, both expressed in the same money-of-account. In particular, we need to observe and then explain fluctuations in the general level of prices (in the price index), whether they were caused by coinage debasements (or the converse: *renforcements*), changes in the money supply and/or monetary circulation, changes in the relative values of gold and silver, and/or changes in various ‘real’ factors.

Another new approach to historical real-wages: the harmonic mean

Real-wage index numbers based on the number of commodity baskets that a craftsman or labourer could purchase with his annual money wage income must be based on the *harmonic* mean value of the baskets so purchased in the base period (1451-75). Furthermore, the calculation of, say, five, or ten, or twenty-five year means of real wages using traditional index numbers from the formula $RWI = NWI/CPI$ also requires the

⁹¹ For example: in accordance with this formula, the Flemish silver coinage debasement of November 1428, involving a 11.76% reduction in the pure silver content of the 2d coin (from 1.725 g to 1.522 g) resulted in a 13.32% increase in the mint *traite* for a *marc* of silver: from 22s 8d *groot* to 25s 8d 6 mites (8.25d) *groot*. John Munro, ‘Deflation and the Petty Coinage Problem in the Late-Medieval Economy: The Case of Flanders, 1334 - 1484,’ *Explorations in Economic History*, 25 (October 1988), 387-423.

⁹² For the exact relationship between silver coinage and money-of-account, see Van der Wee, *Growth of the Antwerp Market*, vol. I, pp. 107-22; Peter Spufford, *Monetary Problems and Policies in the Burgundian Netherlands, 1433-1496* (Leiden, 1970), pp. 13-46; John Munro, *Wool, Cloth, and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, ca. 1340-1478* (Brussels and Toronto, 1973), pp. 11-41 (also analysing the mechanics and economics of debasement); Munro, ‘Deflation’, pp. 387-423.

use of the *harmonic* mean, as an absolute necessity.

The nature of the harmonic mean, which is undoubtedly a complete mystery to most readers, must first be explained. Its importance may be demonstrated by a common use: to find the mean number of candy bars that could be purchased for one dollar (or euro): when one store offers 6 for a dollar, another 8, and a third 9 for a dollar. It is defined as ‘the reciprocal of the arithmetic mean of the reciprocals of the individual numbers in a given series’.⁹³ In mathematical terms, it is:

$$HM = 1 / [\sum (1/r_1 + 1/r_2 + 1/r_3 + \dots + 1/r_n)] / N$$

That can be rewritten as a two-part equation, for each quinquennium (five-year period):

$$HM = 1/x, \text{ when } x = \sum (1/r_1 + 1/r_2 + 1/r_3 + 1/r_4 + 1/r_5) / 5$$

The method of computation is as follows. First, the reciprocal value of each item in the series is computed ($1/r$); then the sum (\sum) of the reciprocals of the total number of items in each five-year period is divided by the total number of the items in the series ($N = 5$) to produce the ‘quotient’ value x . Finally, to obtain the actual harmonic means for each five year period, the reciprocal value of this quotient is calculated as: $1/x$.⁹⁴

When the number of baskets purchased with the annual money wage income provides the foundation for this form of the real wage index, then the *harmonic mean* of the index numbers so created for the base period (1451-75) will always equal 100.00. Furthermore, the *harmonic mean* of the index numbers computed by the traditional formula for real wages ($RWI = NWI/CPI$) will also, for that 25-year period, equal 100.00. The 25-year *arithmetic* mean will never equal 100.00, for either set of numbers; nor will the two means be identical: for the harmonic mean is always less than the arithmetic mean.

⁹³ F.C. Mills, *Introduction to Statistics* (New York, 1956) , pp. 108-12, 401.

⁹⁴ In this study, the annual real wage is calculated by dividing the craftsman’s annual income by the annual cost of the ‘basket of consumables’; and then, for each five-year period, the harmonic mean of those values is calculated in the manner explained above: summing the reciprocals of those values, dividing the sum by 5, and then dividing 1 by the quotient so calculated, on the computer. The formula used here is: $1/[(1/a + 1/b + 1/c + 1/d + 1/e)/5]$, in which the letters a - e represent the number of baskets purchased each year with the annual money wage income.

Yet another problem reveals why computing real wages with harmonic means of the number commodity baskets so purchased is the superior, and indeed the only valid, method. For, if the money wage paid in this 25-year period is not constant, then neither the arithmetic nor the *harmonic* mean of the real wage index numbers obtained by the formula $RWI = NWI/CPI$ will equal 100.00. Only the *harmonic* mean of the index numbers for the number of commodity baskets so purchased will, and always will, exactly equal 100.00. Fortunately, for this and similar studies, the nominal or money wage paid to master building craftsmen in southern England was constant for the period 1451-75: at 6d sterling for masters and 4d sterling for their journeymen labourers or servants. In Flanders (Bruges and Ghent), the nominal or money wage was also constant in this period: at 11d *groot* for master building craftsmen (estimated annual mean wage) and 5.5d *groot* for journeymen. In Antwerp, that nominal daily money wage (estimated mean annual summer-winter wage) was also constant: 11.25d *groot* Brabant (=7.5d *groot* Flemish) for master masons and 6.5625d *groot* Brabant for labourers (=3.708d *groot* Flemish); and similarly in Mechelen, that estimated mean daily wage was 11.50d *groot* Brabant (7.67d *groot* Flemish) for master masons, in this same base period 1451-75.

Finally, the fact that Robert Allen provides no indication that he has used the harmonic mean in calculating his fifty-year means of real wages, from 1500 to 1899, in his 'welfare ratios', is yet another criticism to be made about his otherwise fine article.⁹⁵

⁹⁵ Allen, 'Great Divergence', p. 425

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Table 1

Basket of Consumables Commodity Price Indexes for England, Brabant, and Flanders

mean of 1451-75 = 100

Commodity	England					Brabant					
	Amount	Unit	Metric Measure	Value in d sterling England	Munro Percent	PBH Percent	Amount	Unit	Value in d gr. Brabant	Value in d gr. Flemish	Percent
Farinaceous											
Wheat	1.250	bu	45.461	9.967	8.84%						
Rye	1.000	bu	36.369	6.279	5.57%	126.000	1.	42.404	28.269	18.24%	
Barley	0.500	bu	18.184	2.606	2.31%						
Peas	0.667	bu	24.243	2.947	2.61%						
Sub-total	3.417	bu	124.257	21.799	19.33%	126.000	1.	42.404	28.269	18.24%	
Drink											
barley (or malt)	4.500	bu	163.659	24.227	21.48%	162.000	1.	39.712	26.475	17.08%	
Total Farinaceous	7.917	bu	287.917	46.026	40.80%	288.000	1.	82.116	54.744	35.32%	
Meat											
Pigs	0.500	no.	0.500	15.418	13.67%						
Sheep	0.500	no.	0.500	8.532	7.56%						
Beef	33.000	lb.	14.969	0.000	0.00%	23.500	kg	54.704	36.469	23.53%	
Sub-total				23.950	21.23%			54.704	36.469	23.53%	

Commodity	England					Brabant					
	Amount	Unit	Metric Measure	Value in d sterling England	Munro Percent	PBH Percent	Amount	Unit	Value in d gr. Brabant	Value in d gr. Flemish	Percent
Fish: Herrings	40.000	no.	40.000	6.595	5.85%	4.00%	40.000	no.	9.988	6.659	4.30%
Sub-total				30.545	27.08%	25.00%			119.396	79.597	51.35%
Dairy											
Butter	10.000	lb.	4.536	10.238	9.08%		4.800	kg	19.728	13.152	8.48%
Cheese	10.000	lb.	4.536	5.341	4.73%		4.700	kg	5.968	3.979	2.57%
Sub-total				15.579	13.81%	12.50%			25.696	17.131	11.05%
Food and Drink				92.149	81.69%	80.00%			172.504	115.003	74.19%
Industrial: Fuel											
Charcoal	4.250	bu	154.567	3.813	3.38%		162.000	l.	10.568	7.045	4.54%
Candles	2.750	lb.	1.247	3.475	3.08%		1.333	kg	7.608	5.072	3.27%
Lamp Oil	0.500	pt	0.284	0.865	0.77%						
Sub-total				8.153	7.23%	7.50%			18.176	12.117	7.82%
Industrial: Textiles											
Canvas/Linen	0.667	yd	0.610	2.757	2.44%		1.800	m.	17.000	11.333	7.31%
Shirting	0.500	yd	0.457	2.718	2.41%						
Coarse Woollens	0.333	yd	0.304	7.023	6.23%		1.125	m.	24.844	16.563	10.68%
Sub-total				12.499	11.08%	12.50%			41.844	27.896	18.00%
TOTAL				112.801	100.00%	100.00%			232.524	155.016	100.00%

Table 1

**Basket of Consumables Commodity Price Indexes for England, Brabant, and Flanders
mean of 1451-75 = 100**

Commodity	Flanders			
	Amount	Unit	Value in in d gr. Flemish	Percent
Farinaceous				
Wheat	45.461	1.	13.279	10.51%
Rye	36.369	1.	7.062	5.59%
Barley	18.184	1.	2.867	2.27%
Peas	24.243	1.	7.341	5.81%
Sub-total	124.257	1.	30.549	24.19%
Drink				
barley (or malt)	163.659	1.	25.805	20.43%
Total Farinaceous	287.917	1.	56.354	44.62%
Meat				
Pigs				
Sheep				
Beef		kg		
Sub-total				
Fish: Herrings		no.		

Table 1 **Basket of Consumables Commodity Price Indexes for England, Brabant, and Flanders**
mean of 1451-75 = 100

Commodity	Flanders			
	Amount	Unit	Value in in d gr. Flemish	Percent
Sub-total				
Dairy				
Butter	13.610	kg	36.087	28.57%
Cheese	13.610	kg	8.578	6.79%
Sub-total	27.220		44.665	35.37%
Food and Drink			101.019	
Industrial: Fuel				
Charcoal		l.		
Candles		kg		
Lamp Oil				
Sub-total				
Industrial: Textiles				
Canvas/Linen		m.		
Shirting				
Coarse Woollens	1.225	m.	25.276	20.01%
Sub-total			25.276	20.01%

Table 1 **Basket of Consumables Commodity Price Indexes for England, Brabant, and Flanders**
mean of 1451-75 = 100

Commodity	Flanders			
	Amount	Unit	Value in in d gr. Flemish	Percent
TOTAL			126.295	100.00%

bu = bushels; lb. = pound avoirdupois (453.592 g); pt = pint; yd = yard; l. = litre; m. = metre

Sources:

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Table 2 Real Wages in England: number of commodity baskets purchased with the annual money wage for masons and carpenters: masters and labourers 1311-15 to 1496-1500, in quinquennial means mean of 1451-75 = 100

Years	Nominal Day Wage in d. sterling	Nominal Wage Index 1451-75=100	Nominal Day Wage in d. sterling	Nominal Wage Index 1451-75=100	Master Wage Income	Labourer Wage Income	Labourer wage as percent	Value of the commodity basket in d sterling
	Master	[= 6d. daily]	Labourer	[= 4d. daily]	210 days	210 days	of master	
1311-15	4.000	66.667	2.000	50.000	840.000	420.000	50.00%	124.580
1316-20	4.000	66.667	2.000	50.000	840.000	420.000	50.00%	174.344
1321-25	4.000	66.667	2.000	50.000	840.000	420.000	50.00%	147.434
1326-30	4.000	66.667	2.000	50.000	840.000	420.000	50.00%	118.116
1331-35	4.000	66.667	2.000	50.000	840.000	420.000	50.00%	123.074
1336-40	3.600	60.000	1.800	45.000	756.000	378.000	50.00%	100.682
1341-45	3.000	50.000	1.500	37.500	630.000	315.000	50.00%	96.482
1346-50	3.000	50.000	1.500	37.500	630.000	315.000	50.00%	112.873
1351-55	3.600	60.000	1.800	45.000	756.000	378.000	50.00%	142.661
1356-60	4.600	76.667	2.600	65.000	966.000	546.000	56.22%	133.209
1361-65	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	155.637
1366-70	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	153.928
1371-75	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	143.646
1376-80	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	123.958
1381-85	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	127.679
1386-90	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	114.191
1391-95	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	117.259
1396-1400	5.000	83.333	3.000	75.000	1050.000	630.000	60.00%	124.812
1401-05	5.100	85.000	3.200	80.000	1071.000	672.000	62.73%	127.073
1406-10	5.800	96.667	3.800	95.000	1218.000	798.000	65.45%	123.998
1411-15	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	122.119
1416-20	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	128.139

Table 2 Real Wages in England: number of commodity baskets purchased with the annual money wage for masons and carpenters: masters and labourers 1311-15 to 1496-1500, in quinquennial means mean of 1451-75 = 100

Years	Nominal Day Wage in d. sterling	Nominal Wage Index 1451-75=100	Nominal Day Wage in d. sterling	Nominal Wage Index 1451-75=100	Master Wage Income	Labourer Wage Income	Labourer wage as percent of master	Value of the commodity basket in d sterling
	Master	[= 6d. daily]	Labourer	[= 4d. daily]	210 days	210 days		
1421-25	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	117.020
1426-30	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	127.025
1431-35	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	123.090
1436-40	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	140.118
1441-45	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	104.424
1446-50	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	114.200
1451-55	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	114.774
1456-60	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	110.500
1461-65	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	114.489
1466-70	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	115.869
1471-75	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	108.370
1476-80	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	104.529
1481-85	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	136.921
1486-90	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	114.232
1491-95	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	115.671
1496-1500	6.000	100.000	4.000	100.000	1260.000	840.000	66.67%	111.152

**Table 2 Real Wages in England: number of commodity baskets purchased with the annual money wage
for masons and carpenters: masters and labourers
1311-15 to 1496-1500, in quinquennial means**

Years	Index numbers for the revised Phelps Brown Hopkins commodity basket AM: 1451-75 112.800d	mean of 1451-75 = 100			
		Master mason: no. of commodity baskets bought with annual money wage harmonic mean	Master Masons' Real Wage Index M:1451-75=100 NWI/CPI = RWI harmonic mean	Mason's labourers: no. of commodity baskets bought with annual money wage harmonic mean	Masons' Labourers' Real Wage Index: M:1451-75=100 NWI/CPI = RWI harmonic mean
1311-15	110.443	6.743	60.363	3.371	45.272
1316-20	154.560	4.818	43.133	2.409	32.350
1321-25	130.704	5.697	51.006	2.849	38.254
1326-30	104.712	7.112	63.666	3.556	47.750
1331-35	109.108	6.825	61.102	3.413	45.826
1336-40	89.256	7.482	66.986	3.741	50.239
1341-45	85.533	6.530	58.457	3.265	43.843
1346-50	100.064	5.582	49.968	2.791	37.476
1351-55	126.472	5.200	46.552	2.600	34.914
1356-60	118.092	7.217	64.611	4.024	54.039
1361-65	137.976	6.746	60.397	4.048	54.357
1366-70	136.460	6.821	61.068	4.093	54.961
1371-75	127.345	7.310	65.439	4.386	58.895
1376-80	109.891	8.471	75.832	5.082	68.249
1381-85	113.190	8.224	73.622	4.934	66.260
1386-90	101.233	9.195	82.319	5.517	74.087
1391-95	103.953	8.955	80.165	5.373	72.148
1396-1400	110.648	8.413	75.314	5.048	67.782
1401-05	112.653	8.395	75.156	5.218	70.065

Table 2 Real Wages in England: number of commodity baskets purchased with the annual money wage

**for masons and carpenters: masters and labourers
1311-15 to 1496-1500, in quinquennial means**

Years	Index numbers for the revised Phelps Brown Hopkins commodity basket AM: 1451-75 112.800d	mean of 1451-75 = 100			
		Master mason: no. of commodity baskets bought with annual money wage harmonic mean	Master Masons' Real Wage Index M:1451-75=100 NWI/CPI = RWI harmonic mean	Mason's labourers: no. of commodity baskets bought with annual money wage harmonic mean	Masons' Labourers' Real Wage Index: M:1451-75=100 NWI/CPI = RWI harmonic mean
1406-10	109.927	9.843	88.115	6.446	86.562
1411-15	108.261	10.318	92.369	6.879	92.369
1416-20	113.598	9.833	88.030	6.555	88.030
1421-25	103.740	10.767	96.395	7.178	96.395
1426-30	112.610	9.919	88.802	6.613	88.802
1431-35	109.122	10.236	91.641	6.824	91.641
1436-40	124.218	8.992	80.504	5.995	80.504
1441-45	92.574	12.066	108.022	8.044	108.022
1446-50	101.241	11.033	98.774	7.356	98.774
1451-55	101.750	10.978	98.280	7.319	98.280
1456-60	97.961	11.403	102.082	7.602	102.082
1461-65	101.497	11.005	98.525	7.337	98.525
1466-70	102.720	10.874	97.352	7.250	97.352
1471-75	96.072	11.627	104.088	7.751	104.088
1476-80	92.667	12.054	107.913	8.036	107.913
1481-85	121.383	9.202	82.384	6.135	82.384
1486-90	101.269	11.030	98.747	7.353	98.747
1491-95	102.545	10.893	97.518	7.262	97.518
1496-1500	98.538	11.336	101.483	7.557	101.483

**Table 2 Real Wages in England: number of commodity baskets purchased with the annual money wage
for masons and carpenters: masters and labourers
1311-15 to 1496-1500, in quinquennial means**

Years	Index numbers for the revised Phelps Brown Hopkins commodity basket AM: 1451-75 112.800d	mean of 1451-75 = 100			
		Master mason: no. of commodity baskets bought with annual money wage harmonic mean	Master Masons' Real Wage Index M:1451-75=100 NWI/CPI = RWI harmonic mean	Mason's labourers: no. of commodity baskets bought with annual money wage harmonic mean	Masons' Labourers' Real Wage Index: M:1451-75=100 NWI/CPI = RWI harmonic mean

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Table 3
Wages of Bruges Building Craftsmen (Master Masons and Journeymen)
Expressed in d groot Flemish and a Basket of Consumables Index
Mean of 1451-75 =100

Year	Daily Wages of Master Building Craftsmen in d groot Flemish	Daily Wages of Master Building Craftsmen in d groot Flemish	Bruges Nominal Wage Index: 11.00d.	Wages of Journeymen Building Craftsmen	Journeymen's Nominal Wage	Basket Consumables Total Value in d
	Minor Mode	median wage best estimate	Mean Mode	in d groot Flemish	Index	groot Flemish
					M1451-75=100 (5.50 d)	
1349-50	5.000	5.000	45.455	2.500	45.455	63.868
1351-55	5.200	5.200	47.273	2.600	47.273	76.593
1356-60	6.000	6.000	54.545	3.000	54.545	110.558
1361-65	6.850	6.850	62.273	3.425	62.273	119.255
1366-70	8.000	8.000	72.727	4.000	72.727	135.641
1371-75	8.000	8.000	72.727	4.000	72.727	145.519
1376-80	8.800	8.800	80.000	4.400	80.000	141.024
1381-85	8.000	8.800	80.000	4.400	80.000	150.534
1386-90	10.867	10.867	98.788	5.433	98.788	157.514
1391-95	9.000	9.000	81.818	4.500	81.818	111.784
1396-1400	9.850	9.850	89.545	4.925	89.545	113.407
1401-05	10.000	10.000	90.909	5.000	90.909	111.810
1406-10	10.000	10.000	90.909	5.000	90.909	132.939
1411-15	10.000	10.000	90.909	5.000	90.909	120.370
1416-20	10.400	10.000	90.909	5.000	90.909	135.616
1421-25	10.400	10.000	90.909	5.000	90.909	141.680
1426-30	10.400	10.000	90.909	5.000	90.909	148.741
1431-35	11.600	10.800	98.182	5.400	98.182	155.989
1436-40	12.000	11.000	100.000	5.500	100.000	177.022
1441-45	12.000	11.000	100.000	5.500	100.000	143.350
1446-50	10.400	11.000	100.000	5.500	100.000	138.904
1451-55	10.000	11.000	100.000	5.500	100.000	127.434

Table 3 **Wages of Bruges Building Craftsmen (Master Masons and Journeymen)**
Expressed in d groot Flemish and a Basket of Consumables Index
Mean of 1451-75 =100

Year	Daily Wages of Master Building Craftsmen in d groot Flemish Minor Mode	Daily Wages of Master Building Craftsmen in d groot Flemish median wage best estimate	Bruges Nominal Wage Index: 11.00d. Mean Mode	Wages of Journeymen Building Craftsmen in d groot Flemish	Journeymen's Nominal Wage Index M1451-75=100 (5.50 d)	Basket Consumables Total Value in d groot Flemish
1456-60	10.000	11.000	100.000	5.500	100.000	148.845
1461-65	10.000	11.000	100.000	5.500	100.000	112.030
1466-70	10.000	11.000	100.000	5.500	100.000	121.900
1471-75	10.000	11.000	100.000	5.500	100.000	121.264
1476-80		11.000	100.000	5.500	100.000	148.034
1481-85		11.000	100.000	5.500	100.000	198.097
1486-90						233.028
1491-95						183.104
1496-1500						126.617

Table 3

Wages of Bruges Building Craftsmen (Master Masons and Journeymen)
Expressed in d groot Flemish and a Basket of Consumables Index
1349-50 to 1496-1500, in quinquennial means
Mean of 1451-75 =100

Year	Commodity Basket Price Index M1451-75=100 126.295d	Real Wage for Masons in Commodity Baskets Annual: 210 days harmonic mean	Real Wage for Masons: Index based on commodity baskets bought M1451-75=100 harmonic mean	Commodity Baskets for annual money wage of journeymen builder harmonic mean	Journeymen's Real Wage Index NWI/CPI M1451-75=100 harmonic mean
1349-50	50.571	16.440	89.883	8.220	89.883
1351-55	60.646	14.188	77.572	7.094	77.572
1356-60	87.540	11.397	62.309	5.698	62.309
1361-65	94.425	11.956	65.366	5.978	65.366
1366-70	107.401	12.386	67.716	6.193	67.716
1371-75	115.222	11.545	63.120	5.772	63.120
1376-80	111.662	12.898	70.520	6.449	70.520
1381-85	119.193	12.053	65.898	6.027	65.898
1386-90	124.719	14.152	77.375	7.076	77.375
1391-95	88.510	16.908	92.439	8.454	92.439
1396-1400	89.796	18.241	99.731	9.121	99.731
1401-05	88.531	18.782	102.687	9.391	102.687
1406-10	105.261	15.797	86.366	7.898	86.366
1411-15	95.309	17.446	95.384	8.723	95.384
1416-20	107.381	15.485	84.660	7.742	84.660
1421-25	112.182	14.822	81.037	7.411	81.037
1426-30	117.773	14.118	77.190	7.059	77.190
1431-35	123.512	14.519	79.378	7.259	79.378
1436-40	140.166	13.049	71.344	6.525	71.344
1441-45	113.504	16.114	88.102	8.057	88.102
1446-50	109.984	16.630	90.922	8.315	90.922
1451-55	100.902	18.127	99.106	9.063	99.106

Table 3
Wages of Bruges Building Craftsmen (Master Masons and Journeymen)
Expressed in d groot Flemish and a Basket of Consumables Index
1349-50 to 1496-1500, in quinquennial means
Mean of 1451-75 =100

Year	Commodity Basket Price Index M1451-75=100 126.295d	Real Wage for Masons in Commodity Baskets Annual: 210 days harmonic mean	Real Wage for Masons: Index based on commodity baskets bought M1451-75=100 harmonic mean	Commodity Baskets for annual money wage of journeymen builder harmonic mean	Journeymen's Real Wage Index NWI/CPI M1451-75=100 harmonic mean
1456-60	117.855	15.519	84.850	7.760	84.850
1461-65	88.705	20.619	112.733	10.310	112.733
1466-70	96.520	18.950	103.605	9.475	103.605
1471-75	96.017	19.049	104.148	9.525	104.148
1476-80	117.213	15.605	85.315	7.802	85.315
1481-85	156.853	11.661	63.754	5.830	63.754
1486-90	184.511				
1491-95	144.981				
1496-1500	100.255				

Stadsarchief Brugge, Stadsrekeningen, 1349/50 to 1499/1500; Algemeen Rijksarchief, België, Rekenkamer, registers 32,461 - 32,566 (Bruges town accounts :1406-1500); Stadsarchief Gent, Stadsrekeningen 1359/50-1499/1500, Reeks 400: nos. 7 - 35: Ghent town accounts.

Charles Verlinden and E. Scholliers, et al, eds., *Documents pour l'histoire des prix et des salaires en Flandre et en Brabant/Dokumenten voor de geschiedenis van prijzen en lonen in Vlaanderen en Brabant*, 4 vols. (Bruges, 1959 - 65).

Table 4

**Wages of Bruges Policemen
in d groot Flemish and in commodity baskets,
1349-50 to 1481-85 in quinquennial means**

Mean of 1451-75 = 100

Year	Basket Consumables Total Value in d groot Flemish	Commodity Basket Price Index M1451-75=100 126.295d	Bruges Policemen's Daily Wages in d groot Flemish	Bruges Policemen's Daily Wages Nominal Wage Index M: 1451-75=100	Policeman Annual Wage (365 days) in Commodity Baskets harmonic mean	Policemen Real Wage Index NWI/CPI M1451-75=100 harmonic mean
1349-50	63.868	50.571	2.200	44.000	14.280	94.969
1351-55	76.593	60.646	3.000	60.000	14.296	98.934
1356-60	110.558	87.540	3.800	76.000	12.525	86.676
1361-65	119.255	94.425	4.800	96.000	14.434	99.886
1366-70	135.641	107.401	5.000	100.000	13.455	93.109
1371-75	145.519	115.222	5.000	100.000	12.541	86.789
1376-80	141.024	111.662	5.200	104.000	13.366	92.494
1381-85	150.534	119.193	6.000	120.000	14.548	100.677
1386-90	157.514	124.719	6.000	120.000	13.904	96.216
1391-95	111.784	88.510	6.000	120.000	19.591	135.577
1396-1400	113.407	89.796	5.400	108.000	17.283	119.603
1401-05	111.810	88.531	5.000	100.000	16.322	112.955
1406-10	132.939	105.261	5.000	100.000	13.728	95.002
1411-15	120.370	95.309	5.000	100.000	15.162	104.922
1416-20	135.616	107.381	5.000	100.000	13.457	93.127
1421-25	141.680	112.182	5.000	100.000	12.881	89.141
1426-30	148.741	117.773	5.000	100.000	12.270	84.909
1431-35	155.989	123.512	5.000	100.000	11.700	80.964
1436-40	177.022	140.166	5.000	100.000	10.309	71.344
1441-45	143.350	113.504	5.000	100.000	12.731	88.102
1446-50	138.904	109.984	5.000	100.000	13.139	90.922
1451-55	127.434	100.902	5.000	100.000	14.321	99.106

Table 4

**Wages of Bruges Policemen
in d groot Flemish and in commodity baskets,
1349-50 to 1481-85 in quinquennial means
Mean of 1451-75 = 100**

Year	Basket Consumables Total Value in d groot Flemish	Commodity Basket Price Index M1451-75=100 126.295d	Bruges Policemen's Daily Wages in d groot Flemish	Bruges Policemen's Daily Wages Nominal Wage Index M: 1451-75=100	Policeman Annual Wage (365 days) in Commodity Baskets harmonic mean	Policemen Real Wage Index NWI/CPI M1451-75=100 harmonic mean
1456-60	148.845	117.855	5.000	100.000	12.261	84.850
1461-65	112.030	88.705	5.000	100.000	16.290	112.733
1466-70	121.900	96.520	5.000	100.000	14.971	103.605
1471-75	121.264	96.017	5.000	100.000	15.050	104.148
1476-80	148.034	117.213	5.000	100.000	12.328	85.315
1481-85	198.097	156.853	5.000	100.000		63.754
1486-90	233.028	184.511				
1491-95	183.104	144.981				
1496-1500	126.617	100.255				

Sources: see the sources for table 3.

Table 5

**Wages in Antwerp: Masons and Carpenters and Sawyers
in pence (d) groot of Brabant, commodity baskets, and index numbers**

**1399-1400 to 1496-1500, in quinquennial means
mean of 1451-75 = 100**

Year	Masons Masters d groot Summer	Masons Masters d groot Winter	Masons Masters winter as % summer	Masons Mean of Summer/ Winter wage	Masons Mean Annual Wage Index: M1451-75=100 (nominal wage) 11.250d groot	Mason's labourers daily wage in d groot Summer	Mason's labourers % of master's Summer daily wage
1399-1400	7.500	6.000	80.00%	7.125	63.333	3.500	46.67%
1401-05	7.750	6.000	77.48%	7.313	65.000	4.000	51.66%
1406-10	8.000	6.000	75.00%	7.500	66.667	4.000	50.00%
1411-15	8.000	6.000	75.00%	7.500	66.667	4.000	50.00%
1416-20	8.000	6.000	75.00%	7.500	66.667	4.000	50.00%
1421-25	8.000	6.000	75.00%	7.500	66.667	4.000	50.00%
1426-30	8.000	6.000	75.00%	7.500	66.667	4.000	50.00%
1431-35	9.700	7.000	71.64%	9.025	80.222	6.100	62.98%
1436-40	10.000	8.000	80.00%	9.500	84.444	6.400	64.00%
1441-45	11.400	9.000	79.36%	10.800	96.000	6.800	59.82%
1446-50	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1451-45	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1456-60	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1461-65	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1466-70	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1471-75	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1476-80	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1481-85	12.000	9.000	75.00%	11.250	100.000	7.000	58.33%
1486-90	12.900	9.900	76.67%	12.150	108.000	7.600	58.89%
1491-95	12.000	9.000	75.00%	11.250	100.000	7.400	61.67%
1496-1500	12.400	9.000	72.60%	11.550	102.667	7.850	63.30%

Table 5

**Wages in Antwerp: Masons and Carpenters and Sawyers
in pence (d) groot of Brabant, commodity baskets, and index numbers**

**1399-1400 to 1496-1500, in quinquennial means
mean of 1451-75 = 100**

Year	Mason's labourers daily wage in d groot Winter	Mason's labourers mean annual wage rate in d groot Br	Labourers' Mean Annual Wage Index: M1451-75=100 (nominal wage) 6.5625d groot	Carpenters Masters d groot Summer wage	Sawyers Masters d groot Summer wage	Mean Masters d groot Summer wage	Mean Masters d groot Summer wage index 12.000d gr
1399-1400	2.800	3.325	50.667	7.500	6.000	7.000	58.333
1401-05	3.099	3.775	57.521	7.675	6.350	7.258	60.486
1406-10	3.000	3.750	57.143	8.000	7.000	7.667	63.889
1411-15	3.000	3.750	57.143	8.000	7.000	7.667	63.889
1416-20	3.000	3.750	57.143	8.000	7.000	7.667	63.889
1421-25	3.000	3.750	57.143	8.000	7.000	7.667	63.889
1426-30	3.000	3.750	57.143	8.000	7.000	7.667	63.889
1431-35	4.406	5.676	86.498	9.600	10.100	9.800	81.667
1436-40	5.120	6.080	92.648	10.000	10.000	10.000	83.333
1441-45	5.384	6.446	98.223	11.800	12.000	11.733	97.778
1446-50	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1451-45	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1456-60	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1461-65	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1466-70	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1471-75	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1476-80	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1481-85	5.250	6.563	100.000	12.000	12.000	12.000	100.000
1486-90	5.833	7.158	109.079	12.900	12.900	12.900	107.500
1491-95	5.550	6.938	105.714	12.000	12.000	12.000	100.000
1496-1500	5.697	7.312	111.417	12.000	12.000	12.133	101.111

Table 5

**Wages in Antwerp: Masons and Carpenters and Sawyers
in pence (d) groot of Brabant, commodity baskets, and index numbers
1399-1400 to 1496-1500, in quinquennial means
mean of 1451-75 = 100**

Year	Commodity Basket Value in d groot Brabant	Price Index Base 1451-75=100 232.524d	Master Mason's Annual Wage for 210 days in commodity baskets S + W wages harmonic mean	Master Mason's Real Wage Index NWI/CPI=RWI M1451-75=100 harmonic means	Mason's labourers mean annual wage rate [S + W] in d groot Br	Mason's Labourers' Nominal Wage Index: M1451-75 =100 6.5625d g	Mason's Labourers' Annual Wage in Commodity Baskets harmonic means	Mason's Labourers' Mean Annual Real Wage Index: NWI/CPI M1451-75=100 harmonic means
1399-1400	153.600	66.058	9.741	95.876	3.325	50.667	4.546	76.701
1401-05	149.440	64.269	10.262	101.001	3.775	57.521	5.306	89.517
1406-10	159.400	68.552	9.881	97.250	3.750	57.143	4.940	83.357
1411-15	172.000	73.971	9.157	90.126	3.750	57.143	4.578	77.250
1416-20	187.280	80.542	8.410	82.772	3.750	57.143	4.205	70.948
1421-25	209.720	90.193	7.510	73.916	3.750	57.143	3.755	63.356
1426-30	232.880	100.153	6.763	66.565	3.750	57.143	3.382	57.056
1431-35	238.940	102.759	7.858	77.336	5.676	86.498	4.952	83.546
1436-40	291.660	125.432	6.840	67.323	6.080	92.648	4.385	73.979
1441-45	245.260	105.477	9.192	90.475	6.446	98.223	5.508	92.935
1446-50	231.540	99.577	10.203	100.425	6.563	100.000	5.952	100.425
1451-45	229.140	98.545	10.310	101.477	6.563	100.000	6.014	101.477
1456-60	266.420	114.577	8.868	87.277	6.563	100.000	5.173	87.277
1461-65	211.760	91.070	11.156	109.805	6.563	100.000	6.528	109.805
1466-70	225.440	96.953	10.480	103.142	6.563	100.000	6.113	103.142
1471-75	229.860	98.854	10.278	101.159	6.563	100.000	5.995	101.159
1476-80	280.640	120.693	8.418	82.855	6.563	100.000	4.911	82.855
1481-85	362.160	155.752	6.523	64.205	6.563	100.000	3.805	64.205
1486-90	404.820	174.098	6.316	62.166	7.158	109.079	3.736	62.771
1491-95	309.760	133.216	7.627	75.066	6.938	105.714	4.683	79.015
1496-1500	268.220	115.352	9.039	88.960	7.312	111.417	5.720	96.514

Sources:

Herman Van der Wee, *The Growth of the Antwerp Market and the European Economy, 14th - 16th Centuries*, 3 vols. (The Hague, 1963), Vol. I: *Statistics*, Appendices 27/2 - 30/3, pp. 333-92.

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Table 6

Wages of Building Craftsmen in Mechelen
in d groot of Brabant, commodity baskets, and index numbers
in quinquennial means (arithmetic and harmonic), 1421-25 to 1496-1500

Year Ending	Masons Masters		Masons Master		Masons: Master		Value of Basket of Cons- umables in d gr Br Town	Price Index 1451-75= 100
	summer wage in d gr Br Town	winter wage in d gr Br Town	annual wage in d gr Br Town	Annual wage income (210 days) Town	Nominal Wage Index M1451-75= 100	11.50d arithmetic		
	arithmetic	arithmetic	arithmetic	arithmetic				232.524
1421-25	10.000	8.000	9.500	1995.000	82.609	209.720	90.193	
1426-30	10.000	8.000	9.500	1995.000	82.609	232.880	100.153	
1431-35	10.800	8.800	10.300	2163.000	89.565	238.940	102.759	
1436-40	12.000	10.000	11.500	2415.000	100.000	291.660	125.432	
1441-45	12.000	10.000	11.500	2415.000	100.000	245.260	105.477	
1446-50	12.000	10.000	11.500	2415.000	100.000	231.540	99.577	
1451-55	12.000	10.000	11.500	2415.000	100.000	229.140	98.545	
1456-60	12.000	10.000	11.500	2415.000	100.000	266.420	114.577	
1461-65	12.000	10.000	11.500	2415.000	100.000	211.760	91.070	
1466-70	12.000	10.000	11.500	2415.000	100.000	225.440	96.953	
1471-75	12.000	10.000	11.500	2415.000	100.000	229.860	98.854	
1476-80	12.000	10.000	11.500	2415.000	100.000	280.640	120.693	
1481-85	12.000	10.000	11.500	2415.000	100.000	362.160	155.752	
1486-90	12.300	10.400	11.825	2483.250	102.826	404.820	174.098	
1491-95	13.500	12.000	13.125	2756.250	114.130	309.760	133.216	
1496-1500	13.500	12.000	13.125	2756.250	114.130	268.220	115.352	

Table 6

**Wages of Building Craftsmen in Mechelen
in d groot of Brabant, commodity baskets, and index numbers
in quinquennial means (arithmetic and harmonic), 1421-25 to 1496-1500**

mean of 1451-75 = 100

Year Ending	Masons: Real Wage Index RWI=NWI/CPI M1451-75= 100	Masons: Annual Wage in Commodity Baskets (seasonally) adjusted)	Masons: Annual Wage in Commodity Baskets Real Wage Index M1451-75=100	Carpenters Masters summer wage in d gr Br Town	Carpenters Master winter wage in d gr Br Town	Carpenters Master annual wage in d gr Br Town	Carpenters Master annual wage income in d gr Br Town (210 days)
	arithmetic	harmonic	harmonic	arithmetic	arithmetic	arithmetic	arithmetic
1421-25	91.786	9.513	91.591	10.000	7.000	9.250	1942.500
1426-30	82.504	8.567	82.482	10.000	7.600	9.400	1974.000
1431-35	87.804	8.947	86.145	10.400	8.000	9.800	2058.000
1436-40	81.608	8.280	79.724	12.000	8.000	11.000	2310.000
1441-45	95.434	9.847	94.807	12.000	10.000	11.500	2415.000
1446-50	101.369	10.430	100.425	12.000	9.400	11.350	2383.500
1451-55	101.821	10.539	101.477	12.000	9.000	11.250	2362.500
1456-60	87.744	9.065	87.277	12.000	9.000	11.250	2362.500
1461-65	110.151	11.404	109.805	12.000	9.000	11.250	2362.500
1466-70	103.522	10.712	103.142	12.000	9.000	11.250	2362.500
1471-75	101.312	10.506	101.159	12.000	9.000	11.250	2362.500
1476-80	84.255	8.605	82.855	12.000	10.000	11.500	2415.000
1481-85	67.498	6.668	64.205	12.000	10.000	11.500	2415.000
1486-90	60.012	6.099	58.722	12.000	10.000	11.500	2415.000
1491-95	90.367	8.898	85.673	13.500	12.000	13.125	2756.250
1496-1500	99.591	10.276	98.941	13.500	12.000	13.125	2756.250

Sources:

Charles Verlinden and E. Scholliers, et al, eds., *Documents pour l'histoire des prix et des salaires en Flandre et en Brabant/Dokumenten voor de geschiedenis van prijzen en lonen in Vlaanderen en Brabant*, 4 vols. Rijksuniversiteit te Gent: Werken Uitgegeven door de Faculteit van de Letteren en Wijsbegeerte nos. 125 [vol. I], 136 [vol. II.i], 137 [Vol.II.ii](Bruges, 1959 - 65).

Table 6

**Wages of Building Craftsmen in Mechelen
in d groot of Brabant, commodity baskets, and index numbers
in quinquennial means (arithmetic and harmonic), 1421-25 to 1496-1500**

mean of 1451-75 = 100

Year Ending	Carpenters Nominal Wage Index M1451-75= 100 arithmetic	Carpenters Real Wage Index M1451-75=100 arithmetic	Carpenters Annual Wage in Commodity Baskets (seasonally) adjusted) harmonic	Carpenters Annual Wage in Commodity Baskets Real Wage M1451-75=100 harmonic	Masons Servants OLV summer wage in d gr Br arithmetic	Masons Servants OLV winter wage in d gr Br arithmetic	Masons Servants OLV annual wage in d gr Br arithmetic	Masons Servants OLV annual wage income (210 days) arithmetic
1421-25	82.222	91.357	9.262	91.163	5.000	3.750	4.688	984.375
1426-30	83.556	83.442	8.476	83.421	5.200	3.900	4.875	1023.750
1431-35	87.111	85.274	8.572	84.368	6.400	4.976	6.044	1269.217
1436-40	97.778	79.794	7.920	77.953	6.800	5.520	6.480	1360.800
1441-45	102.222	97.555	9.847	96.914	7.600	6.293	7.273	1527.400
1446-50	100.889	102.193	10.301	101.389	7.200	6.133	6.933	1456.000
1451-55	100.000	101.821	10.310	101.477	6.000	4.862	5.715	1200.245
1456-60	100.000	87.744	8.868	87.277	7.600	6.240	7.260	1524.600
1461-65	100.000	110.151	11.156	109.805	8.000	6.667	7.667	1610.000
1466-70	100.000	103.522	10.480	103.142	8.000	6.667	7.667	1610.000
1471-75	100.000	101.312	10.278	101.159	8.000	6.667	7.667	1610.000
1476-80	102.222	86.127	8.605	84.696	8.000	6.667	7.667	1610.000
1481-85	102.222	68.998	6.668	65.632	8.000	6.667	7.667	1610.000
1486-90	102.222	59.465	5.966	58.715	8.000	6.667	7.667	1610.000
1491-95	116.667	92.375	8.898	87.577	8.200	6.833	7.858	1650.250
1496-1500	116.667	101.804	10.276	101.140	8.000	6.627	7.657	1607.900

Table 6

**Wages of Building Craftsmen in Mechelen
in d groot of Brabant, commodity baskets, and index numbers
in quinquennial means (arithmetic and harmonic), 1421-25 to 1496-1500**

mean of 1451-75 = 100

Year Ending	OLV Masons Servants Nominal Wage Index M1451-75= 100 7.195 arithmetic	OLV Masons Servants Real Wage RWI=NWI/CPI M1451-75= 100 arithmetic	OLV Masons Servants Real Wage RWI=NWI/CPI M1451-75= 100 harmonic	Masons Servants Annual Wage in Commodity Baskets (210 days) harmonic	Masons Servants Annual Wage in Commodity Baskets Real Wage M1451-75=100 6.383 harmonic	Labourers OLV summer wage in d gr Br arithmetic	Labourers OLV winter wage in d gr Br arithmetic
1421-25	65.149	72.387	72.233	4.694	73.534	3.000	2.250
1426-30	67.755	67.625	67.331	4.375	68.544	3.700	2.775
1431-35	84.000	81.871	81.501	5.296	82.969	4.600	3.450
1436-40	90.061	74.160	69.574	4.521	70.828	5.300	3.975
1441-45	101.087	96.993	93.871	6.100	95.562	6.800	5.100
1446-50	96.362	97.103	95.682	6.218	97.406	7.200	5.400
1451-55	79.435	80.878	80.612	5.238	82.064	6.400	4.800
1456-60	100.902	88.912	86.412	5.615	87.969	5.400	4.050
1461-65	106.554	117.371	117.002	7.603	119.110	5.600	4.200
1466-70	106.554	110.307	109.902	7.142	111.882	5.400	4.050
1471-75	106.554	107.953	107.789	7.004	109.731	6.000	4.500
1476-80	106.554	89.777	88.285	5.737	89.876	6.000	4.500
1481-85	106.554	71.922	68.413	4.446	69.645	6.000	4.500
1486-90	106.554	61.985	61.203	3.977	62.306	6.000	4.500
1491-95	109.218	86.884	81.424	5.291	82.891	6.000	4.500
1496-1500	106.415	92.882	90.268	5.866	91.894	6.000	4.500

Table 6

Wages of Building Craftsmen in Mechelen
in d groot of Brabant, commodity baskets, and index numbers
in quinquennial means (arithmetic and harmonic), 1421-25 to 1496-1500

mean of 1451-75 = 100

Year Ending	Labourers	Labourers	OLV Labourers	OLV Labourers	Labourers OLV	Labourers OLV
	OLV annual wage in d gr Br	Annual Wage income in d. groot Br (210 days)	Nominal Wage Index M1451-75= 100 5.400	Real Wage Index RWI=NWI/CPI M1451-75= 100	Annual Wage in Commodity Baskets (seasonally) adjusted)	Annual Wage in Commodity Baskets Real Wage M1451-75=100 4.804
	arithmetic	arithmetic	arithmetic	harmonic	harmonic	harmonic
1421-25	2.813	590.625	52.083	57.747	2.816	58.623
1426-30	3.469	728.438	64.236	63.397	3.092	64.359
1431-35	4.313	905.625	79.861	76.982	3.754	78.150
1436-40	4.969	1043.438	92.014	73.356	3.578	74.469
1441-45	6.375	1338.750	118.056	109.208	5.326	110.865
1446-50	6.750	1417.500	125.000	125.709	6.131	127.616
1451-55	6.000	1260.000	111.111	111.873	5.456	113.571
1456-60	5.063	1063.125	93.750	81.463	3.973	82.699
1461-65	5.250	1102.500	97.222	105.258	5.133	106.855
1466-70	5.063	1063.125	93.750	94.752	4.621	96.189
1471-75	5.625	1181.250	104.167	105.374	5.139	106.972
1476-80	5.625	1181.250	104.167	86.307	4.209	87.616
1481-85	5.625	1181.250	104.167	66.880	3.262	67.895
1486-90	5.625	1181.250	104.167	59.832	2.918	60.740
1491-95	5.625	1181.250	104.167	78.194	3.813	79.380
1496-1500	5.625	1181.250	104.167	90.304	4.404	91.674

Sources: see table 5.

Table 7a

Comparison of Real Wages for Building Workers in England and the Low Countries,

**in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	ENGLAND Oxford-Cambridge Master Masons Real Wage in commodity baskets per year (210 days employment)	ENGLAND Oxford-Cambridge Masons' Labourers Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges-Ghent Master Masons Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges-Ghent Journeymen Masons Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges Policemen Real Wage in commodity baskets per year (365 days employment)
1311-15	6.743	3.371			
1316-20	4.818	2.409			
1321-25	5.697	2.849			
1326-30	7.112	3.556			
1331-35	6.825	3.413			
1336-40	7.482	3.741			
1341-45	6.530	3.265			
1346-50	5.582	2.791	16.440	8.220	13.723
1351-55	5.200	2.600	14.188	7.094	14.296
1356-60	7.217	4.024	11.397	5.698	12.525
1361-65	6.746	4.048	11.956	5.978	14.434
1366-70	6.821	4.093	12.386	6.193	13.455
1371-75	7.310	4.386	11.545	5.772	12.541
1376-80	8.471	5.082	12.898	6.449	13.366
1381-85	8.224	4.934	12.053	6.027	14.548
1386-90	9.195	5.517	14.152	7.076	13.904

Table 7a

Comparison of Real Wages for Building Workers in England and the Low Countries,

**in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	ENGLAND Oxford-Cambridge Master Masons Real Wage in commodity baskets per year (210 days employment)	ENGLAND Oxford-Cambridge Masons' Labourers Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges-Ghent Master Masons Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges-Ghent Journeymen Masons Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges Policemen Real Wage in commodity baskets per year (365 days employment)
1391-95	8.955	5.373	16.908	8.454	19.591
1396-1400	8.413	5.048	18.241	9.121	17.283
1401-05	8.395	5.218	18.782	9.391	16.322
1406-10	9.843	6.446	15.797	7.898	13.728
1411-15	10.318	6.879	17.446	8.723	15.162
1416-20	9.833	6.555	15.485	7.742	13.457
1421-25	10.767	7.178	14.822	7.411	12.881
1426-30	9.919	6.613	14.118	7.059	12.270
1431-35	10.236	6.824	14.519	7.259	11.700
1436-40	8.992	5.995	13.049	6.525	10.309
1441-45	12.066	8.044	16.114	8.057	12.731
1446-50	11.033	7.356	16.630	8.315	13.139
1451-55	10.978	7.319	18.127	9.063	14.321
1456-60	11.403	7.602	15.519	7.760	12.261
1461-65	11.005	7.337	20.619	10.310	16.290
1466-70	10.874	7.250	18.950	9.475	14.971
1471-75	11.627	7.751	19.049	9.525	15.050

Table 7a

Comparison of Real Wages for Building Workers in England and the Low Countries,

**in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	ENGLAND Oxford-Cambridge Master Masons Real Wage in commodity baskets per year (210 days employment)	ENGLAND Oxford-Cambridge Masons' Labourers Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges-Ghent Master Masons Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges-Ghent Journeymen Masons Real Wage in commodity baskets per year (210 days employment)	FLANDERS Bruges Policemen Real Wage in commodity baskets per year (365 days employment)
1476-80	12.054	8.036	15.605	7.802	12.328
1481-85	9.202	6.135	11.661	5.830	9.213
1486-90	11.030	7.353			
1491-95	10.893	7.262			
1496-1500	11.336	7.557			

Table 7b

**Comparison of Real Wages for Building Workers in England and the Low Countries,
in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	FLANDERS	FLANDERS	FLANDERS	BRABANT	BRABANT
	Ghent Journeymen Fullers Real Wage in commodity baskets per year (210 days employment)	Kortrijk Journeymen Fullers Real Wage in commodity baskets per year (210 days employment)	Small Towns Master Craftsmen Real Wage in commodity baskets per year (210 days employment) (summer wage)	Antwerp Master Masons Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Antwerp Masons Labourers Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)
1351-55		4.851			
1356-60		3.361			
1361-65		3.116			
1366-70		2.739			
1371-75	7.620	3.442			
1376-80	7.818	7.123			
1381-85	7.324	6.673			
1386-90	6.451	6.197			
1391-95	7.014	7.890			
1396-1400	6.913	7.777		9.741	4.546
1401-05	7.012	7.888		10.262	5.306
1406-10	5.897	6.635	11.163	9.881	4.940

Table 7b

**Comparison of Real Wages for Building Workers in England and the Low Countries,
in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	FLANDERS	FLANDERS	FLANDERS	BRABANT	BRABANT
	Ghent Journeymen Fullers Real Wage in commodity baskets per year (210 days employment)	Kortrijk Journeymen Fullers Real Wage in commodity baskets per year (210 days employment)	Small Towns Master Craftsmen Real Wage in commodity baskets per year (210 days employment) (summer wage)	Antwerp Master Masons Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Antwerp Masons Labourers Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)
1411-15	6.513	7.327	14.784	9.157	4.578
1416-20	5.781	6.854	12.863	8.410	4.205
1421-25	6.299	6.595	12.094	7.510	3.755
1426-30	6.589	6.432	12.373	6.763	3.382
1431-35		6.616	12.492	7.858	4.952
1436-40		5.536	10.857	6.840	4.385
1441-45		6.836	13.185	9.192	5.508
1446-50		7.055	13.506	10.203	5.952
1451-55			13.893	10.310	6.014
1456-60			10.025	8.868	5.173
1461-65			12.944	11.156	6.528
1466-70			12.222	10.480	6.113

Table 7b

**Comparison of Real Wages for Building Workers in England and the Low Countries,
in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	FLANDERS	FLANDERS	FLANDERS	BRABANT	BRABANT
	Ghent	Kortrijk	Small Towns	Antwerp	Antwerp
	Journeyman Fullers	Journeyman Fullers	Master Craftsmen	Master Masons	Masons Labourers
	Real Wage	Real Wage	Real Wage	Real Wage	Real Wage
	in commodity	in commodity	in commodity	in commodity	in commodity
	baskets	baskets	baskets	baskets	baskets
	per year (210	per year (210	per year (210	per year (210	per year (210
	days employment)	days employment)	days employment)	days employment)	days employment)
			(summer wage)	(summer-winter wage)	(summer-winter wage)
1471-75				10.278	5.995
1476-80				8.418	4.911
1481-85				6.523	3.805
1486-90				6.316	3.736
1491-95				7.627	4.683
1496-1500				9.039	5.720

Table 7c

**Comparison of Real Wages for Building Workers in England and the Low Countries,
in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	BRABANT Mechelen Master Masons	BRABANT Mechelen Master Carpenters	BRABANT Mechelen Master Masons OLV	BRABANT Mechelen OLV Masons Labourers	BRABANT Mechelen Common Labourers OLV
	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)
1351-55					
1356-60					
1361-65					
1366-70					
1371-75					
1376-80					
1381-85					
1386-90					
1391-95					
1396-1400					
1401-5					
1406-10					
1411-15					
1416-20					
1421-25	9.513	9.262	7.510	4.694	2.816
1426-30	8.567	8.476	6.763	4.375	3.092
1431-35	8.947	8.572	7.435	5.296	3.754

Table 7c

**Comparison of Real Wages for Building Workers in England and the Low Countries,
in terms of 'baskets of consumables' purchased with annual money-wage incomes
in quinquennial means, with harmonic means, 1311-15 to 1496-1500:
with index numbers (RWI = NWI/CPI) based on the mean of: 1451-75 = 100**

Years	BRABANT Mechelen Master Masons	BRABANT Mechelen Master Carpenters	BRABANT Mechelen Master Masons OLV	BRABANT Mechelen OLV Masons Labourers	BRABANT Mechelen Common Labourers OLV
	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)	Real Wage in commodity baskets per year (210 days employment) (summer-winter wage)
1436-40	8.280	7.920	7.150	4.521	3.578
1441-45	9.847	9.847	9.409	6.100	5.326
1446-50	10.430	10.301	9.538	6.218	6.131
1451-55	10.539	10.310	9.213	5.238	5.456
1456-60	9.065	8.868	8.328	5.615	3.973
1461-65	11.404	11.156	11.404	7.603	5.133
1466-70	10.712	10.480	10.712	7.142	4.621
1471-75	10.506	10.278	10.506	7.004	5.139
1476-80	8.605	8.605	8.605	5.737	4.209
1481-85	6.668	6.668	6.668	4.446	3.262
1486-90	6.099	5.966	5.966	3.977	2.918
1491-95	8.898	8.898	7.796	5.291	3.813
1496-1500	10.276	10.276	8.656	5.866	4.404

Sources: see sources for Table 1 - 5, and also Algemeen Rijksarchief België, Rekenkamer, 33,147 - 33,238 (Kortrijk, 1393-1493), 38,635 - 38,722 ; and John Munro, 'Gold, Guilds, and Government: The Impact of Monetary and Labour Policies on the Flemish Cloth Industry, 1390-1435', *Jaarboek voor middeleeuwse geschiedenis*, 5 (2002), 153 - 205.