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Friday, 27 September 2002

WORKING PAPER NO. 19

UT-ECIPA-MUNRO-02-04

Postan, Population, and Prices in Late-Medieval England and Flanders

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JEL Classification nos: B4, E3, E4, J1, J3, N1, N3, N5

Key words: Ricardo, Malthus, population, agriculture, money, prices, wages,

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ABSTRACT

This paper re-examines the classic demographic or 'real' model, essentially based on a Malthusian-Ricardian model, that the late Michael Postan (Cambridge) utilized to explain the behaviour of the later-medieval western European economy, and in particular the behaviour of price movements. In essence, Postan had argued that just as population growth, with a relatively static agrarian technology, and thus with the inevitable Law of Diminishing returns, had drive up grain prices during the 'long thirteenth century' (c. 1180-c.1320), so, in reverse fashion, population decline during the fourteenth and fifteenth centuries led to a fall in grain prices. The drastic alteration in the land:labour ratio also led to a rise in real wages and a fall in rents; and in general to rising living standards. This in turn led to a rise in relative prices for non-grain food prices, especially in livestock products, and in industrial prices. In Postan's strongly pronounced views, monetary changes played no role in late-medieval price movements nor in any of the changes that the economy underwent during the late Middle Ages.

Utilising new and revised sets of price and wage data for late-medieval England and Flanders, unavailable to Postan, this paper seeks to prove that 'money mattered', and in particular that the oscillations in price levels (as measured by a consumer price index), from inflation to deflation to inflation and then again to deflation have to be explained by monetary changes, both in money stocks and flows. The evidence, in both tables and graphs, will demonstrate that the prices for grains, livestock products, and industrial goods generally rose together during the inflationary periods in later medieval England and Flanders and then fell together, if never precisely in tandem, during the deflationary periods. Analyses of relative price changes and of livestock:grain price and industrial:grain price do not vindicate Postan's predictions of price divergencies, except during a few, rare, and brief periods.

Since another recent and lengthy publication is devoted to the question of real-wage changes, this paper provides only a cursory overview of those changes: to demonstrate, first, that real wages, which had been declining before the Black Death, did not rise immediately following the Black Death, did not recover their former levels until the late 1360s, and did not begin their sustained rise, in England, until the late 1370s; and in Flanders, not until the 1390s. The subsequent rise in real wages was fundamentally, if not exclusively, the consequence of nominal wage-stickiness combined with prolonged and deep deflation; and thus real wages also fell during inflationary periods in the fifteenth century, particularly in Flanders, where such inflations were the consequence of much more frequent coinage debasements. Money does indeed matter.

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1. Postan and the medieval population question

Certainly, for the English-speaking world of academics, no historian has had a more profound influence, in the past half century, upon our conception of the later-medieval English economy and society than has the late Michael Moïssey Postan (1899-1981) of Peterhouse, Cambridge University. While he made earlier and indeed signal contributions to the studies of medieval trade and finance,[1] which have all basically stood the tests of time, his greatest fame lies in his analyses of the relationships between demographic, economic, and social changes in medieval England, though more generally also in medieval Europe. Profound though they may be, they were not unique. Thus, for their respective area of medieval Europe, a very similar claim may be made for the equally eminent Georges Duby (for France); Wilhelm Abel (for Germany and Central Europe) and B.H. Slicher Van Bath (for the Low Countries). Though none of these three historians would have ever claimed that population was in itself the 'prime mover' in the medieval (and early modern) European economy, nevertheless they certainly portrayed demographic factors to be the primary motor explaining economic and social changes, within the context of what may be called a neo-Malthusian-Ricardian model.[2]

This study, however, will focus solely on the views of Michael Postan and will be largely devoted to the role of demographic forces, and their impact on prices, in late-medieval England, with a lesser emphasis upon the cross-Channel Low Countries. In this particular respect, his major and most profound influence on English economic history began with two papers on population change, in 1950 and 1951:[3] the

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[1] See Postan (1928, 1930, 1933, 1952, 1957).

[2] See Postan (1950, 1951, 1952, 1959, 1966, 1972, 1973), Abel (1978/1980), Duby (1962/1968), Slicher Van Bath (1963). For a more recent exposition, see Hatcher (1977, pp. 11-73).

[3] Postan (1950, 1951). But see the precursor to the 1951 article in Cipolla, Dhondt, Postan, and Wolff (1950, pp. 225-41).
(1950), 225-41.

first entitled 'Some Economic Evidence of Declining Population in the Later Middle Ages,' and the other 'The Economic Foundations of Medieval Society'. He continued that theme with the following year in his impressive chapter on 'Medieval Trade: the North', in Vol. II, of the *Cambridge Economic History of Europe* (which he edited); and then with much more specific and impressive demographic evidence from the Winchester manors, in an article that he co-authored with Jan Titow in 1959; and in 1966, in the revised edition of vol. I of the *Cambridge Economic History of Europe,* when he was able to paint his demographic and agrarian portrait of medieval England, in undertaking to present an entirely new chapter on English medieval agriculture for this series. His final and summary overview came in his 1972 textbook survey: *The Medieval Economy and Society*.

Consequently any discussion of the so-called Postan thesis must begin with an examination of the demographic question. That the European population, especially in the West, underwent dramatic changes, with very significant consequences, from the tenth to fifteenth centuries (and indeed to the nineteenth century) can hardly be denied. Even if we are uncertain about precise statistics, one would hardly doubt that Europe's population at least doubled from the tenth to early fourteenth century; and probably the growth with the most significant consequences took place during the so-called 'long thirteenth century', from ca. 1180 to ca. 1315. If there is some general agreement that Europe's population had soared to over 80 million, and possibly as much as 100 million, there is rather more controversy about the size of the English population. Postan himself, without offering any precise figures, suggested that England's population had peaked, probably on the eve of the Great Famine (1315-17), at level somewhat over six million. H.E. Hallam subsequently contended, with rather daring precision, that the population had peaked in the early 1290s at 7.20 million; and that after the worst of the Great Famine 1317, it had fallen, but to only 6.74 million.[4] Much more recently the historians engaged in the Feeding the City Project have contended that the maximum population probably did not exceed 5.0 million; and Pamela Nightingale, after examining their results, has

[4] Hallam (1998, pp. 508-93).

argued that the maximum was only about 4.0 to 4.5 million.[5]

What then happened, during and after the Great Famine is also of considerable dispute. Postan himself suggested, though never actually specifically stated, that the Great Famine marked the great watershed, with what was evidently a full blown Malthusian crisis of overpopulation. In comparing of the plight of early-fourteenth century England with the Irish Potato Famine of the 1840s, he then stated that:

> It will not be too fanciful to project a somewhat similar story into the facts of the Middle Ages and to see in the falling production of the later centuries a natural punishment for earlier overexpansion. As long as the colonization movement went forward and new lands were taken up, the crops from virgin lands encouraged men to establish new families and settlements. But after a time the marginal character of marginal lands was bound to assert itself, and the honeymoon of high yields was succeeded by long periods of reckoning, when the poorer lands, no longer new, punished the men who tilled them with failing crops and with murrain [disease] of sheep and cattle. In these conditions a fortuitous combination of adverse events, such as the succession of bad seasons in the second decade of the fourteenth century, was sufficient to reverse the entire trend of agricultural production and to send the population figures tumbling down.[6]

Hallam's statistical survey might seem to support that dismal view, since he presents no other data between the aforementioned statistic of 6.74 million in 1317 and 2.75 million in 1377, at the time of the first poll tax, not venturing to estimate either the population on the eve or on the morrow of the Black Death, in 1348-49 (or after the subsequent rounds of bubonic plague in the 1360s).[7] Furthermore, Larry Poos has provided some significant statistical evidence that may indicate a fairly sharp fall in the population of Essex, following the Great Famine, though with certainly a more precipitous fall after the Black Death.[8] Bruce Campbell, on the other hand, in his detailed analyses of some parishes in Norfolk to the north, while certainly finding evidence of an incipient Malthusian crisis on the eve of the Great Famine, in terms of overcrowded subdivided peasant holdings, nevertheless concluded that the population economically adjusted to threats

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[5] Nightingale (1996, 89-106); and for the FCP, see also Campbell (2000)

[6] Postan (1951).

[7] Hallam (1998, pp. 508-93).

[8] Poos (1985, 1991).

of crisis and continued to grow, albeit much more slowly to the eve of the Black Death.[9] Somewhat similar views were held by both J. C. Russell but also Barbara Harvey.[10] In his masterful survey of the English agrarian population during the first half of the fourteenth century, Richard Smith, in the conference volume on *Before the Black Death* was nevertheless unable to conclude whether or not England's population had sustained a continuous decline between the Great Famine and the Black Death.[11] If Postan was rather dismissive of the view that the Black Death was the true medieval watershed,[12] most historians today, even if conceding some decline before the Black Death, though without wishing to do the arithmetic, will still see it in that light, inflicting a population loss of at least 40 percent, or more. If, however, we were to accept Hallam's figure of 2.75 million for 1377 — Miller suggests a range from 2.5 to 3.0 million,[13] and estimate the overall loss by then at 50 percent, that would mean that the population on the eve of the Black Death was 'only' 5.5 million, which is therefore considerably less than his figure for 1317 (6.74 million), but substantially higher than Nightingale's estimate for 1300 (4.5 million maximum).

That England's population continued to fall, or at least to drift downward through the entire fifteenth century now seems indisputable; and in all likelihood the turning point did not occur until about the 1520s, when the population of England and Wales can be estimated with greater certainty at about 2.25 million.[14] And that figure, one should note, is only 50 percent of Nightingale's exceeding conservative estimate of 4.5 million. No one, therefore, can doubt that England – and most of western (if not all eastern) Europe -- did

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[9] See Campbell (1984; and see also 1983a and 1983b); and also Bailey (1998).

[10] Harvey (1966, 1991); Russell (1948, 1966). See also Bridbury (1977) suggesting that England was not overpopulated on the eve of the Black Death, implicitly contradicting views put forth in Bridbury (1973).

[11] Smith (1991); see also Hatcher (1977, pp. 11-20).

[12] Postan (1950, 1951, 1972).

[13] Miller and Hatcher (1978); Miller (1991, pp. 1-33).

[14] For a general overview, see Hatcher (1977, 1986, 1994); Blanchard (1970), Campbell (1981); Miller and Hatcher (1978, pp. 27-63), Miller (1991). For an estimate of 4.5 million in the 1290s, see Nightingale (1996, pp. 89-106); for the estimate of 7.2 million in 1292, see Hallam (1988, p.536); for an estimate of 2.5 - 3.0 million in 1377, see Miller (1991, p. 6).

suffer a demographic catastrophe of monumental proportions during the later Middle Ages.

2. The Postan demographic model on medieval prices: Malthusian and Ricardian foundations

But the major question now becomes: were the economic and social consequences of such drastic depopulations, which probably involved a decline in the birth rate as well as an obvious rise in the death rate, those portrayed in the Postan model. That model is essentially Ricardian; and a Ricardian model itself would predict the following economic consequences (*ceteris paribus*) of such depopulation: (1) a fall in grain prices, (2) a consequent fall in rents (both landowner's rents and pure economic rent), (3) and a rise in real wages. Note in particular that David Ricardo (1772 - 1823) was the Classical Economist who correctly demonstrated that prices – prices for the arable and livestock products of land – determine the rent; and not the other way around.[15]

The model is sometimes also called a Malthusian-Ricardian model to acknowledge the contributions of Thomas Malthus (1776-1834).[16] In essence, Malthus contended that population growth, if left unchecked by 'providential' or 'prudential' constraints, would tend to grow exponentially, while the food supply, at best, could increase only by arithmetical, incremental, additions. The inevitable result would thus be falling real incomes, increasing misery or impoverishment, a rising death toll from malnutrition and disease, and then a falling population, until a new equilibrium was established. Malthus himself, however, believed that, in a developed society, 'prudential' constraints – what we would now call the European Marriage Pattern – would check the growth in population, before the 'providential' forces of famine, disease, and war became necessary.

Later developments in economic theory by the 'marginal utility' school then combined these concepts into the Law of Diminishing Returns, concerning a changing output of labour using a fixed stock of land and capital, with an unvarying technology. In essence, it states that, after some point of maximum efficiency has been reached, each additional or marginal unit of labour added to that given stock of land and

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[15] See Ricardo (1817).

[16] See Malthus (1798, 1820).

capital will produce smaller and smaller additional, or extra, or marginal units of output -- i.e., smaller than that produced by the unit of labour previously added. Note that, when and while the marginal product falls, total output will increase; and further that the declining marginal product curve will intersect the rising average product curve at its peak; and thus marginal product must decline to a very considerable extent before there any tangible signs of a 'Malthusian' crisis would be manifested.

The seemingly complex Postan model can thus be more readily understood in the light to these theoretical considerations. Its basic supposition is that the marginal productivity of agrarian labour rose, as the direct consequence of the radical alteration in the land:labour ratio that, in turn, had been the consequence of these late-medieval depopulations. In a fundamentally agrarian economy, such changes presumably would have taken place fairly soon, with the abandonment of many high-cost marginal lands, which, because of extensive prior population growth, had been subject to severely diminishing returns. Thus arable husbandry would have become concentrated on much better quality, higher-yielding lands that produced much more grain and livestock products with proportionately less labour.

One would then predict that grain prices, at least, would have fallen (relative to other prices) for three reasons. First, the marginal cost of producing a bushel of grain would have fallen, for the reasons just given. Second, the lower-cost lands on which that grain was being produced were presumably closer to markets, so that average transportation costs would have fallen. Third, the quantity of grain supplied to the market probably would have fallen less than the population and hence the demand for grain, if only because land, or good lands, would not fall out of production all that readily and easily. On the other hand, when the price of grain had fallen below the marginal cost of producing a bushel on the remaining marginal lands, production would finally have had to cease on such lands, since few could continue selling grain for prices below their costs.

We would further assume, as a consequence of these changes, that real wages of agricultural labourers would rise, and do so again, for basically three reasons. First, it is an axiom of Classical Economics that the real wage equals the marginal productivity of labour; and, as this analysis has sought to

demonstrate, the drastically altered land:labour ratio should have led to a substantial rise in the marginal productivity of labour. Indeed, as Bridbury suggested some time ago, the original impact of Black Death would have been the elimination of disguised unemployment on overcrowded lands.[17] As the Law of Diminishing Returns indicates, in reverse, as units of labour are removed the marginal product will rise, to that point of maximum efficiency (i.e., with the optional ratio of labour: land + capital). Second, we may assume that, over time, the supply of available labour to work lands still in production became even more scarce, as former itinerant labourers either took up vacated, deserted tenancies or possibly sought employment at higher wages in the towns, or in the now expanding cloth industry (though such opportunities were probably limited). Third, these agrarian changes themselves would have led to a rise in real wages by reducing the prices of foodstuffs and the cost of living in general, including housing costs, with so much more available land. The term 'real wage' means, after all, the quantity of goods and services that can be purchased with the daily, weekly, or annual money wage (plus any additional material benefits supplied by the employer). Classical economic theory further assumes that any rise in real wages in the agrarian sector would necessarily be translated to the other sectors, lest the latter lose labour to or from the agrarian sector (i.e., in reduced migration to towns). Such a process would presumably have been facilitated by the increased labor mobility that ensued from the later fourteenth century, with the breakdown of the manorial domain economies, the consequent leasing of domain lands to peasant tenants, and the decay of villeinage (serfdom).[18]

These changes in turn should have led to further changes in relative prices, producing a continually widening divergence between falling grain prices and rising prices for livestock products and industrial goods. Thus, labourers and artisans, in both rural and urban areas, on finding that they were enjoying greater disposable real incomes, after meeting the basic necessities of life, would probably have chosen to increase their spending on meat, dairy products, industrial goods, and semi-luxuries, thus driving up the relative prices

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[17] Bridbury (1973, and 1977).

[18] See Raftis (1964, pp. 129-204; 1996, pp. 291-206); Farmer (1996); Hatcher (1994).

of such goods. Prices for manufactured goods should have risen even more, because the continued rise in industrial wages would have accounted for an even greater share of total production costs than did wages in producing grain and livestock products.

Such is the classic demographic model for the late-medieval English and indeed West European economy, one that certainly seems both plausible and reasonable, especially in its delineation of expected changes in relative prices, including that of labour (i.e., in real wages). This emphasis upon the behaviour of relative prices – i.e., a change in the price of wheat relative to a change in the price of, say, linen cloth – is crucial for any consideration of the Postan model in particular and of the analytical discussion that follows.

3. Postan and the role of monetary changes in the late-medieval economy

In Postan's strongly pronounced views, these demographic changes were almost entirely responsible for late-medieval price movements, with no significant role played by monetary forces. Contending that the fall in prices was almost entirely confined to grains, so that they diverged from other prices, many of which were rising, indeed in accordance with the model, Postan concluded that:[19]

> monetary factors could not have been the sole or the main cause of the price changes, for the pure logic of the monetary explanation demands that the effects of changes in the circulating medium should be felt throughout the economy, i.e., in the prices of all the goods bought and sold, since changes in money must be, so to speak, 'neutral' as between different commodities.'

In further countering any possible 'monetarist' argument, Postan also observed that:[20]

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[19] The first quotation is from Postan (1972, p. 239). The following quotations also succinctly express his fundamental views: (1) 'And price changes which are not 'general' but are mainly confined to grain point to a factor which has already been shown to have operated in the opposite direction in the early centuries of the Middle Ages, i.e., population' (Postan, 1952, p. 213); (2) 'Butter happened to be a semi-luxury entering into popular consumption. It is not necessary to know what [Alfred] Marshall said about the elasticity of the demand for bread to in order to conclude that agricultural labourers were now better able to indulge in a little butter, however expensive... It is therefore highly significant that the price of butter and the price of grain diverged more widely than the prices of any other commodities [during] the fourteenth and fifteenth centuries. [And furthermore] the prices for animal products in current coinage actually rose [continuing from 1351] the rising trend of the previous two centuries for another 125 years.' (Postan, 1952, pp. 209-10).

[20] Postan (1952, p. 214); Postan (1951/1973, p. 9).

> A fall in population would also have, so to speak, a selective effect on prices, in that it would tend to lower the prices of agricultural products, which were previously being produced at high and every rising cost ... under steeply diminishing returns... but would have little effect on commodities not greatly subject to diminishing returns, i.e., most industrial products; [and thus]... the movements of agricultural and industrial prices did not synchronize.

Such views about the behaviour of late-medieval price-movement are, however, quite misleading. First, as the accompanying Tables 3 and 5 and figures 3 - 4 on English and Flemish prices indicate, the component price-indexes for grains, livestock-products, and industrial goods generally tended to rise or fall together, in distinct phases of inflation and deflation, though by no means exactly in tandem, and with varying amplitudes and differing short-term oscillations. Second, no respectable economist would ever contend that, while monetary forces were at work in the economy, demographic and other 'real' forces would remain suspended or frozen, in time, i.e., without interacting together, in altering the relative prices of many individual commodities.

Third, monetary changes are not 'neutral' in the manner that Postan has suggested. Suppose, for the example, that a country's supply of money had increased. The regional distributions of such increased stocks would have benefited some economic sectors more than others, thus allowing some groups or socio-economic strata to gain relatively greater increases in money incomes. The consequent changes in their savings and expenditure patterns, while possibly producing changes in the income velocity of money, would also have altered the prices of a wide variety of individual goods and services through their impact on the price and income elasticities of demand for various commodities and thus also on their elasticities of supply. Historically, it must be noted, grain supplies, both short and long term, tend to be relatively inelastic (determined by land supplies, crop rotations, climate and weather), while industrial goods are generally far more elastic in supply (especially with more elastic supplies of labour and raw materials).

Furthermore, if those changes in money stocks (even with a possible reduction in the income velocity of money) led to inflation, and if the money incomes of the lower strata of society did not rise correspondingly, many would have been faced with severe budget constraints, thus forcing them to spend proportionately more of their disposable incomes on foodstuffs and necessities and less on other

commodities. Such demand shifts would likely have lowered the relative if not the nominal prices of the latter (especially industrial goods).[21]

Suppose further that this country – or, for the present analysis, most of western Europe after the Black Death – experienced a rapid reduction in its population without, initially, experiencing any corresponding reduction in its aggregate money supply, and, not at least initially, in the income velocity of money. The result would really have been the same: a relative increase in money supplies, relative that is, to a much contracted economy, in which land, so much of which was abandoned, and labour were the chief inputs. Consider this situation in terms of the modernized version of the Fisher Identity: **M.V = P.y**, in which the variable **y** represents NNI (real net national income, in place of 'T,' which cannot be measured). Thus if **y** fell to a greater extent than did any possible reduction in the volume of money payments (i.e., the product of **M.V**), then obviously prices had to rise. The same conclusions are to be drawn in using the much preferable Cambridge 'cash balances' approach: so that **M = k(P.y)**; and thus **k = 1/V**; and **V = 1/k**.[22] As will be seen later in this study, the Black Death was indeed followed by rampant inflation throughout most of western Europe, for about three decades.[23]

Postan, to his credit, certainly did understand the distinction between changes in relative prices and shifts in the overall price-level. But he did not observe the now readily available evidence for oscillating

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[21] See Schwartz (1974, p. 253), for a review of Spooner (1972), in which she comments that: 'the author subscribes to a familiar fallacy, namely that a monetary explanation to be valid requires that all prices move in unison.' Her verdict would be equally valid if directed against the injudicious criticisms that Postan (1959, pp. 77-82) directed against Robinson (1959).

[22] In the Cambridge 'cash balances' equation, which, like the Fisher Identity, is a pure tautology, **k** represents that proportion of Net National Income (or Product), or the proportion therefore of total monetary transactions involved in aggregate spending, and thus the proportion that the public chooses to hold in the form of active, real cash balances; or, the necessary amount of M that is required for that level of NNI. Hence the tautology that M = k (P.y) Note that k is necessarily the reciprocal of V in the Fisher Identity: k = 1/V; V = 1/k. The symbol k is preferable to the nebulous concept of 'the income velocity of money' in that it represents the key elements of Keynesian *liquidity preference*, or why we choose to hold money in real cash balances, rather than in investments: for transactions motives, for precautionary motives, for speculative motives, and for future investment prospects.

[23] See below, pp. On the abandonment of land in so much of medieval western Europe, the so-called 'Wüstungen,' see in particular Abel (1966/1980, pp. 49-79, and especially pp. 80-95) and Slicher van Bath (1963, pp. 160-94).

price-movements of general inflation and deflation in late-medieval Europe (see figures 1 - 3). In his defence, his own observation must also be noted: that few continuous series of medieval prices were then available, except those for grain. The famous Phelps Brown and Hopkins 'basket of consumables' price index for England itself was not published until 1956, and only as a composite index, well after Postan had published his fundamental analyses of late-medieval prices. Furthermore, its six component price-index series (i.e., for grains, meat and fish, dairy products, drink, fuel and light, and textiles) were not published until much later, in 1981, the very year that Postan died. Between those dates, in 1975, Herman Van der Wee published a similar 'basket of consumables' price index (indeed, with the annual values of its ten component commodities) for the Antwerp-Lier-Brussels region of Brabant, from 1400 to 1700.[24] Much more recently, I myself have constructed (but not published) a similar component price-index, based on both the Phelps Brown and the Van der Wee indexes, for Flanders, from 1351-1500.[25] There is, however, no reliable price index available for medieval France;[26] and only scattered price data for medieval Italy.[27] While Hamilton did provide a more or less continuous series of individual prices for medieval Aragon-Navarre (1350-1500), they are not presentable in the form of a composite price index; nor can they be readily interpreted without better and more complete evidence on this regions's coinages and monetary systems.[28]

Subsequently, especially after Postan's death, many of his former students and current academic supporters did become aware of the oscillating movements of inflation and deflation in the medieval English

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[24] Van der Wee (1975/1978).

[25] Principally based upon Verlinden, Craeybeckx, and Scholliers (1959-65) and cloth price data from Stadsarchief Gent, Stadsrekeningen, Reeks 400.

[26] For my critique of the unreliable French price series presented by Vicomte d'Avenel, see my working paper, 'Prices, Wages, and Prospects for 'Profit Inflation' in England, Brabant, and Spain, 1501 -1670: A Comparative Analysis,' available in both of these web sites:
http://www.economics.utoronto.ca/ecipa/archive/UT-ECIPA-MUNRO-02-02.html and
http://www.eh.net/XIIICongress/Papers/Munro15.pdf

[27] See Herlihy (1967, pp. 121 - 34).

[28] See Hamilton (1936).

economy; but many incorrectly attributed those price movements primarily to demographic changes.[29] They evidently did so by confusing macro-economics with micro-economics: i.e., by assuming that a perfectly valid explanation for grain price-changes can be applied to the entire economy and its overall price-level. A growth in population that encounters diminishing returns in agriculture will likely cause relative grain prices to rise; but, acting alone, population growth cannot cause all or even most prices to rise. And conversely, a fall in population, while it may well have led to a sharp fall in relative grain prices, could not, by itself, have caused a general fall in prices – and certainly not following the Black Death, when, as just noted, prices instead rose sharply.[30]

In short, demographic forces can influence long-term price movements only by their interaction with other real economic forces, and by their consequences in inducing changes in both money stocks and money flows (V or k), including changes in credit. They may also have done so through their impact in inducing or stimulating a growth in real net national output and national income; and such was evidently the case during the 'long' thirteenth century (c. 1180 - c. 1320) and again during the sixteenth-century Price Revolution (c. 1530 - c. 1650). Ultimately, real economic growth – in turn promoting further population growth and increased settlement and urbanization – might have reduced or even eliminated elements of 'slack' (elastic supplies) in the agricultural and natural–resource (forestry, mining) sectors of the economy; and thus the economy might well have failed to sustain a rate of growth comparable to that on the ongoing monetary expansion (in stocks and/or flows). Consequently, under such circumstances, as Keynes himself

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[29] For example, see Hatcher (1977, pp. 47-54), which does acknowledge that monetary forces may have played some role, but less so than demographic decline. For a more nuanced view, for the fifteenth century, see Hatcher (1996, pp. 237-72).

[30] As noted above, for the pre-modern era, population growth, by increasing pressures on relatively fixed stocks of land and capital, would – in the absence of technological changes – likely have induced diminishing returns, producing rising marginal costs and thus rising grain prices. But such sharp rises in grain prices might well have forced many consumers, faced with budget constraints – as argued above in the context of monetary changes – to reduce their expenditures on other, less necessary commodities, thus driving down their relative prices. For a similar argument, see McCloskey (1972), in reviewing Ramsey's collection of essays on the Price Revolution (1971).

observed, most prices were bound to rise.[31]

4. The Problem of late-medieval real wages: nominal wage stickiness and monetary changes

For the wage question itself, there remains one further problem with the Postan model, and indeed with the usual presentation of Classical Theory. For, in a frictionless market economy, without long-term wage contracts or other institutional impediments, the real wage for any particular occupation or task, defined by time and place, should be determined not just by the marginal product but by the marginal revenue product of labour (MRP): i.e., the extra revenue that the employer derives by selling the last unit of output produced by the last unit of labour added to his fixed stock of land and capital. If, according to the Postan model, the marginal productivity of agricultural labour rose, with the demographic, agrarian, and price shifts so posited for the late-medieval post-Plague English economy, then presumably the marginal revenue from the sale of grain and other arable products so produced on the now chiefly more productive lands should have fallen, with falling prices (or falling relative grain prices). The result, therefore, may have been just a 'wash' in real wage changes. If, however, contrary to the Postan model, relative grain prices did not consistently fall, then real agricultural wages may well have risen in later-medieval England.

Though much evidence has been published that purports to show such a continual rise in agricultural wages during the later fourteenth century (in decennial means), the accounts of several Winchester manors do not consistently validate that view.[32] As Beveridge has noted, wages on most Winchester manors, after beginning to rise from 1362-63, were forced down in 1367-68, evidently at the behest of the new Bishop William of Wykeham; but then the higher rates were restored between 1370 and 1375.[33] The manorial

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[31] Keynes (1936, p. 300): 'It is probable that the general level of prices will not rise very much as output increases, so long as there are available efficient unemployed resources of every type. But as soon as output has increased sufficiently to begin to reach the 'bottle-necks,' there is likely to be sharp rise in the prices of certain commodities...[But] the elasticity of supply partly depends upon the elapse of time.' For further arguments on these issues, see Munro (1991, pp. 119 - 83); Munro (1999a), in a review of Fischer (1996); and Munro (2002, 2003a).

[32] See in particular Farmer (1983, pp. 117-55; 1988, pp. 760-78, 811-17, with Table F; and 1991, pp.467-90, 516-24, with Tables H and I).

[33] Beveridge (1936-37, p. 27).

records of Taunton (Somerset) provide the most striking deviation from the presumed norm in the behaviour of labourer's wages in later fourteenth-century. To be sure, with the onslaught of the Black Death, casual farm-labourers on the Taunton manor had enjoyed a doubling in their money wage, with a substantial increase as well in their real wage, from 1349 to 1356. But thereafter their money and real wages both fell, and from 1362-63 (i.e., before the election of Bishop William) fell sharply to pre-Plague levels even in money terms. Their real wages fell even more steeply below such levels, recovering only from 1378; but their money wages did not recover before 1412-13.[34]

Second, recently published research on fourteenth-century agricultural production does not fully support the standard Malthusian-Ricardo-Postan model, which purports to demonstrate that the marginal product of labour had to rise with continued depopulation. To be sure, labour productivity did rise in pastoral farming on many manors: proportionally fewer men were required to manage larger flocks on an increased acreage. But, in several Winchester, Glastonbury, and Ramsey Abbey manors, labour productivity generally fell on the arable, in the seven decades from 1341 to 1421.[35]

Indeed, the Malthusian-Ricardian model fails to demonstrate why any rise in industrial productivity should have occurred, especially in the building and textile trades. In woollen-textile manufacturing, productivity in fact remained quite unchanged from the early fourteenth to the late eighteenth centuries.[36]

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[34] Archives, British Library of Economic and Political Science, Beveridge Price and Wage History Collection, Boxes A 31-32. I have not, however, found comparable examples in other manorial accounts. Beveridge (1936-7, p. 30), commented that, at Taunton, wages 'are affected by the greater importance there of customary services and the best method of presenting the [wage] series has not been determined.' But that does not satisfactorily explain why building wages at Taunton were generally higher before the Black Death than elsewhere. Yet if Beveridge is correct, then wages on many late-medieval English manors would have been – to a greater or lesser degree – affected by the relative supplies of servile labor, before and after the Black Death.

[35] Farmer (1996, pp. 214-20, and Table 11.4). On the selected Winchester manors, labor productivity on the arable fell from 34.3 acres per *famuli* ploughman in 1305 only marginally to 32.3 acres in 1382, but then more precipitously to 27.9 acres per ploughman in 1421, a 15.8 percent decline. In animal husbandry, the number of sheep under the care of a single shepherd (again chiefly *famuli*) rose from 231 in 1341 to 342 in 1421, a 48.1 percent increase. For some corroborative evidence on Glastonbury and Ramsey manors, see also Raftis (1996, pp. 191-206).

[36] In late-medieval Flanders, weaving a standard fine woollen broadcloth of 42 ells by 3.5 ells (29.4m by 2.45m = 72.0m^2), containing 84 lb. or 38.2 kg of wool (16.3 kg of warp and 21.8 kg of weft),

Some medieval industries did benefit, to be sure, from applications of more complex forms of water-powered machinery; but, in the leading industries -- textiles, mining, and metallurgy -- most were instituted either long before or a full century after the Black Death.[37] For late-medieval industries in general, convincing evidence is lacking to indicate that the forces of later-medieval depopulation led to any positive qualitative changes in the composition, structure, and institutional utilization of the surviving labour force.

If, therefore, as Classical theory contends, that rises in real wages in the agrarian sector must be translated as well to other sectors (see above, p.), presumably the employment of urban industrial labour would have been restricted to those crafts in which $W_L = MRP_L$. Real urban industrial wages might have risen through a rise in relative industrial prices, if that increased the employer's marginal revenue; and they would have risen further through any fall in the cost of living, chiefly in foodstuffs.

Two of my recent journal articles (both currently in press) attempt to demonstrate, in numerous tables and graphs, that changes in real wages, in both late-medieval England and the Low Countries, were fundamentally though not exclusively dependent upon the combination of nominal wage-stickiness and the upward or downward movements in the aggregate price level: that is, that real wages tended to rise chiefly during periods of prolonged deflation and generally always fell during periods of prolonged inflation (i.e., more than just a few years, though not as prolonged as during the sixteenth-century Price Revolution era, 1520 - 1640).[38] The concept itself is not difficult: for obviously if money wages remained unchanged for

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typically required about 12 - 14 days, with two weavers and a boy. Another dozen days of labor were expended in wool-beating, wool-greasing, carding, combing, spinning, reeling, and warping the yarns for the same cloth, involving about 26-30 artisans and helpers; and at least another 6 - 9 days in the finishing processes of foot-fulling (three or four days per broadcloth), napping, shearing, and dyeing. According to a Parliamentary report of the 1790s, weaving a superfine broadcloth of 34 yards (i.e., before fulling), with 80 lb. of wool (36.2 kg), then required 364 man-hours (= 14.5 days, with two weavers and a boy), and a further 888 man-hours in wool preparation, spinning, reeling, and warping, and fulling (74 days). Fulling had been mechanized in England (water-wheels) from the thirteenth century, and remained the only significantly powered manufacturing process before the Industrial Revolution. See Endrei (1981, pp. 253-62; 1983, pp. 108-19); Van Uytven (1981, pp. 283-94); Lipson (1921, Appendix I, pp. 258-59, citing *Parliamentary Papers*, vol. 23, 1840, pp. 439-41, for the years 1781-96).

[37] Reynolds (1983); Holt (1988); Munro (2003b).

[38] See Munro (2002a and 2002b).

long periods of time, as they did for Oxford and Cambridge masons from 1363 to 1536, then obviously those wages would have commanded a higher purchasing power when prices were lower than when they were higher. The nature, forms, prevalence, and persistence of nominal wage-stickiness into modern times, constitute, however, a complicated topic, also discussed at considerable length in the first of these articles, which also analyses the extent to which wages were paid in kind. In brief, wage-stickiness became much more prevalent after the Black Death, though it could be found before then (certainly in the later thirteenth century); and similarly the proportion of rural wages paid in kind also declined (from about one half to one third, when so paid) after the Black Death. Wage stickiness tended to be much more prevalent in industrial occupations, not just in the building trades (carpenters, masons, pavers, etc.), but also in textiles and services (e.g. for policemen in Flanders). But they tended to be just as prevalent in rural areas or villages as in the major towns, both in England and the Low Countries, except during the mid-fifteenth century depression.[39] Conversely it was much less evident in purely agricultural occupations; but since most of those involved piece-work rates, rather than time-based wages (by the week or day), they are more difficult to measure. Since, therefore, wage-stickiness is easier to measure in those occupations with time-based wages, its overall prevalence is actually difficult to measure since such wages were the minority in medieval societies. Finally to be noted, as another conclusion of these publications, the role of productivity gains, or rather the rise in the marginal revenue product of labour cannot, in the early to mid-fifteenth century, be ruled out in providing at least one important component of rising real wages in this era.

5. Later medieval inflations, deflations, and the role of monetary factors (1180 - 1520)

For this current study, more focused on the essential nature of the Postan thesis, the remaining analysis will necessarily focus on those monetary factors that produced these oscillating cycles of inflation, deflation, and then inflation in late-medieval England and the Low Countries. Since a recently published, and widely received book, has attempted to document and explain these cycles by non-monetary and essentially Postan-influenced demographic explanations, I must necessarily also discuss the views presented

[39] On this see the most recent publications: in Hatcher (1996) and Nightingale (1997); but also Munro (1983a).

in David Hackett Fischer's *The Great Wave: Price Revolutions and the Rhythm of History* (1996).[40]

Both Fischer and I would agree that the first European inflationary era, the first since late Roman times, began in the 1180s, and indeed commenced the aforementioned 'long-thirteenth century' (1180-1320), which in turn represented the apogee of the Medieval Commercial Revolution era. Well before the commencement of this era, however, from about 1135, England, and more specifically the Cumberland-Northumberland region, was enjoying a very major silver-mining boom, which peaked in the 1170s. According to recent estimates of Ian Blanchard, its annual silver outputs were then 'ten times more than had been produced in the whole of Europe' for any year in the past seven centuries. By that decade, the 1170s, and thus still before evident signs of general inflation or a marked demographic upswing, an even greater silver mining boom had begun in the Harz Mountains region of Saxony, which continued to pour out vast quantities of silver until the early fourteenth century.[41] For this same 'Commercial Revolution' era, we must also consider the accompanying financial revolution, also evident from the 1180s, in Genoa and Lombardy. Although one may debate the impact that their deposit-and-transfer banking and foreign-exchange banking had upon aggregate European money supplies, these institutional innovations undoubtedly did at least increase the volume of monetary flows, and near the very beginning of this first documented long-wave.[42]

When and how this expansionary 'long-wave' actually came to an end, is, however, a matter of considerable dispute. In my view, Fischer's obvious terminal date of the Black Death in 1348 is far too late; and it is certainly one that Postan himself would never have endorsed. In particular it ignores the very deleterious effects on international and regional trade that resulted from the spreading stain of widespread, chronic and often devastating warfare and piracy throughout the entire Mediterranean basin, and western Europe, commencing in the 1290s and leading into the better known Hundred Years' War era (1337-1453).[43]

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[40] See Fischer (1996); and my EH.Net Review in Munro (1999a).

[41] Blanchard (1996, pp. 23-45); Blanchard (2001, Vol. II, pp. 583–794).

[42] See De Roover (1963); Van der Wee (2000).

[43] See Munro (1991, 1994, 1997, 1999a, 1999b, 2001).

His periodization also ignores, certainly for both Tuscany and England, the stark deflation and plummeting of mint outputs, from the 1320s to the very eve of the Black Death. For the latter, the Phelps Brown & Hopkins 'basket of consumables' price index (1451-75=100) fell 47 per cent: from 164.8 in 1323 (having been as high as 215.9 in 1316, with the Great Famine) to just 87.8 in 1346. As the accompanying graph shows, England's silver coinage production, having achieved its highest ever volume, with Edward I's successful sterling recoinage of 1298-1300, followed by more than a decade of bountiful outputs, then plunged dramatically, certainly in the aftermath of the Great Famine (1315-22), with evidently the steepest decline ever recorded in English monetary history.[44]

What explains this evident monetary contraction and deflation, one that affected wages as well as prices in England, remains a mystery that cannot be satisfactorily resolved. Possibly it was due to a relative scarcity of precious metals, if, as several historians have asserted, the major German and Central European silver mines had begun to experience not just diminishing returns but serious physical depletion by the end of the thirteenth or early fourteenth century, while the European economy continued to grow, and with it, the aggregate demand for coined money [i.e. if $\Delta\ \mathbf{y} > \Delta\ (M.V) \searrow P$]. Indeed, as Mayhew has also demonstrated, contrary to another of Postan's assertions about Europe's large stocks of virtually immutable silver supplies, coined money is perishable to some considerable degree: from wear, tear, and normal loss in circulation, from shipwrecks, unrecovered hoards, conversion into jewellery and plate, etc., so that the money supply will indeed contract if not continually replenished with fresh minting.[45] For England itself, some historians have also suggested that the crown's foreign military expenditures (under both Edward II and Edward III) had led to major outflows of bullion, though the fall in mint-outputs and the onset of deflation seems to precede any evidence for any such drastic bullion outflows. Finally, since England in this era was minting only silver, and no gold before 1344, the very dramatic rise in the bimetallic ratio, from

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[44] See Ames (1965); Feavearyear (1963); Challis (1992); Mate (1975); Mayhew (1974, 1987, 1995); Prestwich (1977); Schreiner (1954).

[45] Postan (1952, pp. 211-12); Mayhew (1974, 1987); see also Patterson (1972); Munro (1983, pp. 97-126; 1981).

about 12.0:1 in the 1290s to 14.2:1 in the late 1320s may have instigated a large outflow of silver coinage to acquire the higher valued gold. Such bullion movements may have been necessary to permit England's inauguration of an effective gold coinage in the period 1344-52, though with a then falling bimetallic ratio.[46]

Some very general indication of possible bullion outflows from England and a relative scarcity of specie during the second quarter of the fourteenth century may be found in the coinage-output statistics (Tables 1-2). The mean annual values of those outputs (all in silver) fell from a peak of £125,836 sterling in 1306-10 to a nadir of £381 in 1326-30; recovering to a mean of only £7,091 in 1346-50, at the outbreak of the Black Death. Such mint-accounts provide, however, only a very general and very tenuous guide to current monetary conditions. They can be of some value in that years with very low mint outputs were generally followed by prolonged deflation (marked as well by complaints about the scarcity of specie); and, conversely, years of very high mint outputs generally precede or coincide with eras of sustained inflation. But extrapolating a nation's current money supply from these accounts is an enterprise fraught with great dangers, for many complex reasons, the most important of which is that mint-accounts combine stocks and flows in unpredictable and unquantifiable fashions.[47] Recently, however, two economic historians have used a combination of mint accounts and coin hoards to show that the English money supply probably contracted by over one half in this era.[48]

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[46] The fall in the bimetallic ratio may have been due to both declining silver outputs from Bohemian mines and increasing supplies of West African (Sudanese) and Hungarian gold. See Lane (1977, pp. 52-59); Spufford (1986, graph 3 and Table II, pp. li-lxiii; and 1988, pp. 267-88, 340-42). Spufford's dates have been adjusted by those of Lane (1977). See also Mate (1978); Munro (1981)

[47] An absence of minting may indicate only that the nation's mints were offering a mint price for bullion uncompetitive with those of neighbouring foreign mints. With coinage debasement in a bimetallic system (in England, after 1344), a coinage debasement in, say silver, might succeed in recoining much of the current silver monetary stock, in inducing dishoarding, and in attracting foreign bullion, but at the expense of losing the now 'disfavoured' gold to foreign mints. See the essays in Munro (1994). See Figure 1; and Munro (1984, Table A - 1, p. 86): regressing quinquennial mean current prices against corresponding mint output values (current moneys) in these two regions, see for 1350-1409: $R^2 = 0.4327$ (t statistic: 2.762, significant at the 2.00 percent level); for 1350 - 1499: $R^2 = 0.2697$ (t-statistic: 1.455, significant only at the 15.71 percent level).

[48] Mayhew (1987, Table I, p. 125): indicating that the coined money supply contracted from about £1,100,00 sterling in 1311-24 to just £500,000 in the 1340s. See Mayhew (1995 1974); and sources in nn. 69-70 above. For a more recent estimate, see : M. Allen (2000; 2001), indicating (Table 1 in M. Allen, 2001,

What is especially striking and peculiar about this deflation, though affording further evidence that it was a genuine deflation (Tables 3-6), was the marked decline in nominal wages shown in Table 4. From about 1337 to 1340, the mean money wage of a master building craftsmen in southern England fell from 4d per to 3d per day, a decline of 25 percent; and that very low mean wage-rate was maintained until early 1351, i.e., several years after the Black Death (Figure 4).[49] In the earlier fourteenth century, before this fall in nominal wages,[50] real wages did rise, though the brief rise appears to be dramatic only because of the recovery from the drastic nadir of the Great Famine years. When the real-wage of those master craftsmen peaked in 1334-35, it was not appreciably higher than in the very early years of the century (1303-07). Then their real wages suffered a sharp fall, as also shown in Table 4; indeed they fell quite steeply before the Black Death, with the initial recovery of the price level from 1344, and especially with the inflation that soared immediately after the Black Death, one that endured for a full generation.

Thus, with the Black Death, and indeed with the increased tempo of the Hundred Years' War (1337-1453), the monetary structures of western Europe soon became radically transformed. First, and foremost, as David Herlihy so aptly commented, 'men were dying, but coins were not'.[51] Thus, whatever the current status of western European precious-metal mining, the effect of such drastic depopulations, perhaps as much as 40 percent of the total inhabitants, was undoubtedly to augment dramatically the per capita supplies of coined money. Secondly, the fiscal consequences of warfare in western Europe (including the concurrent Italian wars), of increased taxes and other levies, was probably to induce considerable dishoarding; and at

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p. 603) a larger estimated coined silver stock of £1,900,000 - £2,300,000 in 1319, falling to about £700,000 - £900,000 in 1351. See also Table 2, p. 607, providing, for 1470, an estimate of just £350,000 to £450,000 in silver, £400,000 to £500,000 in gold, and thus a total of no more than £750,000 to £950,000.

[49] Phelps Brown and Hopkins (1955, p. 11); Thorold Rogers (1866, 1882); Archives, British Library of Political and Economic Science, Beveridge Price and Wage History collection. Wages for masons and carpenters at the Oxford colleges did not fall, however; but remained at the daily rate of 4d set from at least 1300; Schreiner (1954).

[50] Money wages for master masons and carpenters were typically 3d. per day from before 1264 to 1302; for many, 3.5d until 1310; and then 4d. until 1338. See sources in the previous note.

[51] Herlihy (1967, p. 125): a statement that remains true, (true, even if the medieval economy did suffer some loss of coinage and precious metals through wear and tear, shipwrecks, lost hoards, etc.).

the same time the French, Flemish, Germans and Italian governments sought both to finance and to facilitate the necessary cash flows for warfare by engaging in horrendous coinage debasements, some severe enough to promote a veritable 'flight from coinage'. Thirdly, as some historians have suggested, citing Italian literature -- e.g., Boccaccio's *Da Cameron*, paintings, adornments in dress and housing, that the socio-psychological consequences of both plague and warfare, especially with such devastating and arbitrary death tolls, was to foster a fatalistic yet hedonistic spending spree, all the more facilitated by suddenly inherited cash balances.[52] The overall consequences, as demonstrated at least in the graphs for England and Flanders, was to produce a truly momentous increase in coinage outputs, and consequently -- from both increased stocks and increased flows -- drastic inflation across most of western Europe.

These combined phenomena should give pause to those *real*-oriented historians who believe that population growth causes inflation and that depopulation produces deflation. One will note from the price-graphs for both countries that all three major price series, and not just those for grains, rise during this quarter-century period following the Black Death: to the late 1370s in England (which experienced coinage only a single and very minor debasement, in 1351); and to the 1380s in Flanders (whose debasements continued until the 1390 monetary reform). Such inflation, furthermore, either eliminated or prevented any significant gains in real wages for most workers in these regions, as consumer prices outstripped rises in their money wages. In England, real wages do not begin a sustained rise until the late 1370s; in Flanders, not until the 1390s (see Tables 4 and 6).

Thereafter, during the final quarter of the fourteenth-century, much of western Europe -- certainly including England, the Low Countries, Italy and Aragon-Navarre -- experienced an equally dramatic deflation that lasted until well into the fifteenth century. Since most consumer prices fell much more rapidly than did money wages, their purchasing power, i.e., real wages, rose substantially.[53] The extent of deflation became much more moderate in the early fifteenth century; and then with the resumption of intensive

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[52] See Cassell (1983); Lopez (1962); Miskimin (1975); Stuard (1999).

[53] At least in England and the Low Countries, for which adequate wage data exist.

warfare, from the Battle of Agincourt in 1415 to the dénouement of the Hundred Years' War in the 1440s, another era of inflation ensued in much of northern Europe, certainly in the regions most affected by such warfare, reversing those real-wage trends; and the Low Countries and France in this era suffered from particularly severe coinage debasements. With the end of the Hundred Years War, and indeed even earlier, from the early 1440s, that war-induced inflationary era was succeeded by yet another era of deflation, this time the most prolonged, and by the 1460s, as pronounced as that of the late fourteenth century.

This era in turn also produced the most substantial gains in real wages. Though temporarily disrupted by warfare, by other 'supply shocks', and again by severe coinage debasements, especially in the Low Countries during the 1480s, this deflationary trend lasted until about 1515; and its reversal marked the beginning of the so-called Price Revolution. As the graphs show clearly, these periods of deflation were accompanied by severe slumps in the coinage of both gold and silver, while the briefer periods of inflation were similarly accompanied by upsurges in mint outputs, though never matching in extent those of the mid fourteenth century (third quarter).

Again, as in all the previous inflationary and deflationary cycles, the three major price-indices rose and fell more or less together, though never precisely in tandem (because of the interplay of real forces), during all these fifteenth-century cycles, certainly in England and the Low Countries (see the graphs). While relative prices did fluctuate considerably during these cycles, they did not exhibit any regular or sustained pattern. Grain price-indices -- very sensitive to supply shocks from warfare and bad harvests -- moved up as often as they moved down, in relation to the livestock and industrial indices, while fluctuations in all three indices were swamped by the general inflationary and deflationary movements just outlined.

Rather incredibly, Fischer refers to the later-medieval era, certainly from the Black Death, as one of 'price-equilibrium', ignoring the evidence of these rather drastic inflationary and deflationary cycles. Let us gauge that 'equilibrium' by summarizing the evidence of the price-indices for these two centuries. From just before the Black Death, the English composite price index, in terms now of quinquennial means (1451-75=100), rose 62.7 per cent: from 90.1 in 1341-45 to a peak of 146.60 in 1361-65, but then maintaining

approximately that level until the early 1370s, when it declined to just 135.40 in 1371-75. Thereafter, this CPI fell sharply, by 24.3 per cent, to a nadir of 102.5 in 1386-90; and after some subsequent oscillations, it declined to an early fifteenth-century low of 101.48 in 1421-25. During the next two decades, with a recoinage and substantial new minting at Calais (in trade with the Low Countries), and then supply shocks from renewed warfare with France (after Agincourt) and then wars with the Burgundians (Duke Philip the Good), the price level rose again, to a short-lived peak of 122.01 in 1436-40. Thereafter it plummeted once again, during the so-called 'bullion famine' of the mid fifteenth century, when mints in north-west Europe were either closed, or generally producing just a trickle of ouput, until the coinage debasements, in both England and Flanders, in the mid 1460s.[54] Despite those debasements, the English CPI continued to fall to reach a fifteenth-century nadir of just 91.00 in 1476-80. Thereafter, while rising briefly to a mean of 129.80 in 1481-85, with chiefly war-induced supply shocks, it fell as low as 96.70 in 1496-1500, and was only 108.60, in 1511-15, on the eve of the sixteenth-century Price Revolution.

For Flanders, a similarly constructed price index with quinquennial means (1451-75=100), but commencing only in 1349-50, thereafter more than doubled (i.e., rose 105.8 per cent): from 60.6 in 1351-55 to 124.7 in 1386-90, reflecting an inflation seriously aggravated by coinage debasements that England had not experienced (indeed none at all in England from 1351 to 1412). Thereafter, the Flemish price index plunged 32 per cent, reaching an early fifteenth-century low point of 88.5 in 1401-05. Thereafter, with a series of often severe price oscillations, aggravated by military conflicts and more coinage debasements, it rose to a peak of 140.2 in the war-torn, famine and plague-ridden years of 1436-40. Subsequently this Flemish CPI fell again, by 31.5 per cent, to reach its fifteenth century nadir of 96.0 in 1471-75. During the Flemish anti-Habsburg civil wars, Archduke Maximilian's French wars, and with his war-related coinage debasements, from 1477 top 1493, the Flemish CPI soared in obvious response, by 48.0 percent, to reach a peak of 184.5 in 1486-90; but then with a coinage *renforcement* and political and economic stability, it fell sharply to end the century at 100.3 in 1496-1500.

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[54] See Spufford (1970; 1988, pp. 339-62).

6. Forces for monetary contraction: the debate about late-medieval 'bullion famines'

If the periodic, and relatively brief eras of inflation, during this late-medieval period can be readily explained by a combination of supply-shocks, war-induced fiscal and monetary policies, and especially by the rather extreme coinage debasements in Flanders (Burgundian Low Countries from the 1420s), much more problematic are the explanations for the longer periods of deflation, accompanied by slumps in mint outputs; and some confusion, indeed, has been provided by the now large, often contradictory, and confusing literature on the so-called late-medieval 'Bullion Famines', which can be best documented for two periods: from the 1370s to the 1410s; and from the 1440s to the 1470s.

The predominant theories focus upon a net reduction in the supply of precious metals, from three possible causes. First, western Europe evidently experienced a severe worsening of its late-medieval mining slump, and indeed a veritable cessation of silver mining in some regions, so that even the opening of some new mines in Serbia and Sardinia failed to compensate for the sharp decline in outputs elsewhere. Second, western Europe was experiencing a steadily worsening of balance-of-payments deficit with Asia, with consequent bullion outflows via the Levant and the eastern Baltic. At the same time (for the third reason), that deficit was aggravated by a severe diminution, though not a complete cessation, in European gold imports from the Italian trade with North Africa.[55]

Nevertheless, if Ashtor has provided some impressive evidence for Venice's large silver exports to the Levant in the later fifteenth century, there is little evidence to demonstrate that an overall European balance-of-payments deficit had been worsening from a full century earlier.[56] Indeed, a major factor that helped to end the so-called 'bullion famine' era was the Central European silver-copper mining-boom, which began during the very nadir of deflation in the 1460s, when the consequently high value of silver induced a veritable revolution in mining technology (in chemical and civil engineering). That boom augmented

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[55] The arguments are summarized in Nef (1941, 1952); Miskimin (1964; 1975, pp. 25-72, 132-57); Lopez, Miskimin, and Udovitch (1970); Day (1978, 1981); Kovacevic (1960), Munro (1979, pp. 169-239; 1983a, pp. 97-112; 1984a, pp. 31-122; 1991, pp. 119-83); Spufford (1988, pp. 267-88, 340-42).

[56] Ashtor (1971; 1976, pp. 319-31). See also Day (1978, 1981); Munro (1983a; 1984a; 1992).

European silver production by over five-fold by the 1530s; and without such large increases in its silver stocks, Venice would never have been able to conduct such an increased volume and value of trade with the Levant in the 1490s.[57] The fact, moreover, that even before that mining boom had commenced, mints in England, France, and the Low Countries had all succeeded in reviving, if not in fully recovering former levels of coinage outputs, in the 1420s and early 1430s, suggests that there was no downward linear trend indicating any general *aggravated or augmented* bullion outflows to the 'East', during the fifteenth century. Thus additional, if not alternative, explanations for periodic bullion scarcities should be sought for this era.

Such an explanation may be found in examining the behaviour of bullion flows rather than of monetary stocks: specifically, in two sets of adverse changes in Velocity, or in the demand for idle cash balances, that may be related to the pernicious effects of warfare and plagues, from the 1370s. First, the now chronic and even more devastating warfare throughout so much of Europe, combined with drastic depopulations, produced severe dislocations to established patterns of international trade, while sharply raising transaction costs in that commerce, thus even more reducing flows of both commodities and bullion. Worse, responses to the ancillary manifestations of that warfare, in terms of commercial blockades, confiscations, and especially coinage debasements, radically reduced bullion flows even more. In particular, most west European rulers, in defending themselves against aggressive debasements by their neighbours, necessarily banned the domestic circulation of most foreign coins, especially silver coins (all the more subject to surreptitious debasements); and such bans also forced most foreign coin to be surrendered as bullion to their own mints. More important, in seeking to attract more bullion to their own mints, to increase coinage outputs and their seigniorage revenues, virtually all rulers banned its export. Even when enforcement of those bans failed to prevent international exchanges of precious metals, they still depressed monetary and trade flows by raising transaction costs.

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[57] The two sets of technological revolutions were, first, in mechanical engineering: adits and mechanical pumps to permit much deeper, well drained mining shafts; and then in chemical engineering: the *Saigerhüttenprozess,* for smelting argentiferous-cupric ores with lead to separate the two metals. See Nef (1941; 1952, pp. 691-761); Braunstein (1983); Westermann (1972, 1986); Spufford (1988, pp. 363-77); Munro (1991, 2003a, 2003b).

Finally, the noxious combination of such warfare, famines, plagues, the imposition of higher taxes and such monetary policies, defensive or aggressive, and the consequent commercial disruptions led to periodic but often severe economic depressions, certainly commencing by the late 1370s and 1380s. Such conditions also bred a more general climate of insecurity and pessimism that further discouraged spending and investment, increased hoarding, and further aggravated those depressions. Thus by the 1370s that post-Plague social climate of hedonistic spending-sprees had given way to much more pervasively gloomy and pessimistic outlooks amongst the populace in general that increased their demand for idle cash-balances, i.e., elevated their tendency to hoard.[58] Hoarding is obviously a self-justifying deflationary phenomena; for as prices fell from all combined circumstances of monetary contraction, the rational response of the money-holding populace was to save rather than to spend in the present, in anticipation of even lower future prices.

7. The role of credit and banking institutions: did they remedy bullion scarcities?

Nevertheless, according to many historians, a supposed growth in the use of credit during the later Middle Ages should have fully offset or counteracted those deflationary forces: particularly through the agency of deposit-and-transfer banking and bills-of-exchange banking. Yet neither was an innovation in this era, and both saw their most rapid initial diffusion in the last half-century of the Commercial Revolution era. Why credit instruments largely failed to provide a sufficient remedy for period monetary contractions in late-medieval Europe are very complex, but may be briefly summarized here. First, late-medieval Europe experienced very few additional innovations; and most credit instruments were still far from being effective substitutes for coined money, with the possible though still dubious exception of a very few West-European

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[58] As Peter Spufford (1988, pp. 346-47) has noted, many contemporary European observers believed that 'thesaurisation [hoarding, the accumulation of plate] was the main cause of the bullion famines' during the later fourteenth and early fifteenth centuries. He then comments that: 'In retrospect it appears that it was itself in part a response to the famine. Nevertheless it made that shortage worse, although the export of precious metals from Europe now seems more important, combined with the failures of the mines to make good the losses. But whether or not contemporaries were right in the analysis of its causes, the fact of a bullion famine, not only of silver, but also of gold, was clear for all to see at the end of the fourteenth century. In the middle of the fifteenth century, it was yet worse.' For increased coin hoards in this era, see Thompson (1956); for increased consumption of precious metals in dress and art, as a form of hoarding, see Stuard (1999); for evident reductions in the income velocity of money, see Mayhew (1995). See also Munro (1983a, pp. 97-122; 1984a); Day (1978, 1981).

towns whose commerce was dominated by Italian merchant-bankers. Secondly, much more widespread and more powerful forces, economic and political, involving increased hostility from both church and state, seriously impeded the employment or circulation of credit, with a multitude of examples to be cited in England, France, the Low Countries, and many Hanse towns, if not so much in Italy itself. Indeed, in both England and the Low Countries, late-medieval nationalist monetary policies effectively prevented the emergence of deposit-banking in the former, and virtually closed down such banks in the latter, following the Burgundian unification of the Low Countries, in a series of ever more severe ordinances (1433-35, 1467, 1480, and 1489).[59]

Third, because of those increasingly hostile attitudes from state-dominated legal institutions, despite the growth of a more independent and international Law-Merchant, the enforcement of debt repayments, especially those involving (unnotarized) holograph documents, became even more costly and ineffective, thus restricting credit instruments to a small circle of merchants, chiefly Italian, who knew and trusted each other. Fourth, therefore, most European states and principalities, even in Italy, had failed to provide the legal institutions and sanctions for true negotiability -- i.e., the conversion of a debt instrument into cash or goods, or to be used in place of cash: the fundamentally necessary condition to permit credit instruments effectively to augment the money supply. Fifth, therefore and in sum, credit instruments were far from being divorced from the use of coined money; and, in general, as Spufford, Nightingale, Spooner, Mueller and so many others have effectively demonstrated, credit either expanded or contracted with the coined money supply in the late-medieval and early-modern economies, usually in a non-proportional fashion. As Mayhew so aptly commented as well: 'credit reflected the supply of coin rather than compensated for it.'[60]

Since, in several other publications, I have analysed in some depth the relationships between these

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[59] See Munro (1979, pp. 194-96; 1994, pp. 147-95 and 204-208; 2000, 2001); De Roover (1948, pp. 130, 236-46, 331-57, esp. pp. 339-42); Van der Wee (1963, vol. II, pp. 85-86, 333-40, 355-58; 1977, pp. 302, 312, 323-24, 361-62; 2000, pp. 87-112, 125-33); Nightingale (1990, 1997).

[60] Mayhew (1987, p. 121); Spooner (1972, pp. 3, 53-71), Mueller (1984), Spufford (1986, pp. 346-48), and Nightingale (1990); Munro (1979, 1994, 2000, 2001).

late- medieval monetary changes, in both stocks and flows, and changes in prices and wages, though always with a consideration of the related role of real factors, it would be tedious and unnecessary to do so here once more, even if only for England and the Low Countries during the fourteenth and fifteenth centuries. While the earlier warning about treating mint outputs as proxies for the money supply must always be needed, nevertheless the two graphs do indicate some clear relationship between the often radical fluctuations in such outputs and changes in the price level (as measured by the English and Flemish CPI), though with an often considerable time lag.

8. Price movements and relative-price divergencies in late medieval England and Flanders

Despite, or perhaps even because of, these often radical oscillations in the late-medieval price movements of inflation, deflation, and then again inflation, are we still unable to detect the divergencies in the price series that Postan's Ricardian model predicted? Indeed, even if the three major sub-indexes — those for grains, for meat-dairy-fish products, and industrial goods – did move up and down together, during the oscillating inflationary and deflationary price movements – they never fully synchronized. Furthermore, during the ensuing Price Revolution era, from ca. 1520 to ca. 1650, which must also be explained fundamentally by monetary forces, we can readily discern the price divergencies to be expected from the role of demographic and other real factors.[61] Thus, with the renewed growth in population, which, in England and the Low Countries, clearly followed and did not precede, the monetary expansion, grain prices did rise more steeply than did the prices for livestock prices, while those for industrial goods rose the least – but still rose, of course, as to be expected in a period of general inflation.[62]

But in England and Flanders, during the later fourteenth and fifteenth centuries, we can find no such distinct patterns in the behaviour of relative prices. As figure 5 indicates, the two sets of ratios, those of grain prices to meat-fish-dairy products and to industrial goods (with grain prices as the denominator), do not fully vindicate Postan's views on late-medieval prices. Had his Ricardian-model fully reflected historical reality,

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[61] See Munro (1991, 2003a).

[62] See my recent working paper on 'Profit Inflation', cited in n. 26 above; and Lindert (1985).

we would expect those two ratios to rise continuously: i.e., as (real) grain prices fell, those for livestock and industrial goods should have risen. Sometimes, indeed, those two ratios, or one or the other set, do fall; but just as often they rise, indicating that the relative price of grain (in relation to the other two sets of commodities) rose in those particular quinquennia.

In England, the first, most surprising and quite counter-intuitive change to be observed, chronologically, is that from the later thirteenth, early fourteenth century, the industrial:grain price ratio, and to a lesser extent the livestock-fish:grain price ratio rose; and indeed did so up to the eve of the Great Famine. With population pressures mounting in what some have discerned as an incipient Malthusian crisis, we would except the exact opposite : a fall in those two ratios, with an expected rise in relative grain prices.[63] These two ratios do rise again following the Great Famine (i.e., with expected and necessary fall in grains prices. But after the Black Death, these two price ratios experience rises and falls, with a clearly declining – not rising – trend, from the 1380s to the 1430s, followed by a sudden upsurge in the 1440s and 1450s (with unusually low grain prices), and then an indeterminate trend to the end of the century. With the onset of the Price Revolution era, from the 1520s, however, we do find at least an expected fall in the industrial: grain price ratio (Table 3).

In Flanders, for which our price series commence only with the Black Death (Tables 5 - 6), there is initially a rise, then a brief fall, and than a more sustained rise in these two price ratios until the early 1390s (i.e., during the inflationary era); and then, as in England, the oscillation between the periodic rise and fall of these two ratios has a clearly downward trend, again until the late 1430s, followed (again as in England) with a sharp upward trend, which is again broken sharply to become a steep downward trend from the late 1460s (with renewed coinage debasements) to the early 1490s, when, with political, economic, and monetary stability – and plentiful harvests – the two sets of price ratios again rise at the very end of the century (marking the termination of this Flemish price series).[64]

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[63] The relative paucity of industrial prices before 1320, with the absence of prices for fuel and light, may be responsible, i.e., in providing an inadequate ratio. See Phelps Brown and Hopkins (1956).

[64] See Munro (1973, 1983b, 1984a, 1988); Spufford (1970).

One conclusion may cheer traditional historians more so than economists. For obviously, historical realities do not fit neatly with economic models, Ricardian or otherwise, when the myriad interplay of real forces – including supply shocks from war, plagues, and climatic adversities (or simply bad weather, producing bad harvests) and monetary factors so frequently disrupted and altered predicted movements of relative prices. The other conclusion, however, may cheer economists more than many traditional historians. Clearly monetary changes did matter, not only in affecting the movements of the price-level, with oscillating movements of inflation and deflation, but sometimes also in affecting relative price changes, especially during inflationary periods, when clearly income and household budget constraints, with wage-stickiness, helped shift relative demand from industrial goods to foodstuffs. But even so the results in terms of relative price changes were not readily predictable, for the very reasons given earlier in this same paragraph. *Ceteris paribus* is only a slogan, but one that economists find so conveniently useful in trying to explain why models so often do not fit historical realities. It is not a motto that historians should ever adopt.

List of References

Abel, Wilhelm, *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).

Allen, Martin, 'The Volume and Composition of the English Silver Currency, 1279 - 1351', *British Numismatic Journal*, 70 (2000), 38-44.

Allen, Martin, 'The Volume of the English Currency, 1158 - 1470', *Economic History Review*, 2nd ser., 54:4 (2001), 595-611.

Ames, Edward, 'The Sterling Crisis of 1337-1339', *Journal of Economic History*, 25 (1965), 496-552, reprinted in Roderick Floud, ed., *Essays in Quantitative Economic History* (Oxford, 1974), pp. 36-58.

Ashtor, Eliyahu, *A Social and Economic History of the Near East in the Middle Ages* (London, 1976).

Ashtor, Eliyahu, *Les métaux précieux et la balance des payements du Proche-Orient à la basse époque* (Paris, 1971).

Bailey, Mark, 'Peasant Welfare in England, 1290-1348', *Economic History Review*, 2nd ser.,51:2 (May 1998), 223-51.

Beveridge, William , 'Wages in the Winchester Manors', *Economic History Review*, 1st ser., 7 (1936-37), 22-43.

Blanchard, Ian, 'Population Change, Enclosure, and the Early Tudor Economy', *Economic History Review*, 2nd ser. 23 (1970), 427-45.

Blanchard, Ian, 'Lothian and Beyond: The Economy of the "English Empire" of David I', in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England* (Cambridge, 1996), pp. 23-45.

Blanchard, Ian, *Mining, Metallurgy, and Minting in the Middle Ages*, Vol. II: *Afro-European Supremacy, 1125 - 1225* (Stuttgart: Franz Steiner Verlag, 2001).

Braunstein, Philippe, 'Innovations in Mining and Metal Production in Europe in the Late Middle Ages,' *Journal of European Economic History*, 12 (1983), 573-91.

Bridbury, Anthony R., 'The Black Death', *Economic History Review*, 2nd ser., 26 (1973), 582, 591-92.

Bridbury, Anthony R., 'Before the Black Death,' *Economic History Review*, 2nd ser., 30 (1977), 393-410.

Campbell, Bruce, 'The Population of Early Tudor England: A Re-evaluation of the 1522 Muster Returns and the 1524 and 1525 Lay Subsidies,' *Journal of Historical Geography*, 7 (1981), 145-54.

Campbell, Bruce M., 'Agricultural Progress in Medieval England: Some Evidence from Eastern Norfolk,' *Economic History Review*, 2nd ser. 36 (Feb. 1983), 26-46.

Campbell, Bruce, 'Arable Productivity in Medieval England: Some Evidence from Norfolk,' *Journal of*

Economic History, 43 (1983), 379-404.

Campbell, Bruce, 'Population Pressure, Inheritance, and the Land Market in a Fourteenth-Century Peasant Community,' in Richard M. Smith, ed., *Land, Kinship and Life-Cycle* (Cambridge, 1984), pp. 87 - 134.

Campbell, Bruce M.S., *English Seigniorial Agriculture, 1250 - 1450*, Cambridge Studies in Historical Geography no. 31 (Cambridge and New York, 2000).

Cassell, Anthony, 'Boccaccio, Giovanni', in Joseph Strayer, et al, eds., *Dictionary of the Middle Ages*, Vol. 2 (New York, 1983), pp. 277-90.

Challis, Christopher, 'Appendix 1: Mint Output, 1220-1985,' in Christopher Challis, ed., *A New History of the Royal Mint*, (Cambridge, 1992), pp. 673-698.

Cipolla, Carlo, Jan Dhondt, Michael Postan, and Philippe Wolff, 'Rapports collectif', *IXe congrès international des sciences historiques, Paris âout - septembre 1950*, 1 (1950), 225-41. See Postan (1951), which is a revised version of his contribution to this volume.

Day, John , 'The Great Bullion Famine of the Fifteenth Century', *Past and Present*, no. 79 (May 1978), 1-54; reprinted in John Day, *The Medieval Market Economy* (Oxford, 1987), pp. 1-54.

Day, John, 'The Question of Monetary Contraction in Late Medieval Europe', *Nordisk Numismatisk Arsskrift: Nordic Numismatic Journal, 1981: Coinage and Monetary Circulation in the Baltic Area, c. 1350 - c. 1500* (Copenhagen, 1981), pp. 12-29. Reprinted in John Day, *The Medieval Market Economy* (Oxford: Basil Blackwell, 1987), pp. 55-71.

De Roover, Raymond, *Money, Banking and Credit in Mediaeval Bruges: Italian Merchant-Bankers, Lombards, and Money Changers: A Study in the Origins of Banking* (Cambridge, Mass., 1948).

De Roover, Raymond, The Organization of Trade,' in M.M. Postan and E.E. Rich, eds., *Cambridge Economic History of Europe*, Vol. III: *Economic Organization and Policies in the Middle Ages* (Cambridge, 1963), pp. 42 - 118.

Duby, Georges, *L'économie rurale et la vie des campagnes dans l'occident médiéval* (Paris, 1962); republished in English translation as *Rural Economy and Country Life in the Medieval West*, translated by Cynthia Postan (London, 1968).

Endrei, Walter, 'La productivité et la technique dans l'industrie textile du XIIIe au XVIIe siècle,' in Sara Mariotti, ed., *Produttività e tecnologia nei secoli XII-XVII* (Florence, 1981), pp. 253-62.

Endrei, Walter, 'The Productivity of Weaving in Late Medieval Flanders,' in Negley B. Harte, and K. G. Ponting, eds., *Cloth and Clothing in Medieval Europe: Essays in Memory of Professor E. M. Carus-Wilson*, Pasold Studies in Textile History no. 2 (London, 1983), pp. 108-19.

Farmer, David , 'Crop Yields, Prices and Wages in Medieval England', *Studies in Medieval and Renaissance History,* 6 (1983), 117-55.

Farmer, David, 'Prices and Wages [1042-1350]', in H. E. Hallam, ed., *The Agrarian History of England and Wales*, Vol. II: *1042-1350* (Cambridge, 1988), pp 760-78, 811-17.

Farmer, David, 'Prices and Wages, 1350-1500', in Edward Miller, ed., *The Agrarian History of England and Wales*, Vol. III: *1348-1500* (Cambridge, 1991), pp. 467-90, 516-24.

Farmer, David , 'The *Famuli* in the Later Middle Ages', in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England: Essays in Honour of Edward Miller* (Cambridge, 1996), pp. 214-20.

Feavearyear, Sir Albert, *The Pound Sterling: a History of English Money*, 2nd edn. revised by E.V. Morgan (Oxford, 1963).

Fischer, David Hackett, *The Great Wave: Price Revolutions and the Rhythm of History* (Oxford and New York, 1996).

Hallam, H. E., 'Population Movements in England, 1086-1350', in H.E. Hallam, ed., *Agrarian History of England and Wales*, II: *1042-1350* (Cambridge, 1988), pp. 508-93.

Hamilton, Earl, *Money, Prices, and Wages in Valencia, Aragon, and Navarre, 1351 - 1500* (Cambridge, Mass., 1936).

Harvey, Barbara, 'The Population Trend in England Between 1300 and 1348', *Transactions of the Royal Historical Society*, 5th ser., 16 (1966), 23-42.

Harvey, Barbara, 'Introduction: the 'Crisis' of the Early Fourteenth Century,' in Bruce M.S. Campbell, ed., *Before the Black Death: Studies in the 'Crisis' of the Early Fourteenth Century* (Manchester and New York, 1991), pp. 1 - 24.

Hatcher, John, *Plague, Population, and the English Economy, 1348-1530* (London, 1977).

Hatcher, John, 'Mortality in the Fifteenth Century: Some New Evidence,' *Economic History Review*, 2nd ser. 39 (Feb. 1986), 19-38.

Hatcher, John ,'England in the Aftermath of the Black Death,' *Past & Present*, no. 144 (August 1994), pp. 3 - 35.

Hatcher, John , 'The Great Slump of the Mid-Fifteenth Century,' in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England* (Cambridge, 1996), pp. 237-72.

Herlihy, David, *Medieval and Renaissance Pistoia: The Social History of an Italian Town, 1200 -1430* (New Haven, 1967).

Holt, Richard, *The Mills of Medieval England* (Oxford, 1988).

Keynes, John Maynard, *The General Theory of Employment, Interest and Money* (London, 1936).

Kovacevic, D. , 'Les mines d'or et d'argent en Serbie et en Bosnie médiévales', *Annales: E.S.C.*, 15 (1960), 248-58.

Lane, Frederic, 'The First Infidelities of the Venetian Lire,' in Harry A. Miskimin, David Herlihy, and A. L. Udovitch, eds., *The Medieval City* (New Haven and London, 1977), pp. 52-9.

Lindert, Peter, 'English Population, Wages, and Prices: 1541-1913', *Journal of Interdisciplinary History*,

15 (Spring 1985), 618-26.

Lipson, Ephraim, *The History of the Woollen and Worsted Industries* (London, 1921).

Lopez, Robert, 'Hard Times and Investment in Culture', in Wallace Ferguson, et al., eds., *The Renaissance* (New York, 1962), pp. 29-52.

Lopez, R.S., Harry Mismin, and A.L. Udovitch, 'England to Egypt, 1350 - 1500: Long Term Trends and Long Distance Trade', in M.. A. Cook, ed., *Studies in the Economic History of the Middle East* (London, 1970), pp. 93-128.

Malthus, Robert Thomas, *Essay on the Principles of Population*, 1st edn. (London, 1798).

Malthus, Robert Thomas, *Principles of Political Economy* (London, 1820).

.

Mate, Mavis, 'High Prices in Early Fourteenth-Century England: Causes and Consequences', *Economic History Review*, 2nd ser. 28 (1975), 1-16.

Mate, Mavis, 'The Role of Gold Coinage in the English Economy, 1338 - 1400', *Numismatic Chronicle*, 7th ser. 18 (1978), 126-41.

Mayhew, Nicholas, 'Numismatic Evidence and Falling Prices in the Fourteenth Century', *Economic History Review*, 2nd ser. 27 (1974), 1-15.

Mayhew, Nicholas, 'Money and Prices in England from Henry II to Edward III', *Agricultural History Review*, 35:2 (1987), 121-32.

Mayhew, Nicholas J., 'Population, Money Supply, and the Velocity of Circulation in England, 1300 - 1700,' *Economic History Review*, 2nd ser., 48:2 (May 1995), 238-57.

McCloskey, Donald, 'Review of Peter Ramsey ed., *The Price Revolution in Sixteenth-Century England* (London, 1971)', in *The Journal of Political Economy,* 80 (1972), 1332-35.

Miller, Edward and John Hatcher, *Medieval England: Rural Society and Economic Change, 1086 - 1348,* Social and Economic History of England, ed. Asa Briggs (London and New York, 1978).

Miller, Edward, 'Introduction: Land and People,' in Edward Miller, ed., *Agrarian History of England and Wales*, III: *1348-1500* (Cambridge, 1991), pp. 1 - 33.

Miskimin, Harry, *The Economy of Early Renaissance Europe, 1300 - 1460* (Cambridge, 1975).

Mueller, Reinhold, ' "Chome l'ucciello di passegio": la demande saisonnière des espèces et le marché des changes à Venise au moyen âge', in John Day, ed., *Études d'histoire monétaire, XIIe-XIXe siècles* (Université de Paris VII, Lille, 1984), pp. 195-220.

Munro, John, *Wool, Cloth, and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, ca. 1340-1478* (Brussels, 1973).

Munro, John, 'Bullionism and the Bill of Exchange in England, 1272-1663: A Study in Monetary Management and Popular Prejudice,' in Center for Medieval and Renaissance Studies UCLA, ed., *The Dawn*

of Modern Banking (New Haven and London, 1979), pp. 169-239; reprinted in John Munro, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350-1500* (London-Aldershot, 1992).

Munro, John, '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; reprinted in John Munro, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350-1500* (London-Aldershot, 1992).

Munro, John , 'Bullion Flows and Monetary Contraction in Late-Medieval England and the Low Countries,' in John F. Richards, ed., *Precious Metals in the Later Medieval and Early Modern Worlds* (Durham, 1983a), pp. 97-158; reprinted in John Munro, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350-1500* (London-Aldershot, 1992).

Munro, John, 'Economic Depression and the Arts in the Fifteenth-Century Low Countries,' *Renaissance and Reformation*, 19 (1983b), 235-50; reprinted in Munro, *Textiles, Towns, and Trade*.

Munro, John , '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.

Munro, John, '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; reprinted in Munro, *Bullion Flows and Monetary Policies* (1992).

Munro, John, 'Industrial Transformations in the North-West European Textile Trades, c. 1290 - c. 1340: Economic Progress or Economic Crisis?' in Bruce M. S. Campbell, ed., *Before the Black Death: Studies in the 'Crisis' of the Early Fourteenth Century* (Manchester and New York, 1991a), pp. 110 - 48. Reprinted by Manchester University Press in a paper-back edition in 1992; and reprinted in 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).

Munro, John , 'The Central European Mining Boom, Mint Outputs, and Prices in the Low Countries and England, 1450 - 1550,' in Eddy H.G. Van Cauwenberghe, ed., *Money, Coins, and Commerce: Essays in the Monetary History of Asia and Europe (From Antiquity to Modern Times)* (Leuven, 1991b), pp. 119 - 83.

Munro, John, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350-1500* (London-Aldershot, 1992).

Munro, John, 'Patterns of Trade, Money, and Credit,' in James Tracy, Thomas Brady Jr., and Heiko Oberman, eds., *Handbook of European History in the Later Middle Ages, Renaissance and Reformation, 1400 - 1600*, Vol. I: *Structures and Assertions* (Leiden: E.J. Brill, 1994), pp. 147-95.

Munro, John, 'The Origins of the English 'New Draperies': The Resurrection of an Old Flemish Industry, 1270 - 1570,' in Negley B. Harte, ed., *The New Draperies in the Low Countries and England, 1300 - 1800*, Pasold Studies in Textile History no. 10 (Oxford and New York: Oxford University Press, 1997), pp. 35-127.

Munro, John, Review of David Hackett Fischer, *The Great Wave: Price Revolutions and the Rhythm of History* (Oxford and New York, 1996), for *EH.Net Review* <ehreview@eh.net>, 24 February 1999a.

Munro, John, 'The Symbiosis of Towns and Textiles: Urban Institutions and the Changing Fortunes of Cloth Manufacturing in the Low Countries and England, 1270 - 1570', *The Journal of Early Modern History: Contacts, Comparisons, Contrasts*, 3:1 (February 1999a), 1-74.

Munro, John, 'The 'Industrial Crisis' of the English Textile Towns, 1290 - 1330,' *Thirteenth-Century England:* VII, ed. Michael Prestwich, Richard Britnell, and Robin Frame (Woodbridge, UK: Boydell Academic Press, 1999b), pp. 103-41.

Munro, John, 'The Low Countries' Export Trade in Textiles with the Mediterranean Basin, 1200-1600: A Cost-Benefit Analysis of Comparative Advantages in Overland and Maritime Trade Routes', *The International Journal of Maritime History*, 11:2 (Dec. 1999c), 1 - 30.

Munro, John, 'English "Backwardness" and Financial Innovations in Commerce with the Low Countries, 14th to 16th centuries,' in Peter Stabel, Bruno Blondé, and Anke Greve, eds., *International Trade in the Low Countries (14th - 16th Centuries): Merchants, Organisation, Infrastructure*, Studies in Urban, Social, Economic, and Political History of the Medieval and Early Modern Low Countries (Marc Boone, general editor), no. 10 (Leuven-Apeldoorn: Garant, 2000), pp. 105-67.

Munro, John, 'The "New Institutional Economics" and the Changing Fortunes of Fairs in Medieval and Early Modern Europe: the Textile Trades, Warfare, and Transaction Costs', *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte*, 88:1 (2001), 1 - 47.

Munro, John, 'Wage Stickiness, Monetary Changes, and Real Incomes in Late-Medieval England and the Low Countries, 1300 - 1470: Did Money Matter?' *Research in Economic History*, 21 (2002a): forthcoming.

Munro, John, 'Weaver-Drapers, Fullers, and the Count: The Impact of Monetary and Labour Policies on the Flemish Cloth Industry, 1390-1435', *Jaarboek voor middeleeuwsche geschiedenis*, 5 (2002b), forthcoming.

Munro, John, 'The Monetary Origins of the 'Price Revolution' Before the Influx of Spanish-American Treasure: The South German Silver-Copper Trades, 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, 2003a), forthcoming.

Munro, John, 'Industrial Energy from Water-Mills in the European Economy, Fifth to Eighteenth Centuries: the Limitations of Power', in Simonetta Cavaciocchi, ed., *Economica ed Energia, Seccoli XIII - XVIII*, Atti delle 'Settimane di Studi' e altrie Convegni, Istituto Internazionale di Storia Economica, 'Francesco Datini da Prato', vol. 34 (Florence, Le Monnier: 2003b): forthcoming.

Nef, John, 'Silver Production in Central Europe, 1450-1618', *Journal of Political Economy*, 49 (1941), 575-91.

Nef, John U. ,'Mining and Metallurgy in Medieval Civilization', in M.M. Postan, ed., *Cambridge Economic History of Europe*, Vol. II: *Trade and Industry in the Middle Ages* (1952), pp. 456-69; revised edn. (1987), pp. 696-734.

Nightingale, Pamela, 'Monetary Contraction and Mercantile Credit in Later Medieval England,' *Economic History Review*, 2nd ser. 43 (November 1990), 560 - 75.

Nightingale, Pamela, 'The Growth of London in the Medieval English Economy,' in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England* (Cambridge and New York, 1996), 89-106.

Nightingale, Pamela, 'England and the European Depression of the Mid-Fifteenth Century,' *The Journal of European Economic History*, 26:3 (Winter 1997), 631-56.

Patterson, C.C. 'Silver Stocks and Losses in Ancient and Medieval Times', *Economic History Review*, 2nd ser., 25/2 (1972), 205-35.

Phelps Brown, E.H., and Sheila V. Hopkins, 'Seven Centuries of Building Wages,' *Economica*, 22 (August 1955): reprinted in E.M. Carus-Wilson, ed., *Essays in Economic History*, 3 vols. (London, 1954-62), Vol. II, 168-78, 179-96, and in E.H. Phelps Brown and Sheila V. Hopkins, *A Perspective of Wages and Prices* (London, 1981).

Phelps Brown, E.H., and S.V. Hopkins, 'Seven Centuries of the Prices of Consumables, Compared with Builders' Wage Rates', *Economica*, 23 (November 1956): reprinted in E.M. Carus-Wilson, ed., *Essays in Economic History*, 3 vols. (London, 1954-62), Vol. II, 168-78, 179-96, and in E.H. Phelps Brown and Sheila V. Hopkins, *A Perspective of Wages and Prices* (London, 1981).

Poos, Lawrence R., 'The Rural Population of Essex in the Later Middle Ages,' *Economic History Review*, 2nd ser. 38 (November 1985), 515 - 30.

Poos, Lawrence R., *A Rural Society after the Black Death: Essex, 1350 - 1525* (Cambridge, 1991).

Postan, Michael, 'Credit in Medieval Trade,' *Economic History Review*, 1st ser. I (1928), reprinted in Michael M. Postan, *Medieval Trade and Finance* (Cambridge, 1973), pp. 1 - 27.

Postan, Michael, 'Private Financial Instruments in Medieval England,' 28-64. *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte*, 22 (1930), reprinted in Michael M. Postan, *Medieval Trade and Finance* (Cambridge, 1973), pp. 28-64.

Postan, Michael, 'The Economic and Political Relations of England with the Hanse from 1400 to 1475', in Eileen Power and Michael Postan, eds., *Studies in English Trade in the Fifteenth Century* (London, 1933), pp. 91-154.

Postan, Michael M., '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.').

Postan, Michael M., 'The Economic Foundations of Medieval Society,' *Jahrbücher für Nationalökonomie*, 161 (1951), reprinted in his *Essays on Medieval Agriculture and General Problems of the Medieval Economy* (Cambridge, 1973), pp. 3 - 27.

Postan, Michael M., 'The Trade of Medieval Europe: the North', in M.M. Postan and E.E. Rich, eds., *Cambridge Economic History of Europe*, Vol. II: *Trade and Industry in the Middle Ages* (Cambridge, 1952), pp. 119-256; republished, with a few changes, in the 2nd revised edn, ed. M.M. Postan and Edward Miller (Cambridge, 1987), pp. 168-305; and in M. M. Postan, *Medieval Trade and Finance* (Cambridge, 1973), pp. 92-31 (with bibliography).

Postan, Michael, 'Partnership in English Medieval Commerce,' *Rivista della società*, 11:3 (1957), reprinted in Michael M. Postan, *Medieval Trade and Finance* (Cambridge, 1973), pp. 65-91.

Postan, Michael, and J.Z. Titow, 'Heriots and Prices on Winchester Manors', *Economic History Review*, 2nd ser. 11 (1959); reprinted in his *Essays on Medieval Agriculture* (1973), pp. 150-85.

Postan, Michael, 'Note': response to the article by W.C. Robinson, 'Money, Population, and Economic Change in Late Medieval Europe', *Economic History Review*, 2nd ser. 12 (1959), 63-76, 77-82.

Postan, Michael M., 'Medieval Agrarian Society: England,' in M. M. Postan, ed., *Cambridge Economic History*, Vol. I: *The Agrarian Life of the Middle Ages*, (2nd rev. edn. 1966), 560-70.

Postan, Michael M., *The Medieval Economy and Society: An Economic History of Britain, 1100-1500* (Cambridge, 1972).]

Prestwich, Michael, 'Currency and the Economy of Early Fourteenth-Century England', in Nicholas Mayhew, ed., *Edwardian Monetary Affairs, 1279-1344* (British Archeological Reports, BAR International Series, no. 36 (Oxford, 1977), pp. 45-58.

Raftis, J. Ambrose, *Tenure and Mobility: Studies in the Social History of the Medieval English Village* (Toronto, 1964).

Raftis, Ambrose, 'Peasants and the Collapse of the Manorial Economy on Some Ramsey Abbey Estates', in Richard Britnell and John Hatcher, eds., *Progress and Problems in Medieval England: Essays in Honour of Edward Miller* (Cambridge, 1996), pp. 191-206.

Ramsey, Peter, ed., *The Price Revolution in Sixteenth-Century England* (London, 1971).

Reynolds, Terry S., *Stronger than a Hundred Men: A History of the Vertical Water Wheel*. Johns Hopkins Studies in the History of Technology, New series no. 7 (Baltimore and London: The Johns Hopkins University Press, 1983).

Ricardo, David, *Principles of Political Economy and Taxation* (London 1817).

Robinson, W.C., 'Money, Population, and Economic Change in Late Medieval Europe', *Economic History Review*, 2nd ser. 12 (1959), 63-76; and Postan, 'Note', pp. 77-82.

Rogers, James E. Thorold, *A History of Agriculture and Prices in England From the Year After the Oxford Parliament (1259) to the Commencement of the Continental War (1793)*, 7 vols. Oxford: Clarendon Press, 1866 - 1902. Vols.I and II: *1259 - 1400* (1866).

Rogers, James E. Thorold. *A History of Agriculture and Prices in England From the Year After the Oxford Parliament (1259) to the Commencement of the Continental War (1793)*, 7 vols. Oxford: Clarendon Press, 1866 - 1902. Vols.III and IV: *1401 - 1582* (1882).

Russell, Josiah Cox, *British Medieval Population* (Albequerque, 1948).

Russell, Josiah Cox, 'The Pre-plague Population of England', *Journal of British Studies*, 5 (1966).

Schreiner, Johan, 'Wages and Prices in the Later Middle Ages,' *Scandinavian Economic History Review*, 2 (1954), 61-73.

Schwartz, Anna Jacobson, Review of Spooner, *International Economy and Monetary Movements in France,*

1493 - 1725 (1972), *Journal of European Economic History*, 3:1 (Spring 1974), 252-55.

Slicher-Van Bath, B.H., *The Agrarian History of Western Europe, A.D. 500-1850*, translated by Olive Ordish (London, 1963).

Smith, Richard, 'Demographic Developments in Rural England, 1300-48: a Survey,' in Bruce M.S. Campbell, ed., *Before the Black Death: Studies in the 'Crisis' of the Early Fourteenth Century* (Manchester and New York, 1991), pp. 25-77.

Sosson, Jean-Pierre, *Les travaux de la ville de Bruges, XIVe - XVe siècles: les matériaux, les hommes*, Collection Histoire Pro Civitate no. 48 (Brussels: Credit Communal de Belgique, 1977).

Spooner, Frank, *The International Economy and Monetary Movements in France, 1493-1725* (Cambridge, Mass., 1972).

Spufford, Peter, *Monetary Problems and Policies in the Burgundian Netherlands, 1433-1496* (Leiden, 1970).

Spufford, Peter, *Handbook of Medieval Exchange*, Royal Historical Society Guides and Handbooks no. 13 (London, 1986).

Spufford, Peter, *Money and Its Use in Medieval Europe* (Cambridge, 1988).

Stuard, Susan M., 'Gravitas and Consumption', in Jacqueline Murray, ed., *Conflicted Identities and Multiple Masculinities: Men in the Medieval West*, Garland Medieval Casebooks vol. 25 (New York, 1999), pp. 215-42.

Thompson, J.D.A., *Inventory of British Coin Hoards, A.D. 600 - 1500*, Royal Numismatic Society Publications (Oxford, 1956).

Van der Wee, Herman, *The Growth of the Antwerp Market and the European Economy, 14th - 16th Centuries*, 3 vols. (The Hague, 1963).

Van der Wee, Herman, '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.

Van der Wee, Herman, 'Monetary, Credit, and Banking Systems', in E.E. Rich and C.H. Wilson, eds., *Cambridge Economic History of Europe*, vol. V: *The Economic Organization of Early Modern Europe* (Cambridge, 1977), pp. 290-392.

Van der Wee, Herman, 'European Banking in the Middle Ages and Early Modern Period (476-1789)' Herman Van der Wee and G. Kurgan-Van Hentenrijk, eds., *A History of European Banking*, 2nd edn. (Antwerp: Mercator Fonds, 2000), pp. 71 - 266.

Van Uytven, Raymond, 'Technique, productivité, et production au moyen âge: le cas de la draperie urbaine aux Pay-Bas,' in Sara Mariotti, ed., *Produttività e tecnologia nei secoli XII-XVII* (Florence, 1981), pp. 283-94.

Verlinden, Charles, E. Scholliers, and J. Craeybeckx, 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,* 2 vols., Rijksuniveristeit te Gent: Werken Uitgegeven door de Faculteit van de Letteren en Wijsbegeerte nos. 125, 136, 137 (Bruges, 1959-65), Vol. Is, IIi., and II.ii

Westermann, Ekkehard, 'Die Bedeutung des Thüringer Saigerhandels für den mitteleuropäischen Handel an der Wende vom 15. zum 16. Jahrhundert,' *Jahrbuch für die Geschichte Mittel- und Ostdeutschlands*, 21 (1972), 68-92.

Westermann, Ekkehard, 'Zur Silber- und Kupferproduktion Mitteleuropas vom 15. bis zum frühen 17. Jahrhundert: über Bedeutung und Rangfolge der Reviere von Schwaz, Mansfeld und Neusohl,' *Der Anschnitt: Zeitschrift für Kunst und Kultur im Bergbau*, 38 (May-June 1986), 187 - 211.

Table 1

English Mint Outputs, 1266-70 to 1536-40
in kilograms of pure silver and gold
and in pounds sterling values
with the Phelps Brown & Hopkins Composite
Price Index: 1451-75 = 100
in quinquennial means

Years	Silver in kg	Silver in £ sterling	Gold kg	Gold £ sterling	Total Value in £ sterling	PB&H CPI
1266-70	8,550.489	26,637.383			26,637.383	81.25
1271-75	3,559.688	11,089.515			11,089.515	103.84
1276-80	22,194.388	69,353.587			69,353.587	96.61
1281-85	21,913.309	68,548.734			68,548.734	104.80
1286-90	17,280.596	54,056.784			54,056.784	80.52
1291-95	1,552.352	4,856.034			4,856.034	107.45
1296-00	12,071.417	37,761.545			37,761.545	102.34
1301-05	16,017.465	50,105.484			50,105.484	92.35
1306-10	40,226.553	125,835.827			125,835.827	109.81
1311-15	10,706.712	33,492.502			33,492.502	115.33
1316-20	7,275.676	22,759.610			22,759.610	161.91
1321-25	1,780.107	5,568.492			5,568.492	137.97
1326-30	121.857	381.190			381.190	111.07
1331-35	209.056	665.131			665.131	114.12
1336-40	429.488	1,551.599			1,551.599	94.32
1341-45	5,077.456	17,710.473	240.011	9,859.484	27,569.958	90.06
1346-50	1,991.051	7,090.874	675.837	27,123.297	34,214.171	102.70
1351-55	17,442.905	67,245.275	1,939.777	83,567.731	150,813.007	132.18
1356-60	4,423.016	17,081.461	1,726.695	74,406.844	91,488.305	129.46
1361-65	1,630.811	6,298.107	2,415.242	104,077.756	110,375.864	146.64
1366-70	293.822	1,134.727	1,729.027	74,507.352	75,642.079	146.10
1371-75	316.966	1,224.108	802.608	34,586.019	35,810.127	135.26
1376-80	356.898	1,378.322	235.330	10,140.847	11,519.169	110.62
1381-85	317.412	1,225.829	161.835	6,973.804	8,199.633	112.90
1386-90	247.514	955.887	504.811	21,753.331	22,709.218	102.53

Years	Silver in kg	Silver in £ sterling	Gold kg	Gold £ sterling	Total Value in £ sterling	PB&H CPI
1391-95	193.489	747.245	626.546	26,999.152	27,746.397	106.33
1396-00	175.596	678.143	391.143	16,855.142	17,533.285	110.84
1401-05	66.344	256.216	168.671	7,268.390	7,524.606	114.84
1406-10	10.592	40.907	69.005	2,973.568	3,014.475	111.23
1411-15	967.484	4,483.340	1,870.669	89,519.896	94,003.236	108.11
1416-20	837.763	3,882.476	1,035.150	49,563.076	53,445.552	113.40
1421-25	3,186.020	14,765.093	2,557.314	122,444.369	137,209.462	101.48
1426-30	6,858.608	31,785.107	599.478	28,703.069	60,488.176	112.27
1431-35	8,059.545	37,350.656	220.785	10,571.183	47,921.839	108.48
1436-40	977.025	4,527.863	132.274	6,333.298	10,861.161	122.01
1441-45	130.700	605.707	90.778	4,346.467	4,952.174	92.53
1446-50	517.373	2,397.681	64.336	3,080.422	5,478.103	100.90
1451-55	1,460.637	6,769.085	63.526	3,041.629	9,810.714	100.25
1456-60	1,415.094	6,558.024	26.719	1,279.288	7,837.312	97.06
1461-65	3,432.915	18,067.349	488.118	29,731.331	47,798.679	102.73
1466-70	5,168.090	29,938.348	1,288.157	83,263.992	113,202.339	106.75
1471-75	2,422.654	14,034.247	538.669	34,818.552	48,852.799	97.76
1476-80	834.683	4,835.252	404.477	26,144.624	30,979.875	90.06
1481-85	995.231	5,765.296	219.449	14,184.753	19,950.049	127.38
1486-90	926.785	5,368.794	129.749	8,386.730	13,755.524	102.77
1491-95	1,270.840	7,361.876	268.983	17,386.525	24,748.402	106.80
1496-00	2,490.940	14,429.823	278.926	18,029.238	32,459.060	96.70
1501-05	4,313.544	24,988.026	516.604	33,392.271	58,380.297	106.79
1506-10	3,633.212	21,046.916	1,523.115	98,451.267	119,498.183	103.77
1511-15	1,089.012	6,308.562	694.599	44,897.564	51,206.126	108.52
1516-20	79.145	458.481	743.656	48,068.530	48,527.011	120.44
1521-25	3,148.207	18,237.317	442.135	28,578.780	46,816.096	146.05
1526-30	9,244.701	60,248.025	736.421	54,079.255	114,327.280	157.35
1531-35	4,616.832	30,088.071	189.160	13,890.972	43,979.043	155.64
1536-40	5,684.094	37,043.459	406.719	29,826.052	66,869.511	152.33

Sources: Challis (1992); Munro (1973, 1981, 1983a, 1984, 1991).

Table 2

The Mint Outputs of Flanders (1341 to 1420) and of the Burgundian Low Countries (1421-1500) in kilograms of pur silver and gold and in pounds groot Flemish values with Flemish Composite Price Index (1451-75=100) in quinquennial means, 1341-45 to 1496-1500

Years	Silver in kg	Silver in £ groot Flem	Gold kg	Gold £ groot Flem	Total Value £ groot Flem	Flemish CPI 1451-75=100
1336-40	3,641.114	4,873.432	266.769	3,975.690	8,849.122	
1341-45	176.761	310.860	1.322	26.600	337.460	
1346-50	5,553.490	11,138.594	315.965	6,596.362	17,734.956	50.57
1351-55	5,178.951	11,397.252	1,096.661	24,811.554	36,208.806	60.65
1356-60	8,820.730	21,251.516	3,191.827	80,870.028	102,121.544	87.54
1361-65	3,992.165	11,141.966	2,629.891	77,350.494	88,492.460	94.43
1366-70	10,030.194	32,269.760	1,586.502	50,200.530	82,470.290	107.40
1371-75	2,215.757	8,315.146	825.209	32,921.278	41,236.424	115.22
1376-80	915.615	3,648.742	261.200	10,555.072	14,203.814	111.66
1381-85	2,816.883	11,467.496	529.809	22,941.630	34,409.126	119.19
1386-90	1,787.714	7,792.290	423.106	20,865.908	28,658.198	124.72
1391-95	3,676.062	14,958.400	368.614	14,458.242	29,416.642	88.51
1396-00	5,791.306	23,507.520	324.589	12,731.424	36,238.944	89.80
1401-05	691.661	2,826.540	31.535	1,236.902	4,063.442	88.53
1406-10	1,113.700	3,887.994	19.025	636.250	4,524.244	105.26
1411-15	2,484.269	8,665.846	5.884	196.762	8,862.608	95.31
1416-20	3,124.468	15,052.698	4.308	181.634	15,234.332	107.38
1421-25	12,143.547	58,804.340	41.056	2,195.696	61,000.036	112.18
1426-30	7,999.913	43,326.036	1,105.072	69,470.408	112,796.444	117.77
1431-35	6,609.816	34,252.100	1,774.868	115,353.244	149,605.344	123.51
1436-40	5,015.219	25,788.386	511.935	28,534.390	54,322.776	140.17
1441-45	102.683	527.552	111.931	6,466.290	6,993.842	113.50
1446-50	5.911	40.786	2.550	148.084	188.870	109.98
1451-55	164.611	880.316	827.293	50,701.692	51,582.008	100.90

Years	Silver in kg	Silver in £ groot Flem	Gold kg	Gold £ groot Flem	Total Value £ groot Flem	Flemish CPI 1451-75=100
1456-60	64.066	408.310	253.139	15,513.918	15,922.228	117.86
1461-65	0.000	0.000	6.596	404.224	404.224	88.71
1466-70	4,628.964	27,867.694	253.594	16,400.726	44,268.420	96.52
1471-75	7,313.984	45,191.724	261.202	18,927.514	64,119.238	96.02
1476-80	9,341.495	67,636.251	380.051	29,208.498	96,844.749	117.213
1481-85	6,534.304	56,337.184	58.536	5,216.392	61,553.576	156.853
1486-90	6,803.602	78,323.898	144.641	24,136.964	102,460.862	184.511
1491-95	2,780.071	19,521.098	20.320	1,336.341	20,857.439	144.981
1496-00	5,109.489	43,603.013	474.633	44,464.280	88,067.293	100.255

sources: Munro (1973, 1981, 1983a, 1984, 1998, 1992); Verlinden, Scholliers, Craeybeckx (1959-65).

Table 3

England: The Phelps Brown and Hopkins 'Basket of Consumables' Composite Price Index, 1266-70 to 1526-30 in quinequennial means: 1451-75=100

Year	Farinaceous [wheat, rye, barley, peas]	Farinaceous [with drink: barley malt]	Meat and Dairy	Fuel and Textiles	Aggregate Price Index 1451-75=100	Ratio of Livestock/ Farinaceous [with drink] 1451-75=100	Ratio of Industrial/ Farinacous [with drink] 1451-75=100
weights	20.00	42.50	37.50	20.00	100.00	5 yr means	5 yr means
1266-70	84.00	95.01	76.60	48.40	81.25	84.52	53.87
1271-75	129.00	130.06	96.60	36.40	103.84	74.25	27.84
1276-80	102.20	110.67	100.80	36.20	96.61	92.07	32.94
1281-85	110.80	133.83	93.20	40.90	104.80	70.52	31.50
1286-90	79.20	90.42	84.53	34.80	80.52	97.00	39.24
1291-95	137.80	148.28	82.27	44.20	107.45	57.08	30.04
1296-00	107.80	124.21	91.60	60.20	102.34	74.31	48.75
1301-05	91.60	106.11	90.00	52.60	92.35	85.56	50.03
1306-10	116.80	126.33	104.17	70.60	109.81	85.98	56.47
1311-15	114.20	120.66	122.53	75.60	115.33	105.66	64.64
1316-20	189.80	215.74	132.00	68.60	161.91	78.82	43.51
1321-25	160.00	167.84	122.07	104.33	137.97	75.46	65.49
1326-30	102.20	118.72	108.07	100.45	111.07	95.48	86.73
1331-35	112.00	131.16	104.47	96.00	114.12	86.09	79.63
1336-40	85.20	91.45	96.27	96.75	94.32	106.64	110.85
1341-45	81.00	90.32	93.47	83.13	90.06	104.39	92.61
1346-50	102.00	111.53	98.60	91.63	102.70	90.23	85.16
1351-55	125.40	146.68	115.00	133.60	132.18	84.47	100.19
1356-60	116.40	129.74	111.60	162.35	129.46	86.50	124.91
1361-65	132.60	168.60	123.80	142.78	146.64	74.84	86.24
1366-70	155.00	161.46	128.13	147.15	146.10	84.30	96.16
1371-75	133.20	130.45	134.13	147.60	135.26	103.24	117.08
1376-80	96.00	105.00	110.00	123.71	110.62	108.96	119.91

Year	Farinaceous [wheat, rye, barley, peas]	Farinaceous [with drink: barley malt]	Meat and Dairy	Fuel and Textiles	Aggregate Price Index 1451-75=100	Ratio of Livestock/ Farinaceous [with drink] 1451-75=100	Ratio of Industrial/ Farinacous [with drink] 1451-75=100
weights	20.00	42.50	37.50	20.00	100.00	5 yr means	5 yr means
1381-85	103.60	114.19	109.13	117.21	112.90	95.79	103.02
1386-90	83.20	96.54	106.20	108.38	102.53	112.61	114.48
1391-95	96.60	110.89	102.80	103.25	106.33	101.02	102.35
1396-00	106.20	117.42	109.00	100.28	110.84	92.92	86.00
1401-05	115.80	126.71	107.20	103.95	114.84	89.46	87.47
1406-10	109.20	114.81	108.47	108.83	111.23	98.44	99.69
1411-15	93.00	106.66	107.53	112.25	108.11	101.18	105.58
1416-20	116.40	121.80	107.50	106.63	113.40	89.00	89.16
1421-25	94.20	106.80	94.26	103.70	101.48	88.52	97.52
1426-30	104.60	119.95	102.38	114.48	112.27	90.56	102.33
1431-35	109.60	115.53	101.40	106.75	108.48	89.52	93.72
1436-40	146.20	143.87	106.80	104.08	122.01	81.92	81.74
1441-45	76.80	80.40	98.80	106.53	92.53	123.12	133.67
1446-50	96.00	96.21	106.20	100.93	100.90	110.55	105.53
1451-55	103.00	103.53	97.40	98.63	100.25	95.05	96.79
1456-60	93.40	92.02	100.80	100.73	97.06	110.34	110.10
1461-65	108.20	107.04	100.00	98.71	102.73	99.09	96.87
1466-70	103.80	101.47	111.80	108.48	106.75	110.97	107.49
1471-75	98.20	98.94	96.00	98.53	97.76	99.69	102.60
1476-80	106.00	94.25	79.20	101.50	90.06	85.45	110.62
1481-85	147.80	145.47	120.00	102.78	127.38	84.54	74.20
1486-90	108.00	97.84	105.80	107.58	102.77	108.79	112.52
1491-95	110.40	104.36	111.80	102.58	106.80	109.04	99.84
1496-00	100.80	95.61	95.80	100.70	96.70	104.32	108.24
1501-05	127.20	115.76	97.70	104.78	106.79	84.85	90.97
1506-10	101.80	95.87	113.50	102.33	103.77	121.27	108.76
1511-15	116.80	103.99	113.33	109.13	108.52	112.31	108.03
1516-20	120.20	120.31	126.17	109.98	120.44	104.60	92.63
1521-25	135.80	135.91	174.60	114.05	146.05	137.12	89.76
1526-30	182.40	172.66	158.00	123.58	157.35	97.08	75.65

Year	Farinaceous [wheat, rye, barley, peas]	Farinaceous [with drink: barley malt]	Meat and Dairy	Fuel and Textiles	Aggregate Price Index 1451-75=100	Ratio of Livestock/ Farinaceous [with drink] 1451-75=100	Ratio of Industrial/ Farinacous [with drink] 1451-75=100
weights	20.00	42.50	37.50	20.00	100.00	5 yr means	5 yr means
1531-35	161.60	163.08	164.20	123.78	155.64	106.29	81.21
1536-40	159.60	149.75	168.20	128.05	152.33	115.43	87.90

sources: Phelps Brown and Hopkins (1956, 1981). Note: I have consulted their working papers in: Archives, British Library of Political and Economic Science, the Phelps Brown Papers Collection; and I have used them to correct very numerous compilation errors and to interpolate missing data (when Phelps Brown and Hopkins chose not to interpolate). I am preparing a new 'basket of consumables', and one that will contain the actual values of the commodities in each year's basket, and thus the total annual value of the basket.

Table 4

Nominal and Real Wages in Southern England: in pence sterling and in Index numbers, in quinquennial means (harmonic and arithmetic) 1266 - 1270 to 1536-40 Mean of 1451-75 = 100

Years	Basket of Consumables Price Index 1451-75 = 100	Nominal Day Wage in d. for a Master	Nominal Wage Index 0.00 [= 6d. daily]	Nominal Day Wage in d. for a Labourer	Nominal Wage Index 1451-75=100 [= 4d. daily]	Real Wage Index Master 1451-75 = 100 harmonic mean	Real Wage Index Labourer 1451-75 = 100 harmonic mean	Real Wage Index Master 1451-75 = 100 arithmetic mean	Real Wage Index Labourer 1451-75 = 100 arithmetic mean
1266-70	81.25	3.00	50.00	1.50	37.50	61.539	46.155	61.823	46.368
1271-75	103.84	3.00	50.00	1.50	37.50	48.152	36.114	48.707	36.530
1276-80	96.61	3.00	50.00	1.50	37.50	51.757	38.818	51.810	38.858
1281-85	104.80	3.00	50.00	1.50	37.50	47.710	35.782	48.163	36.122
1286-90	80.52	3.00	50.00	1.50	37.50	62.097	46.573	62.930	47.198
1291-95	107.45	3.00	50.00	1.50	37.50	46.532	34.899	47.222	35.417
1296-00	102.34	3.00	50.00	1.50	37.50	48.856	36.642	49.108	36.831
1301-05	92.35	3.30	55.00	1.65	41.25	59.286	44.464	59.568	44.676
1306-10	109.81	3.60	60.00	1.80	45.00	54.807	41.105	55.244	41.433
1311-15	115.33	4.00	66.67	2.00	50.00	57.805	43.354	58.322	43.742
1316-20	161.91	4.00	66.67	2.00	50.00	41.176	30.882	44.849	33.637
1321-25	137.97	4.00	66.67	2.00	50.00	48.320	36.240	48.869	36.651
1326-30	111.07	4.00	66.67	2.00	50.00	60.022	45.017	60.816	45.612
1331-35	114.12	4.00	66.67	2.00	50.00	58.418	43.814	59.552	44.664
1336-40	94.32	3.60	60.00	1.80	45.00	63.259	47.444	64.226	48.169
1341-45	90.06	3.00	50.00	1.50	37.50	55.519	41.639	55.775	41.832
1346-50	102.70	3.00	50.00	1.50	37.50	48.685	36.514	49.138	36.853
1351-55	132.18	3.60	60.00	1.80	45.00	44.557	33.418	46.514	34.886
1356-60	129.46	4.60	76.67	2.60	65.00	59.007	49.413	59.311	50.161
1361-65	146.64	5.00	83.33	3.00	75.00	56.830	51.147	57.053	51.348
1366-70	146.10	5.00	83.33	3.00	75.00	57.039	51.335	58.129	52.316
1371-75	135.26	5.00	83.33	3.00	75.00	61.610	55.449	62.258	56.032

Years	Basket of Consumables Price Index 1451-75 = 100	Nominal Day Wage in d. for a Master	Nominal Wage Index 0.00 [= 6d. daily]	Nominal Day Wage in d. for a Labourer	Nominal Wage Index 1451-75=100 [= 4d. daily]	Real Wage Index Master 1451-75 = 100 harmonic mean	Real Wage Index Labourer 1451-75 = 100 harmonic mean	Real Wage Index Master 1451-75 = 100 arithmetic mean	Real Wage Index Labourer 1451-75 = 100 arithmetic mean
1376-80	110.62	5.00	83.33	3.00	75.00	75.335	67.801	77.272	69.544
1381-85	112.90	5.00	83.33	3.00	75.00	73.813	66.432	73.892	66.503
1386-90	102.53	5.00	83.33	3.00	75.00	81.277	73.149	81.311	73.180
1391-95	106.33	5.00	83.33	3.00	75.00	78.372	70.535	79.526	71.573
1396-00	110.84	5.00	83.33	3.00	75.00	75.187	67.668	75.589	68.030
1401-05	114.84	5.10	85.00	3.20	80.00	73.717	68.693	75.286	71.288
1406-10	111.23	5.80	96.67	3.80	95.00	87.067	85.527	87.562	85.887
1411-15	108.11	6.00	100.00	4.00	100.00	92.503	92.503	92.633	92.633
1416-20	113.40	6.00	100.00	4.00	100.00	88.181	88.181	89.126	89.126
1421-25	101.48	6.00	100.00	4.00	100.00	98.546	98.546	98.867	98.867
1426-30	112.27	6.00	100.00	4.00	100.00	89.074	89.074	90.998	90.998
1431-35	108.48	6.00	100.00	4.00	100.00	92.187	92.187	92.358	92.358
1436-40	122.01	6.00	100.00	4.00	100.00	81.960	81.960	85.413	85.413
1441-45	92.53	6.00	100.00	4.00	100.00	108.079	108.079	108.574	108.574
1446-50	100.90	6.00	100.00	4.00	100.00	99.108	99.108	99.228	99.228
1451-55	100.25	6.00	100.00	4.00	100.00	99.751	99.751	100.064	100.064
1456-60	97.06	6.00	100.00	4.00	100.00	103.034	103.034	103.115	103.115
1461-65	102.73	6.00	100.00	4.00	100.00	97.340	97.340	99.009	99.009
1466-70	106.75	6.00	100.00	4.00	100.00	93.681	93.681	93.723	93.723
1471-75	97.76	6.00	100.00	4.00	100.00	102.297	102.297	102.590	102.590
1476-80	90.06	6.00	100.00	4.00	100.00	111.043	111.043	111.678	111.678
1481-85	127.38	6.00	100.00	4.00	100.00	78.505	78.505	80.745	80.745
1486-90	102.77	6.00	100.00	4.00	100.00	97.305	97.305	98.059	98.059
1491-95	106.80	6.00	100.00	4.00	100.00	93.637	93.637	93.931	93.931
1496-00	96.70	6.00	100.00	4.00	100.00	103.413	103.413	103.510	103.510
1501-05	106.79	6.00	100.00	4.00	100.00	93.640	93.640	93.746	93.746
1506-10	103.77	6.00	100.00	4.00	100.00	96.365	96.365	96.391	96.391
1511-15	108.52	6.00	100.00	4.00	100.00	92.149	92.149	92.528	92.528
1516-20	120.44	6.00	100.00	4.00	100.00	83.031	83.031	83.659	83.659

Years	Basket of Consumables Price Index 1451-75 = 100	Nominal Day Wage in d. for a Master	Nominal Wage Index 0.00 [= 6d. daily]	Nominal Day Wage in d. for a Labourer	Nominal Wage Index 1451-75=100 [= 4d. daily]	Real Wage Index Master 1451-75 = 100 harmonic mean	Real Wage Index Labourer 1451-75 = 100 harmonic mean	Real Wage Index Master 1451-75 = 100 arithmetic mean	Real Wage Index Labourer 1451-75 = 100 arithmetic mean
1521-25	146.05	6.00	100.00	4.00	100.00	68.472	68.472	69.128	69.128
1526-30	157.35	6.00	100.00	4.00	100.00	63.555	63.555	64.274	64.274
1531-35	155.64	6.00	100.00	4.00	100.00	64.251	64.251	65.008	65.008
1536-40	152.33	6.50	108.33	4.00	100.00	71.118	65.647	71.393	65.901

Sources: Phelps Brown and Hopkins (1955, 1956, 1981). See the previous table and its sources.

Table 5

Basket of Consumables Price Index for Flanders (Bruges and Ghent)
Mean of 1451-75 = 100

values in d. groot Flemish

Year	Basket Consumables Total Value in d groot Flemish	Grains Group Index 1451-75= 100 56.354d groot Flemish	Dairy Group Index 1451-75= 100 44.665d groot Flemish	Textiles Group Index 1451-75= 100 25.276d groot Flemish	Commodity Basket Index 1451-75= 100 126.295d groot Flemish
1349-50	63.868	62.076	46.777	31.624	50.571
1351-55	76.593	68.466	63.048	38.968	60.646
1356-60	110.558	102.100	93.151	45.160	87.540
1361-65	119.255	108.636	98.228	56.023	94.425
1366-70	135.641	126.994	101.825	73.568	107.401
1371-75	145.519	121.901	112.359	105.388	115.222
1376-80	141.024	105.597	121.366	108.038	111.662
1381-85	150.534	110.799	135.714	108.711	119.193
1386-90	157.514	132.745	122.655	110.470	124.719
1391-95	111.784	82.803	99.235	82.282	88.510
1396-00	113.407	92.733	92.132	79.118	89.796
1401-05	111.810	95.190	80.675	87.565	88.531
1406-10	132.939	115.682	91.056	107.127	105.261
1411-15	120.370	93.652	92.417	104.114	95.309
1416-20	135.616	110.755	104.677	104.636	107.381
1421-25	141.680	112.756	114.392	106.998	112.182
1426-30	148.741	122.830	114.511	112.262	117.773
1431-35	155.989	132.917	115.130	117.353	123.512
1436-40	177.022	172.289	109.153	123.350	140.166
1441-45	143.350	111.205	113.067	119.403	113.504
1446-50	138.904	107.703	110.051	114.952	109.984
1451-55	127.434	95.302	102.660	110.282	100.902

Year	Basket Consumables Total Value in d groot Flemish	Grains Group Index 1451-75= 100 56.354d groot Flemish	Dairy Group Index 1451-75= 100 44.665d groot Flemish	Textiles Group Index 1451-75= 100 25.276d groot Flemish	Commodity Basket Index 1451-75= 100 126.295d groot Flemish
1456-60	148.845	131.873	107.281	105.288	117.855
1461-65	112.030	83.052	90.737	97.721	88.705
1466-70	121.900	93.351	101.206	95.304	96.520
1471-75	121.264	96.422	98.116	91.406	96.017
1476-80	148.034	125.644	118.347	96.410	117.213
1481-85	198.097	198.728	131.927	107.537	156.853
1486-90	233.028	190.773	187.098	165.979	184.511
1491-95	183.104	156.841	122.174	158.841	144.981
1496-00	126.617	82.119	93.309	152.966	100.255

Table 5, continued

Basket of Consumables Price Index for Flanders (Bruges and Ghent)
Mean of 1451-75 = 100
values in d. groot Flemish

Years (5 yr)	Commodity Basket Index 1451-75= 100 126.295d groot Flemish	Grains as per cent of total basket by value	Dairy as per cent of total basket by value	Textiles as per cent of total basket by value	Ratio of Dairy to Grain Price Indices 1451-75=100 means	Ratio of Textile to Grain Price Indices 1451-75=100 means
1349-50	50.571	54.77%	32.71%	12.52%	75.37	50.93
1351-55	60.646	50.37%	36.77%	12.86%	95.55	58.99
1356-60	87.540	52.04%	37.63%	10.32%	91.13	44.72
1361-65	94.425	51.34%	36.79%	11.87%	93.72	55.54
1366-70	107.401	52.76%	33.53%	13.71%	81.49	59.15
1371-75	115.222	47.21%	34.49%	18.31%	93.76	88.96
1376-80	111.662	42.20%	38.44%	19.36%	115.57	102.99
1381-85	119.193	41.48%	40.27%	18.25%	122.81	98.43
1386-90	124.719	47.49%	34.78%	17.73%	92.89	84.45
1391-95	88.510	41.74%	39.65%	18.60%	123.49	101.82
1396-00	89.796	46.08%	36.29%	17.63%	99.96	85.95
1401-05	88.531	47.98%	32.23%	19.79%	87.55	94.68
1406-10	105.261	49.04%	30.59%	20.37%	82.70	97.45
1411-15	95.309	43.84%	34.29%	21.86%	98.30	112.14
1416-20	107.381	46.02%	34.48%	19.50%	106.56	104.71
1421-25	112.182	44.85%	36.06%	19.09%	102.14	96.03
1426-30	117.773	46.54%	34.39%	19.08%	93.53	91.72
1431-35	123.512	48.02%	32.97%	19.02%	90.37	91.42
1436-40	140.166	54.85%	27.54%	17.61%	71.80	84.36
1441-45	113.504	43.72%	35.23%	21.05%	104.14	111.45
1446-50	109.984	43.70%	35.39%	20.92%	104.57	110.16
1451-55	100.902	42.14%	35.98%	21.87%	107.58	115.77
1456-60	117.855	49.93%	32.19%	17.88%	84.70	82.21

Years (5 yr)	Commodity Basket Index 1451-75= 100 126.295d groot Flemish	Grains as per cent of total basket by value	Dairy as per cent of total basket by value	Textiles as per cent of total basket by value	Ratio of Dairy to Grain Price Indices 1451-75=100 means	Ratio of Textile to Grain Price Indices 1451-75=100 means
1461-65	88.705	41.78%	36.18%	22.05%	112.77	122.47
1466-70	96.520	43.16%	37.08%	19.76%	108.80	102.27
1471-75	96.017	44.81%	36.14%	19.05%	103.03	96.20
1476-80	117.213	47.83%	35.71%	16.46%	94.50	79.81
1481-85	156.853	56.53%	29.75%	13.72%	76.10	69.62
1486-90	184.511	46.14%	35.86%	18.00%	97.71	85.49
1491-95	144.981	48.27%	29.80%	21.93%	84.17	122.55
1496-00	100.255	36.55%	32.92%	30.54%	116.82	191.97

Sources: Verlinden, Scholliers, and Craeybeckx (1959-65); Stadsarchief Gent, Stadsrekeningen, Reeks 400; Munro (2002a).

Table 6

Wages of Master Building Craftsmen and their Journeymen in Bruges in pence (d) groot Flemish and in Flemish commodity baskets with Consumer Price, Nominal Wage, and Real Wage Indexes (1451-75=100)

Year	Basket Consumables Total Value in d groot	Commodity Basket Price Index 1451-75=100 126.295d groot Flemish	Wages of Master Building Craftsmen in Bruges in d gr. Best estimate of median wage	Bruges Nominal Wage Index Mean Mode 1451-75=100 [11d groot Flem]	Bruges Real Wage Index 1451-75=100 harmonic mean	Real Wage in Commodity Baskets Annual: 210 days harmonic mean
1349-50	63.868	50.571	5.000	45.455	89.884	16.440
1351-55	76.593	60.646	5.200	47.273	77.572	14.188
1356-60	110.558	87.540	6.000	54.545	62.309	11.397
1361-65	119.255	94.425	6.850	62.273	65.366	11.956
1366-70	135.641	107.401	8.000	72.727	67.716	12.386
1371-75	145.519	115.222	8.000	72.727	63.120	11.545
1376-80	141.024	111.662	8.800	80.000	70.520	12.898
1381-85	150.534	119.193	8.800	80.000	65.898	12.053
1386-90	157.514	124.719	10.867	98.788	77.375	14.152
1391-95	111.784	88.510	9.000	81.818	92.439	16.908
1396-00	113.407	89.796	9.850	89.545	99.731	18.241
1401-05	111.810	88.531	10.000	90.909	102.687	18.782
1406-10	132.939	105.261	10.000	90.909	86.366	15.797
1496-00	120.370	95.309	10.000	90.909	95.384	17.446
1416-20	135.616	107.381	10.000	90.909	84.660	15.485
1421-25	141.680	112.182	10.000	90.909	81.037	14.822
1426-30	148.741	117.773	10.000	90.909	77.190	14.118
1431-35	155.989	123.512	10.800	98.182	79.378	14.519
1436-40	177.022	140.166	11.000	100.000	71.344	13.049
1441-45	143.350	113.504	11.000	100.000	88.102	16.114
1446-50	138.904	109.984	11.000	100.000	90.922	16.630

Year	Basket Consumables Total Value in d groot	Commodity Basket Price Index 1451-75=100 126.295d groot Flemish	Wages of Master Building Craftsmen in Bruges in d gr. Best estimate of median wage	Bruges Nominal Wage Index Mean Mode 1451-75=100 [11d groot Flem]	Bruges Real Wage Index 1451-75=100 harmonic mean	Real Wage in Commodity Baskets Annual: 210 days harmonic mean
1451-55	127.434	100.902	11.000	100.000	99.106	18.127
1456-60	148.845	117.855	11.000	100.000	84.850	15.519
1461-65	112.030	88.705	11.000	100.000	112.733	20.619
1466-70	121.900	96.520	11.000	100.000	103.605	18.950
1471-75	121.264	96.017	11.000	100.000	104.148	19.049
1476-80	148.034	117.213	11.000	100.000	85.315	15.605
1481-85	198.097	156.853	11.000	100.000	63.754	11.661
1486-90	233.028	184.511				
1491-95	183.104	144.981				
1496-00	126.617	100.255				

sources: See sources for Table 5; and also Stadsarchief Brugge, Stadsrekeningen, 1350/51 to 1475/76; and Sosson (1977, pp. 225-32; Tables 13-15, pp. 301-03).