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“Prices and Real Inequality in Europe since 1500”

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ABSTRACT

Introducing a concept of real, as opposed to nominal, inequality of income or wealth suggests some historical reinterpretations, buttressed by a closer look at consumption by the rich. The purchasing powers of different income classes depend on how relative prices move. The influence of relative prices on real inequality was greater in the sixteenth through nineteenth centuries than in the twentieth. Between 1500 and about 1800, staple food and fuels became dearer, while luxury goods, especially servants, became cheaper, greatly widening the inequality of lifestyles. Peace, industrialization, and globalization reversed this inegalitarian price effect in the nineteenth century.

JEL classifications: N33, D12, D31, D63

“Prices and Real Inequality in Europe since 1500”

“Qu’ils mangent de la brioche.”

-- Attributed to Marie Antoinette by Rousseau

The life styles of the rich, the poor, and the middle income ranks involve consuming very different bundles of goods and services. By definition, staples (necessities) are a large share of what the poor consume, and luxuries are a higher share of what the rich consume, generation after generation. Any strong historical trend toward making staples more expensive relative to luxuries should widen the inequalities in real living standards.

Yet our explorations of inequality trends in the past have missed this point. We have been content to trace the history of economic inequality around trends in the conventional shares of income or wealth in current prices, without noticing what the movements of relative prices implied about inequality.¹ This paper lays a foundation for building a new history of European inequality trends over the last five centuries. We use tentative estimates to support these conjectural conclusions:

(1.) Before 1914, and especially before 1815, movements in inequality within and between European nations were more pronounced than has been appreciated. Introducing the concept of real, as opposed to nominal or conventional, income inequality reveals these pronounced inequality movements because relative prices happened to move very differently for the poor and the rich before 1914.

(2.) Between 1500 and 1790-1815 the prices of staple foods rose much more than the prices of what the rich consumed. This greatly magnified the rise in real-income inequality because in those days the poor and the rich depended more heavily on buying services from each other than is true today. The poor needed land-intensive food and housing, and land was owned and rented out by the rich. The rich, in turn, hired servants much more than today, so that the fall in workers' real wages became a fall in the cost of living an affluent lifestyle.

(3.) The opposite happened between 1815 and 1914, for two main reasons. One is that real wages rose, and servants became more expensive and less common. The other is that globalization cut the price of food relative to other goods and services.

(4.) Since 1914, relative-price movements have had little effect on trends in income inequality. The earlier price effects were not repeated for two reasons. First, the main swings in relative prices, such as the oil shocks since 1973, have had similar effects on purchasing power up and down the income spectrum. Second, the shares of income spent on different things are no longer so different between the poor and the rich as they were in earlier times. The poor spend only a tiny share of their income on food and the rich cannot afford many servants.

Our exploration of these issues dwells mainly on the first three of the last five centuries. It was between 1500 and the war era 1790-1815 that life was short, the poor depended on the affordability of food, and food rose in price relative to luxuries. Accordingly, Parts I through VII concentrate on the early modern era, and the period since 1815 receives shorter treatment in Section VIII. We begin with some basic issues of early modern historiography, emphasizing some contradictions and puzzles that a concept of real income inequality can help to resolve.

I. Rethinking Early Modern Inequality

Two promising but difficult paths are leading toward a new appreciation of the rise of global inequality in living standards from the early sixteenth century through the early nineteenth. One path explores that great global divergence in the average living standards of countries and continents, while the other explores economic inequality within societies. Global divergence between countries appears to have emerged in Europe in this era (Allen, forthcoming), and Europe as a whole began to pull ahead of Asia in the late eighteenth and early nineteenth centuries (Pomeranz 2000). Inequality within the nations of Europe may also have been rising (Van Zanden 1995).

Neither path is easy to clear in a pre-statistical era, but both are leading toward a new history of inequality. In this new history, the highly unequal world of the early nineteenth century was neither inherited from an ancient feudal order nor created by the Industrial Revolution. Rather, both paths are leading us toward the suspicion that humans were not yet as starkly unequal when Vasco de Gama and Columbus set sail as their descendents were to become in the early nineteenth century.

A concept of real, as opposed to nominal or conventional, inequality in human living standards will help us make progress along both paths. Using such a concept suggests that on balance, the long era from about 1500 to the 1820s was indeed an era of rising global inequality, like the era since the 1820s.ⁱⁱ To clear the way for this suggestion, a first step is to overhaul the conventional measurements of the gaps between nations' average real incomes.

Measures of early income inequality between nations may have been particularly distorted by the working-class bias in our comparative studies. Driven by social concerns and a partial data base, we have concentrated too much on comparing the abilities of ordinary workers to buy ordinary food. This leads to the anomaly that in the very era where we suspect that Western Europe is starting to pull ahead of Eastern Europe and Asia, our only measures -- those conventional food-wage measures -- imply that Western Europe was actually declining. It is the rise of Western Europe's middle and upper classes that pulled the region's product per capita far ahead of the rest of the world before the 1820s.

As this conjecture implies, inequality within the nations of Western Europe has risen greatly. In fact, the real gaps have widened even more greatly than the widening of nominal income gaps can reveal. What makes the concept of real inequality compelling for the period before the 1820s is that the price

history of this period is wholly unlike anything experienced in the twentieth century. The cost of living for the poor rose and fell dramatically relative to the cost of living for the rich. The relative price of staple foods rose sharply between 1500 (or earlier) and the 1640s, fell in some countries 1640s-1740s, and rose again in most countries between the 1740s and 1815. After 1870 staple foods became much cheaper. Calculations for England, France, and Holland show just how much upward tilt this relative-price effect gives to the trend in inequality before the 1820s. It turns out that the swings in real income inequality within nations were often contemporaneous with, but more dramatic than, swings in nominal inequality.

The likelihood of such inegalitarian price effects can be established even in pre-industrial settings where we lack reliable size distributions of income. As long as agriculture produced, say, a third or more of national income, the ratio of agricultural rents per quality-adjusted hectare to the wage rate of unskilled labor is not so bad a proxy for income inequality as one might think at first. For England, France, and Holland, at least, it moved in concordance with movements in income inequality, both nominal and real. We return to this suggestion in Part VII.

The magnified swings in real inequality, and their correlation with the rent/wage ratio, were caused by the interaction of population growth with concentrated land ownership and Engel's law. Concentrated land ownership and Engel's Law together meant that the poor and the rich depended greatly on each other's factor services. Population growth, by supplying more labor, tipped the terms of inter-class trade against workers, who needed more land-intensive food. This combination was broken up by the French Revolution and by globalization in the nineteenth century.

II. First Things First: Differences in Early Modern Life Expectancy

The concept of living standards that most scholars will rightly favor is the broad one of lifetime resources, not resources per hour or per year. Even if one's view were confined to a monetized measure of a person's free time plus consumption of goods and services, an inquiry into living standards must start from the length of life itself -- especially for early settings, in which food scarcity meant shorter life.ⁱⁱⁱ

What little we know about inequalities in the length of life before the early nineteenth century serves to preview what we will find about inequalities in real incomes. On the one hand, comparing national-average life expectancies across Europe or around the globe is extremely difficult, and we cannot say much about systematic inequalities. On the other, looking within nations, we can detect a widening of inequalities, in this case within Western European countries in the eighteenth century.

Direct estimates of average national life expectancy before mid-nineteenth century are concentrated in the seven countries whose experience is summarized in Table 1 and Figure 1. The advance of English life expectancy as mapped by the Cambridge Group for the History of Population and Social Structure makes the best baseline for comparison with other groups and nations. That English series showed some improvement in life expectancy from the mid-sixteenth century to the early seventeenth, then

a century of retreat back to the old mortality, and finally a sustain rise after the mid-eighteenth century. The improvement after the mid-eighteenth century looks stronger and stronger in writings since the original estimates were presented in the path-breaking Wrigley-Schofield volume in 1981. The Cambridge Group's new reconstitution volume (Wrigley *et al.* 1997) seems to show a stronger rise after 1750, in line with the suggestions raised by Razzell (1994, 1998, 1999, forthcoming) and others.

No other country represented in Table 1 and Figure 1 seems to have kept up with the English national average life expectancy. Even around 1750, at the start of the great lengthening of English life, only the estimates for Sweden seemed to match the English,^{iv} and Sweden fell behind thereafter. As for China, a central interest in this volume, we have two straws in the wind. On the one hand, the available quantitative estimates, like those for Beijing men in Table 1 and Figure 1, show shorter life spans in a few Chinese localities. On the other, Pomeranz (2000, Chapter 1) had argued that we really can't tell that Chinese populations died younger than Europeans.

Any comparisons beyond the few countries in Table 1 and Figure 1 are covered in statistical darkness. For any country outside of Western Europe, and for many within Western Europe, we still don't know how mortality changed. Thus Pomeranz's valid doubt about shorter life spans in China rests on the scarcity of data.

To get an indirect sense of how mortality compared across countries and regions, some have tried to supplement direct estimates of national-average life expectancy with indirect reasoning based on the rate of population growth. That rate must equal the crude birth rate plus the immigration rate minus the crude death rate. If we know that some other regions had faster population growth than Western Europe without having higher birth rates or more net immigration, then they must have had lower death rates. If this contrast continued for a century or longer, one could use the lower death rate as a sign of lower age-adjusted mortality. As it happens, some areas did have faster population growth than England or Western Europe as a whole between 1500 and 1800. China's population grew as fast as England's, and faster than that of Western Europe (McEvedy and Jones 1978, Wrigley *et al.* 1997, Lee and Wang 1990). So did the population of Russia. Asia as a whole grew as fast as Western Europe as a whole. In the case of China, at least, one could further argue that the total fertility rate was not higher than in Europe (Lee and Wang 1999, pp. 67-99), suggesting that its faster population growth must have owed something to a lower death rate. Yet even this inference founders on the lack of good data on how many West Europeans emigrated to the Americas between 1500 and 1800. In general, then, we are still in doubt about the superior life expectancy of the English, and especially about any longer life for Western Europe as a whole, for any time before 1800.

Looking within countries, one can be a little more certain about inequality trends in life expectancies than one can about contrasts between national averages. In general, the top socio-economic classes and their children lived longer after 1750. Genealogical studies show us that the British peers' family members began surviving longer than the national average by 1750 or a little earlier (Table 1 and Figure 1). The ruling families of Europe did not fare as well as British peerage families, but their survival

did catch up with the English national average in the eighteenth century, which apparently gave them longer life than the averages for Continental countries. Similarly, the eighteenth century also brought better survival chances for infants of middle- and upper-class parents in England, France, and Geneva (Razzell 1998, 1999, in progress; Bideau *et al.* 1988; Perrenoud 1975, 1997). Before about 1750, being born into a top-class family had an uncertain average effect on longevity. A child born to a high family did not live longer among British peers, or in the ruling families of Europe. On the other hand, wives of French notables had better adult survival rates at least as far back as 1700-1739, and the families of notables in Geneva lived longer as far back as 1625-1644 (Perrenoud 1997, pp. 300-303).

Thus within the nations of Western Europe, the reigning suggestion -- or guess -- is that life spans were correlated with socio-economic class after 1750, or perhaps earlier.^v This correlation suggests that the inequality of lifetime income or consumption was probably greater across the major income classes than was annual income, at least after 1750.

III. Whose Real Income? Whose Cost of Living? What Prices?

The rise in inequality latter half of the eighteenth century was probably the second of two great widenings of intra-national income inequality in the early modern era, the earlier one coming between 1500 and the 1640s (or 1650). To see the likelihood of these two great widenings, we need to start with differences in consumption styles and how they interacted with the remarkable swings in relative prices between 1500 and the 1820s.

The fact that the rich and the poor consume very different things means that movements in relative prices can affect them very differently. The same may be true of rich versus poor nations. Historians of the sixteenth through eighteenth centuries have misinterpreted differences in early modern living standards by overlooking the effects of income-class contrasts in lifestyles on real-income differences between regions and on inequality trends within nations.

A first step toward giving this point its due is taken in Table 2's overview of class differences in expenditure patterns. Note how much more familiar are the working-class contexts at the top of each panel than the middle and upper class contexts that follow. In expenditure studies, as in studies of income and prices, scholars have fixed their attention on the working class and the poor. We are accustomed to historical household budgets that are spent mostly on food. Even at late as the eve of World War I, Britain's cost of living was still tracked by an index giving 60-percent weight to food, when food was only 27 percent of consumer expenditures (Bowley 1921, p. 67; Feinstein 1972, p. T61). The food share of working-class budgets has always exceeded the national average, which in turn exceeded food's share of consumption by the middle and upper income groups, who spend more on servants, clothing, and miscellaneous luxuries. That income-class contrast gave rise to Engel's Law in the nineteenth century.^{vi}

Engel's Law works over time and across nations as well. Over time, any improvements in national income per capita cut the share spent on food. Our early mostly-food household budgets, like those from England's poor in 1787-1796, come from a setting where food had already dropped below half of national expenditure. Across nations, too, the higher the average income, the lower the share spent on food.

The contrasts in what people consumed mean that any comparisons in real purchasing power depend on which prices are used. The choice matters greatly. The early modern world had greater spatial and temporal variations in relative prices than any seen in the twentieth century, at least until the two oil shocks of 1973 and later. Yet the written price history of the early modern era uses a biased set of prices, following a few series out of proportion to their shares of expenditures. Specifically, that history has these biases:

Over-using the prices of:

- staple products, especially food
- standardized older products
- international traded goods
- wholesale products
- physical goods
- products intensively using land, natural resources, and capital

... and under-using prices of:

- luxuries
- new products
- non-traded products
- retail products
- services
- products intensive in labor, both unskilled and skilled

There are two good reasons for our biased choices. One reason is that we care more about some categories in the first group, particularly life-sustaining staples and the traded goods over which nations went to war. The other reason is that the prices listed on the left are more available. The price series that are most available for constant product definitions over many decades are those for standardized staples in wholesale trade. Yet the more elusive prices listed on the right must get a larger share of our attention if our historical numbers are to reflect the realities of early modern inequality.

IV. Revising the International Divergence of Real Incomes, 1500-1830

There are three ways in which the bias in expenditure shares and the selectivity in prices threaten to distort our view of international differences in average income. First, using common wage rates as proxies for national income per person has hidden the contribution of property-income growth to the overall rise of national income. Second, focusing on food prices has probably hidden part of the West European rise of real income per person for the long periods 1500-1640s and 1740s-1800s, since food prices rose dramatically relative to other prices. Missing the fact that luxuries became relatively cheap

means under-estimating the rise in the relative purchasing power of the leading Western European countries, which consumed relatively more of the cheapening relative luxuries and relatively less of the increasingly expensive staple foods. Third, perhaps a “PPP bias” in international price comparisons has overstated the levels, rather than the trends, of international real-income differences, as has happened consistently in the second half of the twentieth century.

Recent work by Van Zanden (1999) and Allen (forthcoming) has already supported this third point about PPP bias in the sixteenth through eighteenth centuries. Comparing the prices of grain and a few other products across regions and nations, they find that prices are higher where wages are higher, even when both are measured in silver. Here is an initial sense in which international comparisons of incomes, in this case the daily wage in grams of silver, may overstate early modern differences in real purchasing power. A deeper exploration of PPP bias in comparing levels of income or consumption will require gathering data on more goods and services, including many non-tradables, and converting them into grams of silver per modern metric unit. Pursuing this third kind of bias must await a laborious comparison of archaic units of measurement from across Europe and around the world. Here we can only make the first two points, those relating to the over-emphasis on ordinary workers’ wages and on food prices.

A. Workers versus Nations

It’s a simple point. As long as we continue to draw our living-standards data from the poor and from ordinary workers, we are unlikely to find any real-income advantage of living in Western Europe before the 1820s. The food consumption and clothing and availability of warmth will look no greater than in Poland or China. Such an impression is reinforced by the apparent decline in real wages in Western Europe from the sixteenth century through the eighteenth.^{vii} There is the danger of thinking that the global divergence of real incomes dating from the 1820s^{viii} was something new in world economic history, when it is more likely that Western Europe began pulling away in the mid-eighteenth century or even earlier. What most international comparisons have missed is the unmistakable rise of property incomes from mid-eighteenth century on, and in some cases from 1500 on. When prosperity in the upper part of society is combined with the stagnation or decline in real wages, the net result will be a greater apparent rise in real national income per person in Western Europe than elsewhere before the nineteenth century. The possible magnitude of this adjustment will be sketched when we come to the real inequality trends within England, France, and Holland.

B. Cheaper Luxuries, Greater Divergence between Nations

A second point about income-class differences in spending patterns also suggests that we may have understated the rise in global inequality before the 1820s. It is very likely that luxury goods became cheaper relative to staple foods over most of the period from 1500 to 1820. Part of the cheapening took the form of consumer gains from new luxury goods. This early modern phenomenon is well known (van der

Woude and Schuurman 1980, Wetherill 1988, Shammass 1990, Brewer and Porter 1993, Jardine 1996). Yet its importance for real incomes is as hard to quantify for that period as it is for officials trying to introduce new goods and services into today's cost-of-living indices.^{ix} In fact, for fashion goods, luxuries are intended to change constantly, frustrating our search for consistent time-series.

How can the role of new goods be quantified? There is much that can be done by working from both ends of this stretch of the path. Quantitative social historians can continue estimating the values of new consumer durables from probate inventories and other archival documents. Economists can apply new developments in index number theory that allow us to put bounds on the consumer welfare gains from the arrival of new goods (e.g. Feenstra 1994, 1995). While the ultimate magnitudes of the welfare gains from new goods are unknown, they presumably helped the rich more than the poor.

New goods aside, the available time-series on the prices of a few older goods and services show that the prices of necessities generally rose faster than the prices of other goods and services between the early sixteenth century and the late eighteenth. Drawing on the International Price History Project of the interwar years, one can follow the price trends of a dozen major non-staple products of consumption from 1500 or earlier through 1790 or later in a few dozen European cities and regions. We have summarized the trends in relative or "real" prices of non-staples, relative to a food grain or bread, in Figures 2 and 3, with fuller detail in Table 3. The common denominator, in all these relative-price series is a staple food-grain item. The price of bread, a true consumer good, is available to play this role for regions in three leading countries, but in most cases one must use a grain price as if it were a food price.

The general pattern in relative price trends over the whole 1500-1790 period is fairly clear, despite the variations by place and by era. As sketched in Figure 2, unskilled labor definitely fell in price (wage) relative to the cost of grains and bread. The overall three-century drop in this food wage varied between a modest 9 percent (Krakow) and drastic drops of more than 60 percent (Gdansk, Warsaw, and Spain). The declines were concentrated in the inflationary sixteenth century and the late eighteenth.

So great was the rise in food scarcity that few items rose in price faster than basic food grains. The prices of meats, wine, soap, and candles moved in proportion to food-grain prices, neither faster nor slower. One category that clearly rose in price faster than food was rent, either on housing or on the land that produced that food. Another was the set of luxury spices from the distant tropics. Like the cinnamon price featured here, the prices of pepper, nutmeg, and cloves also rose faster than grain prices in many settings, the exceptions being pepper in sixteenth-century Augsburg and ginger and saffron in eighteenth-century Warsaw. Yet spices made up only a tiny share of household expenditures, even for the rich.^x More relevant, the cost of such fuels as firewood, charcoal, coal, and peat rose at least as fast as the food price. While the

food crisis may have been greater than the fuel crisis in the sixteenth century and the late eighteenth, fuel scarcity was more evident than food scarcity in the trends between 1600 and 1750.

While succeeding generations of unskilled workers found it increasingly hard to afford rent, food, and fuel, other product prices rose more slowly than their wage rates. That was generally true of beer, textiles and clothing, writing paper, some miscellaneous luxuries, and sugar, as sketched toward the bottom of Figure 2. At the very bottom of the price-trend ranks were silver and national moneys of account, since these centuries brought considerable price inflation. Settings aside the two forms of money, the products falling in price relative to food had two salient features:

- (1) their production made intensive use of factors of production that were getting cheaper across these centuries; and
- (2) they tended to be luxuries.

The falling-real-price products in the lower half of Figure 2 tended to make relatively more use of labor and capital, which were falling in relative price.^{xi} By contrast, the main rising-real-price products -- housing, fuel, and food -- called for more intensive use of land (farmland, forests, and mineral reserves), the factor that was rising in price. The pattern does not fit perfectly, of course. The increasingly scarce spices were not land-intensive in a sense that is meaningful for Western Europe, and increasingly cheap sugar did use land. Yet as a general rule, land-intensity is lower in the lower half of Figure 2's list of products. This factor-price pattern suggests a cost-side explanation for some of the price trends.

The other salient feature of the falling-real-price products in the lower half of Figure 2 is that they tended to be luxuries, or at least not staples. The tendency was rough, and had its exceptions. Beer was a luxury in the working-class end of the spectrum, though sugar was not (Clark *et al.* 1995, p. 224), and luxury wines did not fall in price relative to food grains. Most studies find that clothing was slightly a luxury good, which should imply the same for the textiles that were fashioned into clothing. Writing paper, chocolate, pewter, and sealing wax were surely luxury goods, and they fell considerably in price relative to food grains.^{xii} And as we shall note in Part V, labor itself was a luxury, in the sense that the rich spent a greater share of their income buying labor.

This inter-product pattern in real prices before 1820 brought greater real-income gains for richer nations, just as it did for richer classes within each nation. Developing truly national cost-of-living indices, with luxuries taking a greater share of expenditure in the richer nations, would probably reveal that the global inequality of real purchasing power rose faster than the global inequality of income measured in units of any one good such as silver or wheat. It also did so without a trend toward globalization. While there was enough trade integration in early modern Europe for prices to move in harmony between regions and nations (Jacks 2000), there was no secular trend for price gaps to shrink until after the 1820s, as O'Rourke and Williamson (2000) have stressed.

V. Trends in the Class-Specific Cost of Living, 1500 - 1830

How has the traditional focus on wage rates and on grain or bread prices biased our view of real-wage trends and inequality trends within countries?

If one just expanded the cost-of-living deflator to include such familiar non-food goods as beverages, clothing, fuel, and light, then the traditional real-wage studies would not need a massive adjustment. We could end up seeing only that average real incomes declined a bit less than past studies of the food wage have implied.

Yet the partial expansion of the cost-of-living bundle should not stop there. It should also explore how the cheapening of luxuries relative to staples interacts with those differences in expenditure shares illustrated back in Table 2. By omitting these interactions, past studies have missed the inegalitarian feature of cost-of-living trends before the early nineteenth century. That is, difficulties in both concepts and data have caused us to underestimate the widening of the economic gaps within nations. This is true not only of the real-wage literature but also of the literature that has followed nominal income inequality (e.g. Lindert and Williamson 1982, 1983; Van Zanden 1995). It is time to probe more deeply into real income inequality.

The next step is to supplement the introduction of a few luxury goods in Figure 2, Figure 3, and Table 3 with further discussion of two particular differences in life-style between top and bottom income classes. With these in view, we will be able to construct class-specific cost of living indices and measures of trends in real income inequality.

A. The Declining Real Cost of Servants

The real wage rate itself has a further implication about real inequality. High-income families hired labor directly as household servants and day servants. So the lower the real wage rates sank before 1820, the cheaper the cost of living the high-income lifestyle. This key point needs to be quantified as best the data permit. Conversely, the rise in real wages after the 1820s meant that the cost of living of the rich advanced faster than the cost of living for workers. Who hired servants, and in what numbers, can be roughly gauged from a variety of sources discussed in Appendix A. Since servants' nominal wages apparently followed the wage rates for the unskilled agricultural workers (Snell 1985, pp. 25-47, 411-417), which in turn moved similarly with unskilled building wages before 1820, one can use an unskilled wage rate as a rough index for servants' wages.

To the extent that upper-class employers paid their servants in kind, one could say that expenditures on servants are already built into the data on other expenditures of the household. That is the case for the English data in Table 2, though not for the Duc de Saulx-Tavanes. Yet even for the English

data, it makes sense that the pay in kind for servants varied in its nominal value with the nominal wage of servants, more directly than with the prices of the goods and services purchased for them. Accordingly, we have inferred the shares of food and other items implicitly paid to servants by applying low-income consumption weights to total expenditures on servants, and have deducted these from the rich-household expenditures on these other categories in Table 2. To the estimated full servant bill -- both for those paid in kind and for those paid in cash --we use the unskilled wage rate as the barometer of their unit cost. The unskilled wage rate itself thus becomes a luxury-service price, one that greatly affects our estimates of the trend in living costs for the rich.

B. Selling Food or Housing to Themselves

The meaning of price movements depends critically, of course, on whether one is a buyer or a seller. Past measurements of the cost of living and real wages have assumed that households sell everything they make and buy everything they consume. That is often not the case, of course. Many households consume what they produce. Others sell more of a consumer good or service than they use, making them beneficiaries of higher prices of that good or service.

The first place where the consumption of non-purchases intrudes into the traditional discussion is in the consumption by lower-income rural households of food and clothing they produce themselves. As William Hagen (1986) has rightly warned, ordinary peasants do not experience anything like a 30 percent loss of real income when food prices rise 30 percent relative to the wage rate. In many cases, their real income is wholly unaffected. This clearly important point is hard to quantify. In England, the socio-occupational categories in the social tables of 1688-1803 imply that among families with below-average income the share of home food consumption that was home-produced was probably between 4 and 30 percent of total income.^{xiii} The importance of home production will have been greater in less market-integrated settings. In early modern Europe, this kind of protection against price movements was probably greater in the countryside and to the east. All subsequent discussions of real wages as measures of the real purchasing power of "the masses" must remember that real wage measures overstate the real-income importance of movements in those measured real wages.

Yet the likely magnitude of home production as a share of workers' incomes would not have been as great as the share of a different kind of home production, one that affected the top income groups. The fact that high-income groups bought housing mainly from themselves needs particular attention here.

For all the narratives about the cost and condition of workers' housing, very few historical cost-of-living indices have been able to include housing rents. This is not surprising, since housing is more varied and changing in its quality than bread or coal. For housing, as for fashionable luxuries, the variety and change frustrate our attempts to build long-run time series. Yet in a few cases it has proven possible to produce long time series of the rental prices of housing of given quality. We now have fair housing rent series for Holland and Belgium.^{xiv} Philip Hoffman has assembled another index for pre-Revolutionary

Paris. In addition, Gregory Clark has now assembled credible housing rent series extending from the mid-seventeenth to the mid-nineteenth for London, for the rest of England, and for England as a whole.

Housing rents, as we saw in Table 3, rose at least as fast as the cost-of-living index in general up to the early nineteenth century, and they rose even faster across the rest of that century. Over the last five centuries as a whole, housing is probably the one major consumer price that might have kept pace with the wages of labor, when quality is held constant.

If everybody spent the same share of their budget on rented housing, then the movements in the relative price of housing would play little role in class differences in cost-of-living trends. Housing's share of a broad concept of total income or expenditures is indeed roughly constant across the income classes in any given year. Economists have noted that the income elasticity of housing is near enough to unity that one could use the value of occupied housing as an index of permanent income.^{xv} So as far as the use of housing is concerned, its rough proportionality to income might suggest that movements in the real price of housing should not have caused any difference in cost-of-living trends between the rich and the poor.

Yet the impact of house-rent movements on the different income classes was probably far from neutral, since the rich owned housing and the poor typically did not. It would clearly be wrong to imagine that a jump in rents would raise the cost of living for an affluent household that owned its own home. And if that affluent household owned housing that it rented out to others, the jump in market rents would raise, and not lower, its real income. Many affluent households were in fact exporters, not importers, of residential housing. A rise in real rents would therefore favor the rich.

The fact that housing owners were higher in the income ranks than housing occupants would not have complicated our accounting for relative real incomes if the historical record of nominal incomes had correctly including all the incomes that owners received from their residential properties, including their own (owned) home. Had that been the case, then any jump in real rents would be recorded correctly as a jump in their nominal income, partly offset by the fact that some of the housing they own was consumed by themselves rather than rented out for income.

That is apparently not the case, however. None of the scholarly estimates of early high incomes makes any explicit reference to an imputation for owner-occupied housing. Typically someone like Gregory King would show awareness of owner-occupied housing only in separate discussion of the nation's housing stock, and would not carry its value over to any tabulation of income by class. Nor, as far as we can tell, did the official returns on income taxation in England and France give this point its due. Our views of the real income movements of high-income groups are in danger of implicitly assuming that they had to rent all their housing from landlords. We will have stepped into that trap if we take nominal incomes, excluding imputations for owner-occupied housing, and deflate them by a cost-of-living index that implies that these affluent families had to rent all their lodging.

To avoid the mismatching of the nominal income concept and the cost-of-living concept, one has two choices. Either

- add the imputed rental of all owner-occupied housing to the measures of nominal income by class, or
- exclude housing from the cost-of-living bundle, giving 100 percent of the expenditure shares to other products.

Since this paper concentrates on making points about relative prices, we take the second approach here. Since it is hard to know the exact share of their housing that top income groups owned, we shall present two alternative estimates of the cost of living in top-income families, based on these two extreme assumptions:

- (1) the assumption that the high-income families owned none of their housing, and paid full rent, and
- (2) the assumption that the high-income families owned all of their own housing and paid no rent.

The truth should lie between these two extreme cases.

C. Tentative Cost-of-Living Indices by Income Class

Armed with the expenditure shares in Table 2 and price series like those illustrated in Figure 2 and Table 3, one can put together cost-of-living indices that apply to the expenditure patterns of the different income ranks. Tables 4 through 6 present the relevant price series for England, the Paris Basin, and Holland. Figure 4 summarizes the contrasts in the cost-of-living trends for the top and bottom groups. In Figure 4, a rise is egalitarian in that it means that the cost of living rose more for the rich than for the poor. A decline is inegalitarian.

The cost-of-living deflators for different income classes moved very differently before the early nineteenth century. For England (Panel A in Figure 4), the movements reveal historical eras that seem to match those delineated by other inequality indicators. First, during the famous but gradual Price Revolution between 1500 and 1650, the top income groups enjoyed a relative decline of about 20 percent in their cost of living, in the form of less price inflation, relative to the prices faced by workers and the poor. Then, between about 1650 and about 1750, the common people had the better of it, with a reversal of that previous 20-percent movement. That is, by 1750 the cost-of-living bundles of the rich and poor stood in the same relative-price ratio as they had 250 years earlier. In the second half of the eighteenth century, this swing was itself reversed again, so that in 1800 the relative cost-of-living hardship of being poor was as bad as back in 1650. In the late nineteenth century, as Part VIII will show, the pendulum swung back in favor of workers and the poor. In fact, it swung further their way than at any time over the previous three centuries. The early modern English swings, those before the early nineteenth century, were dominated by swings in the relative price of staple foods. In the inegalitarian era of the Price Revolution,

1500 – 1650, the food-cost effect by itself would have caused an even greater shift toward a relatively greater cost of purchasing a typical low-income consumption bundle instead of a high-income bundle, had other movements not offset it. For the next two swings, 1650-1750 and 1750-1800, the food-price effect accounts, more or less, for the swings in the relative cost of living.

In pre-revolutionary France, the broad class differences in cost-of-living trends looked similar. Relative to an urban working-class household, a wealthy noble family had a declining cost of living up to the 1650 benchmark, especially if homeownership shielded them from the rapid rise in housing rents. In this respect, nobles and wealthy merchants differed. Some rented their high-class housing, just as the Duc de Saulx-Tavanes rented his Paris residence. Others owned their own housing, just as the Duc owned his country estate. There is again an egalitarian drift between 1650 and 1750 and a reversal between 1750 and 1790, though these movements were smaller than those in England.

In Holland, as in France and England, the cost of a high-income lifestyle declined relative to the cost of living in a working-class household, as shown in Panel C of Figure 4. In both Holland and France, the real movement in relative living costs came in the era before 1650. We see only a slight imitation of England's late-eighteenth-century inegalitarian trend.

VI. Rough Estimates of “Real Inequality” Trends for Early Modern England, France, and Holland

Real income inequality is an important index-number concept that could be fully formalized with an explicit overall welfare function that combines different people's individual wellbeing. One approach to specifying an aggregate welfare function is to assume a meta-utility function in which everybody has the same basic tastes. In this approach, even though the poor and the rich have the same tastes in the abstract, having very different resources means that the same price movements affect their welfare very differently. A formal model of social welfare in this spirit has been developed by Dale Jorgenson, Erwin Diewert, and Daniel Slesnick (Jorgenson and Slesnick 1983, Diewert 1990, Slesnick 1998). It allows one to combine welfare changes for the poor and the rich into the same overall welfare metric. Here we follow a similar approach, but to avoid the troublesome index-number concept of overall real wellbeing we will illustrate real inequality movements only in ratios of the real income of higher income ranks to the real income movements of lower ranks.^{xvi} The ratios of real purchasing power can help answer such questions as “What happened to the relative abilities of higher and lower income ranks to buy things in the proportions typical of their lifestyles?” or “How did the real incomes of higher and lower income ranks compare with those of their counterparts in earlier generations?”

The history of real-income movements seems more volatile than that suggested by more conventional measures of nominal income inequality. The bottom panels in Tables 4-6 underline this point by reinterpreting the movement in the income ranks between benchmark dates.

In England and Wales, both the egalitarian change between Gregory King's 1688 and Joseph Massie's 1759 and the subsequent inegalitarian change from 1759 to Patrick Colquhoun's 1802 (1801-1803) were apparently greater in real terms than in nominal terms. This can be illustrated by looking at what happened to the ratio of top-decile income to the income of the bottom two fifths between 1759 and 1802 in Table 4. In nominal terms this ratio rose by 50 percent (from 14.4 to 21.8). But in real terms, it rose by 76 percent (from 13.0 to 21.8) assuming the rich paid full rent for housing, or by 81 percent (from 12.8 to 21.8) assuming they paid no rent. That is, the movement of real inequality proves to have been a magnification of the movement in nominal inequality. The same holds for the other periods shown in Table 4, Panel C.

In the case of eighteenth-century France, too, the price movements amplified the movements in nominal income inequality. The trends were modest in this case, however, and they seemed to reverse at mid-century. As shown in Table 5's Panel C, the income ratios dividing rich and poor may have narrowed a bit between 1700 and 1750, and re-widened between 1750 and 1790. These modest movements are subject to wide ranges of possible error, as Morrisson and Snyder (2000) warn us. For what it is worth, the same shift from a possibly egalitarian trend before 1750 to an inegalitarian trend between 1750 and the Revolution was magnified by the movement of relative prices.

For Holland, price movements seem to have magnified a greater and more prolonged rise in inequality. The current price estimates of Van Zanden (2000) accentuate the inegalitarian drift in his earlier (1995) estimates of Holland's nominal income distribution. Over the entire three centuries from 1500 to 1808, say his estimates reproduced in Table 6, the rich got richer and the poor got poorer, with the gaps widening even more in real terms than in nominal terms.

Would a closer look at other countries and regions also show that relative price movements accentuated the widening of gaps between rich and poor before the early nineteenth century, as they seem to have done when incomes widened in England, France, and Holland?

VII. Land Rents versus Wage Rates: A Better Clue to Pre-Industrial Inequality than We Thought?

The early modern, or pre-industrial, eras of contrasting movements in the relative cost of living and in real income inequality may look familiar. They were also contrasting eras in the behavior of land rents, real wages, and population growth. The different contrasts are probably related.

Economic historians have long resisted the temptation to use a simple ratio of farmland rents per hectare to agricultural wage rates as a clue to inequality. The distribution of income, even within the

agricultural sector alone, is too complex to be quantified by a single factor-price ratio. It is affected by the distributions of land and skills, by the interest rate, and by a host of barriers that impose rationing and multiple prices into every factor market.

Yet the points just raised about the real incomes recommend reviving the idea of using the available rent/wage ratios as a good clue to the direction, if not the exact magnitude, of movements in inequality. This is especially true in those historical and Third-World settings where agriculture still looms large as a share of national income, and where most agricultural land rents are received by the rich. Before 1820 most countries fit that description.

The rent/wage ratio's value as an inequality clue is supported by two arguments:

(1) Where rents are collected at the top of the overall-income ranks, any forces that raise them will obviously widen the income gaps.

(2) The wage denominator in the rent/wage ratio is also a proxy for the cost of domestic service.

A drop in real wages for common labor lowers the cost of living for the rich, in addition to depressing the living standards of lower income groups.

These points deserve further exploration. Figure 5 and Appendix C show the broad movements in the numbers of days it would take a farm laborer to rent a hectare of cultivated land. England, the Paris Basin, and the Western Netherlands all showed major increases in the farm rent/wage ratio between the early sixteenth century and the early seventeenth. No rise in this indicator was evident between about the 1640s and the 1740s. Then, between the 1740s and about 1800 the labor cost of renting land jumped again in all three countries. If one were interested in how many days of labor it would take for an aspiring laborer to purchase a hectare, as opposed to just renting it, the upward movement would be even more pronounced than in Figure 5. The reason is that the real rate of interest, a force holding down the purchase price relative to the rental price, dropped greatly over this long era, especially in the more inflationary and inequalitarian periods 1500-1640s and 1740s-1800 (Allen 1988, Homer and Sylla 1991, Clark 1998). These movements seem to parallel all three countries' movements in real and nominal income inequality.^{xvii}

VIII. Since the Early Nineteenth Century

Did the cost of living move differently for high and low income ranks since the pre-industrial age? How did luxury goods' price trends compare with those on bread? Was the hiring of servants still a big factor making any real-wage movement affect poor and rich consumers in opposite ways? Did the upper and middle classes still own their homes much more than the poor? Were staple foods still a much greater share of low-income budgets than of high-income budgets? The evidence continues to be sparse for the nineteenth century and even for the twentieth. Yet we can see a general pattern: Movements in the relative

costs of living rich and poor lifestyles seemed to move in favor of the poor across the nineteenth century, and there were no trends at all in relative consumer prices in the twentieth.

The price trends of luxury goods versus staple grains can be discerned in a few cases, thanks to the fact that staple grains are the most documented of commodities. For Western Europeans, food grains became cheaper relative to most other goods in two nineteenth-century periods. The first great cheapening of food came in the first quarter of the century, especially in the decade after Waterloo. The recovery of international grain markets meant cheaper grain in the grain-importing countries, as evidenced by relative price movements in England and Milan (Phelps Brown and Hopkins 1981, DeMaddalena 1974), for example. This had an egalitarian effect, as suggested by the inter-class movements in the cost of living in England (Figure 4A).

Western Europe's second period of an egalitarian movement in relative costs of living was the last third of the nineteenth century. Once again, improvements in grain markets get part of the credit. Cheaper grain from across the Atlantic and from Eastern Europe meant that grains and bread fell in price relative to labor, housing, meat, and dairy products. So say the data for food-importing England and the food-importing regions of Germany and Russia (Phelps Brown and Hopkins 1981; O'Rourke and Williamson 1999, Chapter 3). The same was not true of food-exporting regions, however, as shown by grain-price movements in Russia, Germany, and the United States, and by relative-price movements in Lvov (Lemberg) in Austria-Hungary (O'Rourke and Williamson 1999, Chapter 3; Hoszowski 1934). Thus the great grain globalization of the late nineteenth century favored workers' relative purchasing power in food-importing Western Europe, though not in food-exporting areas. Workers were denied some of the benefits of cheaper grain in France, Germany, and Italy, which imposed new tariff barriers in the last quarter of the century.

The real wage gains of the nineteenth century presumably raised the cost of high-income lifestyles, in mirror image to the inegalitarian effect of labor cheapening in earlier centuries. As the wage gains made servants more expensive, employers economized on their use. Domestic service declined as a share of the labor force and as a number of servants per rich household. The rise in wages relative to other factor incomes and the decline in the share of servants in total employment offset each other's effect on the share of national product spent on domestic service. That share had no clear trend until it finally declined after World War II.^{xviii}

By the early twentieth century, the basis for earlier wide swings in relative living costs had disappeared. No longer did top and bottom income strata differ so sharply in the shares they spent on staples versus luxuries. Engel's law plus prosperity brought all staple-food shares down toward zero, reducing the contrast between rich and poor expenditure patterns, for any given income ratio between the two groups. Meanwhile, income inequality itself shrank throughout Western Europe over the first half of the twentieth century (Kuznets 1955, Lindert and Williamson 1985, Lindert 2000, Morrisson 2000, Morrisson and Snyder 2000), due to fiscal redistribution and the logic of moving from a property-based

economy to a more egalitarian skills-based market economy. This automatically reduced the contrast in budget shares.

For example, a pair of surveys of British households in 1937-1939 found the usual directions of contrast between a working-class sample and a middle-class sample. Yet the magnitudes of the contrasts had shrunk. The share of food and drink was 39.6 percent for the working-class group and 26.9 for a smaller middle-class group, a contrast of less than 13 percent of total expenditures. Contrast this with Table 2's gaps from earlier eras, such as that between the bottom 40 percent and the top 20 percent in England and Wales in 1688. The former spent 59.7 percent on food and drink, and the latter spent only 31.5 percent, a contrast of over 28 percent. The shrinking and convergence of the expenditure shares meant that any movement in food prices versus other prices would mean less in the more prosperous and egalitarian twentieth century.

Finally, globalization and price history also conspired to dampen movements in the relative price indexes themselves in the twentieth century. The real price of food has not had swings in the twentieth century to match those of the sixteenth through eighteenth centuries, partly because in a globalized food market shocks in different areas are more easily offset by trade. The only major relative-price shocks have been the oil-price shocks since 1973 and the headlong fall in the prices of computing and communications over the last quarter of the century. Yet these do not affect the poor and the rich as differently as did early modern price movements. Dependence on gasoline and home heating does not divide sharply along income-class lines. As for computers and computing, it might seem that these benefit to more wired-in upper income groups, but the benefits have diffused quickly to all income classes. In particular, the communications revolution has greatly cheapened discount-store merchandizing of staple goods. Overall, it so happens that the cost-of-living indexes appropriate to poor and rich lifestyles shared much the same trends across the twentieth century.

IX. Summary

Five centuries of relative-price movements suggest some striking contrasts in real-income trends -- contrasts between eras, contrasts in income-class fortunes, and contrasts between nations' real income progress.

The eras that stood out as eras in which price trends favored the rich were also eras in which a rise in nominal inequality also favored the rich. Thus those eras brought more acute widening of real purchasing power than in nominal income inequality, on which we have focused in the past.

The era with the clearest inegalitarian trends seems to have come at the very start of these five centuries, long before any Industrial Revolution or globalization. It was between 1500 and 1650 that the rich benefited most from the relative cheapening of new luxury goods and of old luxury goods such as domestic servants, while soaring land rents probably also enhanced their nominal incomes. In the same

period the poor faced a trend toward scarcity of food, housing, and land. As far as we can tell, this shift toward dear food and cheap luxuries was experienced throughout most of Europe before 1650.

Inegalitarian trends revisited at different times between 1650 and the turbulent 1790-1815 era. For England and France, at least, one might argue for a second inegalitarian era across the second half of the eighteenth century. For England, this second inegalitarian age probably came between 1740 and 1795-1815. It might have had a similar dating for France, but data limitations allow us to see only a slightly inegalitarian trend change between 1750 and 1790. For Holland, the timing was quite different. The three centuries of rising inequality traced by van Zanden (1995) were slightly augmented by inegalitarian price movements. Yet of the whole three-century pre-industrial era, the time when relative price movements contributed the most to purchasing power at the top and misery for the masses was the period before 1650.

The nineteenth century, which lacked a clear overall trend toward nominal income inequality, was also a period in which relative-price movements were egalitarian, helping the advance of purchasing power for workers more than for the time income classes. In the twentieth, by contrast, the net trend toward greater equality in Europe was hardly affected by relative price movements.

The divergence in early modern price trends also carries an implication for trends in international inequality, at least within Europe. To the extent that all countries shared a drift toward scarce grain and cheaper luxuries between 1500 and 1800, the real purchasing power of the richest nations, especially England and Holland, must have risen above other nations' purchasing power even faster than the silver-price or constant-price comparisons could reveal. Real purchasing power must have risen faster, other things equal, in countries where consumption patterns favored the goods that were falling in relative price. Over much of the sixteenth through eighteenth centuries, those falling-price goods tended to be luxuries, giving an extra relative bargain to England and Holland.

What caused these relative-price movements that so reshaped the history of inequality? The eventual answer is likely to be multi-causal, of course. Political and military history, technological history, climatic history, and demographic history probably all played significant parts in shaping this history of prices and inequality. Yet among the main forces governing prices and incomes and inequality, one in particular is likely to stand out for the pre-industrial era. The rate of population growth seems to have driven the main trends in real prices and inequality, across periods and countries.^{xix} Faster population growth by itself could have lowered real wages, raised real land rents, raised the price of staple foods relative to luxuries, and raised real inequality even more than it raised nominal inequality. For our three leading countries, population growth was faster in the inegalitarian eras 1500-1640s and 1740s-1800 than in other eras.

Swings in population growth due to what? Here we return to the frontier questions of early modern demographic history. Tentatively, a significant share of the answer has to be due to swings, and then dramatic reduction, in mortality. This leads to the odd result that people's annual incomes became more unequal largely because people were less unhealthy and survived better, especially in England. At least that was the pattern up to the early nineteenth century.

In retrospect, the wartime era between the 1790s and 1815 was an historic high-water mark of expanded population, scarce food, cheap servants, and wide income gaps in Western Europe. It was the kind of period that could have inspired pessimistic theories of population and economics. If one were inclined to fear that population growth would cause food scarcity and a drop of wages back down to subsistence, the year 1798 would have been a good time to write an Essay on Population persuading a wider public to take these fears seriously. And if one thought that population growth tended to raise land rents for the rich at the expense of workers and capitalists, with workers' wages again sinking back to subsistence, 1817 would have been a good time to publicize this prediction in a book on Principles of Political Economy and Taxation.

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ENDNOTES

ⁱ A laudable exception is Williamson (1976), which explored movements in real income based on different cost-of-living indexes for the different U.S. income classes since 1820. Williamson's study, like this one, found that movements in relative prices typically accentuated the movements in nominal income inequality. The U.S. relative-price effects he studied were, however, less dramatic than those revealed here.

ⁱⁱ "The 1820s" here represent a compromise postwar benchmark. In some cases, the phrase means the initial postwar era of recovery on the Continent and agricultural depression in England, 1815-1820. It also serves as a link to Angus Maddison's (1995) estimates for 1820 in his study of the world economy, and to the argument by O'Rourke and Williamson (2000) that international price convergence may not have progressed between the 16th century and the 1820s. In other cases it refers to the 1831 output benchmark date for the UK or to the Morrisson-Snyder (2000) benchmark estimates of French inequality in 1836. And for some Continental countries the disruption of the French War era 1790-1815 will require stopping the evidence at 1790 instead of the 1820s.

Similarly, we will at times equate the 1640s or even the early seventeenth century with 1650 and the 1740s with 1750 as turning points. The dating of turning points has to be flexible, since different series changed trends at different times.

ⁱⁱⁱ The sensitivity of mortality to food scarcity is confirmed by several studies in "New Evidence on Standards of Living in Pre-industrial Europe and Asia," a conference-volume-in-progress, edited by Tommy Bengtsson and Martine Dribe, based on the Arild (Sweden) conference of August 1-5, 2000.

^{iv} So say not only Table 1's estimates for Swedish females 1750-1759 but also the reconstitution experiments of Bengtsson and Oeppen (1993) on population data from Scandia in Southern Sweden 1650-1750. Apart from mortality crises around 1675 and 1705, Scandia's mortality seemed no worse than English over this century.

^v This way of summarizing the inequality of life spans is the conventional way, which tends to focus on class and to view the survival of infants as something experienced by their parents' class. A more logical approach would be to view all persons as separate individuals, and to follow the inequality in live spans and in consumption per lifetime. On this more logical approach, inequality of life spans in Western Europe has been dropping ever since 1750, mainly thanks to the elimination of infant mortality.

^{vi} Table 1's distinction between the full-rent and no-rent expenditures for the upper classes will be discussed in Part V.

^{vii} For the robust conclusion that workers' abilities to purchase food were declining in most European countries across the second half of the eighteenth century or longer, see Brown and

Hopkins (1957, 1959, 1981), Braudel and Spooner (1966), Söderberg (1974), Van Zanden (1999), and Allen (forthcoming).

^{viii} The monotonic rise of global income inequality since 1820 is documented by Bourguignon and Morrisson (2000).

^{ix} This is not to imply that all new goods were luxuries. The New World introduced the potato and other new foods that were to become staples. Yet the introduction of these was not sufficient in its impact to prevent the rise in the real price of staple foods relative to luxuries before 1820. Two other likely exceptions were health-related: cotton clothing and other aids to sanitation might have helped the poor as much as the middle and upper income groups. Even these new goods had a not-so-egalitarian side, to the extent that they raised the labor supply, bidding wages down and rents up.

^x For example, in 1784-1786, spice imports were less than one percent of the value of imports into great Britain (Davis 1979, p. 110). They would have been an even smaller share of income in the top 20 percent of families.

^{xi} That labor was increasingly cheap relative to most products and the overall cost of living is evident in Table 3 and in the real-wage studies of Van Zanden (1999), Allen (forthcoming), and earlier authors. The cheapening of capital inputs follows mainly from the drop in interest rates (Allen 1988, Homer and Sylla 1991, Clark 1998). On the rise in real land rents, see Part VII below.

^{xii} On a musical note, another luxury that became cheaper relative to bread or the overall cost of living was a London opera ticket. While other nominal prices rose between the 1720s and 1786-1787, opera tickets stayed fixed at 10s 6d for boxes and the pit, and at 3-5s for the gallery (Hunter 2000, p. 35).

^{xiii} This statement uses the social tables in Lindert and Williamson (1982), and assumes that home production could have been 100 percent of income for lesser freeholders and husbandmen, and 10 percent for laborers, vagrants, paupers, and cottagers.

^{xiv} On housing rents in Holland from the mid-sixteenth century on, see Van Zanden (2000) and the sources cited there. A series for Bruges from 1500 on is given by Verlinden *et al.* (1959-1965).

^{xv} For an application of the unit-elastic assumption about housing to the economic history of inequality, see Williamson (1985).

^{xvi} This paper confines itself to sketching movements in early modern inequality in income before, rather than after, taxes and transfers. The pre-tax pre-transfer focus avoids the difficult task of exploring fiscal incidence, a topic too vast to undertake here. So for the time being, we must perpetuate an inconsistency shared by most of the literature presenting real-income time series. We use a price deflator appropriate to disposable income --- that is, after-tax and after-transfer income -- as a denominator for original income, from which taxes and transfers have not been netted out.

^{xvii} In Germany, Belgium, and Denmark, and in parts of France away from the Paris basin, something similar happened between the 1730s and about 1800, according to some figures and tables in Abel (1973, esp. pp. 294-295).

^{xviii} See Appendix A.

^{xix} Our emphasis on the role of population growth echoes the interpretation of Phelps Brown and Hopkins (1957, 1959, 1981).