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Historical Account Books as a Source for Quantitative History

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Abstract

The account books of long-standing institutions such as monasteries, universities, hospitals, courts, and private landed estates have an enormous potential for quantitative history. They can be used to collect prices, wages and rents which are useful for macro and micro historical topics, including the reconstruction of historical national income accounts, the study of inequality, tracking the evolution of human capital skill premia over time, studies of standard of living, gender pay differentials, and even the histories of specific professions They also permit building price indices which provide a long-term measure of inflation over time, a precondition to interpreting past monetary amounts. Even for European history, there is still enormous potential for the usage of these sources; in other parts of the world, where equivalent sources often also exist despite the late formation of modern states, their usage is still in its infancy.

Keywords: historical institutional account books, prices, wages, GDP

Introduction

Historians love to complain about the lack of sources for quantitative research, but in fact, one thing that the past has left us in great quantities is market prices, wages, and rents. Institutional account books are relatively uniform sources which contain expense and revenue records which sometimes go as far back as the middle ages. They are available for many parts of the world, and they can be used both for macro and micro historical topics. These include the reconstruction of historical national accounts, the study of inequality, tracking the evolution of human capital skill premia over time, studies of standard of living, gender pay differentials, and even histories of specific professions.[2] They can hence be used to estimate the evolution of skill premia over time, as well as distributional matters.[3] Even for European history, there is still enormous potential for the usage of this type of sources; in other parts of the world, where equivalent sources often also exist, their usage is still in its infancy.[4] This type of sources can even be used for places where modern states which kept organized taxation records formed relatively late.

Data sources

Different kinds of historical account books sometimes survive, but in this chapter, I focus on historical institutional account books, which tend to be particularly convenient. The most common sources of this nature are the account books of landed estates originally belonging to local government and royal administration, as well as those of historical hospitals, prisons, charities, orphanages, courts and institutions of the church, particularly monasteries and convents. Sometimes account books of longstanding universities also survive – in Portugal, for instance, Palma and Reis (2019) used, among other sources, the account books of the royal university of Coimbra. The sources are today typically placed in National and Regional Archives. These institutions were purchasers of both commodities and labour services. Some of them were also sellers. It is hence possible to collect data on wages and land returns. Capital returns are usually harder to come by, though it is often possible to know certain in-

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[2] With regards to the reconstruction of historical national accounts, the degree to which the different studies rely on institutional account books varies; typically, studies that reconstruct GDP from using a demand approach rely more heavily on this type of source.

[3] See for instance Costa, Palma and Reis (2015), Reis (2017), and Malinowski and van Zanden (2017).

[4] Remarkable recent studies for other parts of the world include Abad and van Zanden (2016), Bassino et al (2019), Broadberry et al (2015), and Broadberry et al (2018).

terest rates, both private and public, as well. The account books typically display the date of the transaction, the gross and unit value of the commodity, the unit of measurement employed, the quality of the product (e.g. coarse or fine paper, mutton, pork or beef) and particular features of the transaction.[5] Figure 1, which comes from a 1650 expenses book of a monastery, presents an example.

Figure 1. A typical example from an expenses book page containing wages and prices for 1650. From the Convento da Graça de Évora (Códice CLXVII/1-6), now deposited in the *Biblioteca Pública de Évora*. This was one of the sources used by Palma and Reis (2019).

Collecting the data presents several challenges. First, the data is not always fully digitized. Even when digitized, it can take a long time to collect; this is especially true for the periods before the early sixteenth century. While it tends to be the case that the further back in time one goes, the data becomes less abundant, this is not always the case. In England, for instance, the period of 1492 to 1553 corresponds to a "statistical dark age" (Broadberry et al 2015, p. 120-124).

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[5] The data is easiest to collect when it comes in a list, as is the case with expenses books. But for periods when not enough information of this type survives, it is often possible to alternatively collect prices from individual contracts (e.g. as Palma and Reis 2019 do for parts of the sixteenth century).

Second, there is the matter of borders. Countries like Italy and Germany did not exist prior to the nineteenth century. The most common convention in economic history is to use fixed borders, and these are typically modern borders: that is, when speaking about Germany's GDP for 1500-1800 (Pfister 2008), what scholars mean is the territories which today comprise Germany. For some cases, however, there are exceptions. For instance, Malanima (2011) warns the reader that his GDP estimates for Italy correspond to North and Central Italy only (i.e. he did not use sources corresponding the modern South). In turn, Markevich and Harrison (2011) use the frontiers of the territory of the Soviet state under the 1925-1939 as their benchmark. Border changes are to be avoided when possible as they usually lead to jumps in GDP per capita, but this is not always possible: for example, Broadberry et al (2015) switch from England to Britain in 1700.

Third, reading documents from before 1700 or so (in the European case) often requires specialized palaeographic knowledge. It is not the case that documents closer to our time are always easier to read; for many European languages, the script or hand in which some seventeenth-century documents are written can be harder to read than their sixteenth century equivalent. Documents are typically written in vernacular language and commonly use abbreviations, some of which were contemporaneous and thus can be hard to decipher nowadays. The likelihood that Arabic numerals are used does increase over time.

Fourth, there is the matter of physical units. As a precondition to comparative analysis, units need to be expressed in common units; however, when we delve into the past quantities are often not expressed in the metric system, so careful attention and specialized knowledge is required to translate the original quantities to the metric system. During the early modern period, for instance, even small countries often had dozens of different measures at one given time, and even within the same city. For example, in Portugal a measure of liquids (the *almude*) contained 17.4 liters in Évora, 16.8 liters in Lisbon, 16.7 liters in Coimbra, 25.4 liters in Porto. Non-metric measures for the exact same commodity were also common: in Lisbon, charcoal was sold in five different units.[6] In early modern Scotland and until the nineteenth century, each of the twenty-odd shires had their own grain measure called *boll*, which was different in every shire.

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[6] Often a nineteenth century source lists all the conversions; for the case of Portugal, see Silveira (1868).

Fifth, there is the matter of monetary units. Some countries used multiple currencies, and their value over time, measured in silver, varied as well (see Karaman et al 2018 for a summary which relates to the European case). This is not a big problem as long as for a given location the exchange rate between different currencies is known (including its variation over time). Then if one simply wishes to calculate quantities which are deflated by a price index (e.g. welfare ratios, real wages or real GDP), both the numerator and the denominator will be in the local units which will cancel out.

Sixth, documents do not use modern accounting methods. Double-entry bookkeeping appeared in Italy towards the end of the thirteenth century, and it took time to spread, especially outside Europe (see for instance the Chinese case in Yuan et al 2017). This is not a problem if the goal is simply to collect wages and prices, but it can be for the calculation of profits, return rates and for some micro analyses of business practices.

Seventh, it is important to make sure that for a given product, quality is constant across time; furthermore, there may be gaps in several years for which a product is missing while another is available. In order to proxy missing values it is possible to use a similar product or labour type (e.g. tallow candles for wax candles, or carpenters instead for masons, both being skilled workers) by adjusting its price using a price ratio with the original product at a nearby year.

A related important matter relates to the measurement of time worked. The last line in Figure 1, for instance, is a payment of 1400 reis "for a man who guarded the vineyard". This sort of sentence is ambiguous about how much time was worked, so it is necessary to use other contextual information, if available, or discard the ambiguous cases. Despite the challenges, as the above discussion and the existing studies suggest, these problems are not impossible to overcome.

New data, new answers

As mentioned, the prices and income measures collected from these sources can be used to answer both macro and micro historical questions. I now give several examples. By collecting certain prices from the account books, it is possible to construct a price index which allows for inflation-adjusted monetary values to be given for the past. The most popular basket is based at the consumption patterns of mid-eighteenth

century Strasbourg. Table 1 shows this basket, known as the "respectability basket" (Allen 2001).[7] Having a long-term measure of inflation over time is an essential precondition to interpreting value over time; hence we need it to interpret any historical monetary quantity in modern terms. For instance, if Henry VII spent £24,000 invading France in the late fifteenth century, how much was that? Historians often have the bad habit of presenting sums in their original amounts (i.e. in current prices, that is, the prices which appear in the sources), but it is impossible for a modern reader to interpret these amounts. Bringing current-price amounts to the present is a matter of using a price index which can be built using collected prices.[8]

	Quantity per person per year	Spending share (%)	Calories per day	Grams of protein
Bread	182kg	30.4	1223	50
Beans/peas	52 liter	6.0	160	10
Meat	26kg	13.9	178	14
Butter	5.2kg	4.3	104	0
Cheese	5.2kg	3.6	53	3
Eggs	52 units	1.3	11	1
Beer	182 liters	20.6	212	2
Soap	2.6kg	1.8	-	-
Linen	5m	5.3	-	-
Candles	2.6kg	3.1	-	-
Lamp oil	2.6 liter	4.7	-	-
Fuel	5.0 millions of BTU	5.0	-	-
Total		100	1941	80

Table 1. Respectability CPI Basket. Source: Allen (2001, p. 421).

Once we have a price index, constructing real wages (i.e. wages that are corrected for the purchasing power at a given location and moment in time) is straightforward: it is simply a matter of dividing the nominal wage (that is, the wage ex-

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[7] This CPI does not of course correspond to the modern version of a CPI but it shares with it important features such as the fact that it omits business investment or government expenditures. For a simpler, "barebones" basket, see Allen et al (2011) and Allen et al (2012).

[8] It is sometimes not obvious which deflator should be used and the choice of the right option can be subtle. What the correct price index to use is depends on the question being asked, i.e. the exact usage to be given to the inflation-corrected amounts, and presents methodological challenges which go beyond the scope of this chapter; see https://www.measuringworth.com/calculators/ukcompare/

pressed in local monetary units) by the price level, also expressed in those units.[9] Furthermore, welfare ratios can then be also calculated. They answer: how many respectability baskets can a family of 3.15 consume?[10] Table 2 shows the comparative results for the early modern period and the first half of the nineteenth century.

	1500-1549	1550-1599	1600-1649	1650-1699	1700-1749	1750-1799	1800-1849
Antwerp	1.40	1.28	1.36	1.28	1.34	1.28	1.21
	(2.41)	(2.26)	(2.27)	(2.13)	(2.23)	(2.13)	(2.01)
Amsterdam	1.37	1.37	1.07	1.34	1.42	1.55	1.41
	(2.02)	(1.61)	(1.93)	(1.99)	(2.02)	(1.83)	(1.49)
London	1.42	1.26	1.16	1.37	1.58	1.42	1.41
	(2.19)	(1.86)	(1.82)	(2.07)	(2.21)	(2.21)	(2.31)
Florence/Milan	0.92	0.78	0.73	0.72	0.70	0.51	0.39
	(1.74)	(1.53)	(1.62)	(1.42)	(1.34)	(0.97)	(0.77)
Naples	1.04	0.77	1.01	-	0.96	0.75	0.47
	(1.85)	(1.24)	(1.45)	-	(1.40)	(1.11)	(0.82)
Valencia	1.15	0.90	0.89	0.76	0.75	0.59	-
	(1.79)	(1.18)	(1.06)	(1.13)	(1.16)	(0.86)	-
Madrid	-	0.80	0.74	-	0.87	0.64	0.95
	-	(1.61)	(1.83)	(1.81)	(1.91)	(1.29)	(1.72)
Paris	0.89	0.87	0.85	0.87	0.80	0.74	1.08
	(1.41)	(1.45)	(1.37)	(1.40)	(1.28)	(1.20)	(1.72)
Strasbourg	1.27	0.74	0.70	0.56	0.57	0.61	0.85
	(1.74)	(1.19)	(0.94)	(1.11)	(0.86)	(0.90)	(1.12)
Augsburg	0.92	0.72	0.58	0.93	0.80	0.71	-
	(1.49)	(0.99)	(0.78)	(1.26)	(1.14)	(0.91)	(0.77)
Leipzig	-	0.49	0.61	0.80	0.75	0.64	0.80
	-	(0.85)	(1.04)	(1.44)	(1.27)	(1.06)	(1.29)
Vienna	1.24	0.89	0.88	0.91	0.87	0.71	0.54
	(1.87)	(1.31)	(1.12)	(1.34)	(1.33)	(1.14)	(0.86)

[9] In premodern economies it was often the case that in-kind payments were an important part of the workers reward, especially for annual workers (see for instance, Humphries and Weisdorf 2016). This does not represent a problem to the general approach I describe here as long quantities and prices are available for the non-pecuniary benefits (which is not always the case when these include form of board and lodging), or if the real wage of such workers can be well proxied by that of those of a similar level of skill.

[10] The number 3.15 refers to the consumption needs of a hypothetical family of two adults and two children, with both children together counting as an adult, plus a 5% per head allowance for renting housing (Allen 2001, p. 425-427).

Gdansk	1.07	0.73	0.96	0.85	0.88	0.60	0.87
	(1.52)	(1.59)	(1.65)	(1.89)	(1.87)	(1.25)	(1.00)
Krakow	0.97	1.06	0.92	0.96	0.85	0.88	0.60
	(1.92)	(1.91)	(1.16)	(1.37)	(1.24)	(1.16)	(1.30)
Lwow	-	-	-	-	-	-	-
	(1.93)	(1.83)	(1.63)	(1.00)	(0.96)	(0.81)	-
Lisbon	0.30	0.31	0.31	0.35	0.48	0.50	0.44
	(1.03)	(1.12)	(1.16)	(1.14)	(1.15)	(1.23)	(1.21)

Table 2. Welfare ratios for unskilled (and in parenthesis, skilled) workers.

Sources: Palma and Reis (2019) for Lisbon, Allen (2001, p. 428) for the others.

One typical problem with the calculation of real wages and welfare ratios is that in the primary sources many wages – especially those of the unskilled workers – appear as day wages. This is a problem because as researchers we are more frequently interested in annual income, but it is not clear how many days (and hours) people were working.[11] However, different professions were typically paid at different frequencies. Raw labour professions (e.g. labourers and undifferentiated agricultural work) and even mid-skilled professions (e.g. craftsman, carpenters or masons) were typically paid by the day, while high-skilled jobs (such as lawyers) were paid at lower frequencies. In some cases, people had annual contracts and were paid four times a year. The problem is compounded by the fact that day wage contracts may include a premium for the added unemployment and income uncertainty risk compared with long-term (e.g. annual or even monthly) contracts.[12]

Despite the challenges, using annual rather than daily wages matters greatly for our substantive interpretation of history. For example, in a well-known book, Clark (2007) argues that persistent per capita economic growth only started in the late eighteenth century, and that the medieval English economy was considerably richer than other scholars tend to believe.[13] His evidence is based on day wages, however, combined with his insistence that the working year did not increase. There is, however, considerable evidence that labour input increased both at extensive and intensive

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[11] To consider variation in standards of living we must care about how much consumption were people able to enjoy over a period which includes unemployment and time off.

[12] While surviving evidence about skilled wages is typically more abundant, in practice there are not many professions for which both types of frequencies exist, since as mentioned, annual wages were more typically used for higher skilled, i.e. those with a higher human capital element embedded.

[13] Note that the two claims are closely related: since we have a reasonable idea of the levels of income for the nineteenth century, slow growth during the early modern period must imply that medieval levels were higher than was previously believed.

levels – that is, more people worked for the market, and people worked more days and hours as well (Broadberry et al 2013; DeVries 2008; Humphries and Weisdorf 2016; Voth 2001; Palma 2018).

Gross Domestic Product

GDP measures an economy's productive, income-generating capacity. There tends to be a strong, positive relationship between GDP and wellbeing in a country (e.g. measured by education and health outcomes or reported levels of happiness; Deaton 2008, Stevenson 2008). Nonetheless, this relationship is only a correlation (rather than the causation necessarily going only from income to those outcomes). There are situations when the evolution of incomes can fail to track wellbeing closely, but these are best thought as exceptions. The notion of GDP is often criticized, for instance, for the way that it deals with polluting industries. This criticism is often exaggerated, since it is cities in poor countries that tend to be more polluted. In other words – and ongoing global coordination challenges notwithstanding – richer societies tend to organize (i.e. regulate) themselves in ways that prevent pollution and other externalities to a greater extent than poorer ones.

The concept of GDP was developed during the 20th century, and it is sometimes claimed that is does not apply well to previous historical periods for which the informal (e.g. subsistence farming) sector was important and few tax records may have existed or survive. These claims are exaggerated. Outside of the contexts of serious constraints to labour mobility such as slavery or serfdom, the returns to labour time in agriculture or the informal sector (whether monetized or not) are usually well proxied by the unskilled wage; and even in the absence of centralized states a sufficient number of documents often survives.

For the period after 1950 it is possible to use official GDP estimates made by the statistical agencies of most countries (though there are exceptions in poor parts of the world). Between 1850 and 1950 we can use reconstructions based on historical statistical data that are reasonably solid in most developed countries. These include e.g. production series, price data, wages and employment. For less-developed countries we have to rely on indirect measures based, for instance, on import or export statistics of major products. For the period before 1850 more indirect methods and stronger

assumptions have to be applied to arrive at plausible data. It is helpful to distinguish the construction of growth series, which can then be linked to a given benchmark and extrapolated backwards to arrive to earlier income levels, from the construction of the different benchmarks themselves.[14]

The following table shows per capita GDP in "international" Geary-Khamis 1990 dollars (purchasing power parity). To interpret this, keep in mind the World Bank's definition of poverty as having less than 1 dollar a day, hence about 350 dollars per year. This is a rather arbitrary definition, for sure. It can also be difficult to compare societies which consume very different kinds of goods, not to mention that it's difficult to control for quality improvements. Nevertheless, these problems are mitigated for premodern economies, which consumed reasonably similar baskets, with the exception of different foodstuffs (for instance, for fat, olive oil in South Europe and butter in North Europe), a problem which is here mitigated by the adjustment of the different consumption baskets used in different studies, which nevertheless keep the caloric and protein components in each basket roughly constant.

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[14] For details about GDP reconstructions, see Jong and Palma (2018), Bolt et al (2018), and Prados de la Escosura (2000). For a good recent discussions of the complex index number problems associated with these types of calculations, see Prados de la Escosura (2016) and Ward and Devereux (2018).

	England	Holland	Germany	France	Italy	Spain	Sweden	Portugal
1500	1041	1454	1146	935	1367	846	1195	1189
1550	1014	1798	—	809	1278	891	1125	836
1600	1037	2662	806	901	1216	893	853	790
1650	887	2691	948	965	1247	668	941	830
1700	1513	2105	939	992	1317	814	1357	987
1750	1753	2355	1050	1010	1367	783	1061	1372
1800	2097	2609	986	1045	1216	916	930	916
1850	2718	2355	1428	1597	1321	1079	1171	923

Table 3. Output per capita in Western Europe (1990 Geary-Khamis "international" dollars). Sources: Annual growth rates from the following sources – England, Broadberry et al (2015); Holland, van Zanden and van Leuween (2012); for Germany, Pfister (2011); for France until 1789, Ridolfi (2016); for Italy, Malanima (2011); for Spain, Álvarez-Nogal and Prados de la Escosura (2019); for Sweden, Schön and Krantz (2012) and Krantz for 1500-1560. For Portugal, Henriques et al (2019) for 1500-1527, and Palma and Reis (2019) for 1527-1850. The levels in this table are calculated by applying these volume indexes to benchmarks corresponding to the endpoint year of each index. In the case of England, figures correspond to the volume indexes of England before 1700 and Great Britain afterwards applied to the 1870 level of Great Britain (Broadberry et al 2015, pp. 375-376). In the case of Holland, borders correspond to Holland until 1800 and the Netherlands for 1850; a benchmark for 1807 was used for the data prior to 1800 (van Zanden and van Leuween 2012, p. 121), and the 1850 level is from Smits et al (2000). The other benchmarks are from Maddison (2006) and correspond to 1820 for France (with additional assumptions; see Ridolfi 2016, p. 196), 1850 for Germany, Spain, and Portugal, and 1913 for Italy and Sweden. The 1800 level shown for France in the table is Ridolfi's 1789 level. For France in 1850, the level is that given in Álvarez-Nogal and Prados de la Escosura (2013, p. 23). Italy corresponds to north and central Italy only; Germany corresponds to the present-day borders of Germany.

The first thing which is clear from the table is that these societies lived well above physical subsistence. Most of these economies grew in the 1550-1750 period, though some more than others, and though later there were some reversals. While Maddison (2006) claimed that Europe experienced significant levels of real income growth during the early modern period (i.e. 1500-1800), by contrast Clark (2007) argues that this was not the case. Getting the timing and magnitude of growth right can help us falsify some theories and clarify others. It may also help new explanations surface. Determining who is right in these matters has important implications for our understanding of the origins of the industrial revolution, for instance.[15] The most anti-Malthusian implication of the data is the fact that both real income per capita and population levels (the latter not shown above) grew at the same time, for most of these countries, during much of the early modern period. Hence for several of these economies the early modern period was one of both intensive and extensive growth. Though medieval income levels were generally higher than Maddison believed (and hence early modern growth slower, given what we know about nineteenth century levels), the conclusions have overall been closer to the position of Maddison than to that of Clark.[16] Also, numerous studies have confirmed that direct output and demand-based reconstructions of income tend to be consistent (Álvarez-Nogal et al 2017; Broadberry et al 2005a, pp. 120-124, Broadberry, Custodis and Gupta 2015, p. 65; Edvinsson 2016).

Limitations

Since relative prices changed over time, by using the fixed (over time and space), "respectability" basket of Table 1, consumer demand is implicitly assumed to be price and income inelastic, an assumption which is only defensible on pragmatic terms, due to the data collection limitations.[17] But across time and space, relative prices

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[15] Pre-modern price evidence can also be useful for debates in economics as well (see for instance, Velde 2009 and Palma 2019).

[16] The opposite is true if we look at the long term evolution of real day wages instead of GDP growth; Clark usually focuses on real wages, though he also has a paper on English GDP; but as it is calculated from the demand side, it rests heavily on those. Also notice that by 1500 population levels had not yet fully recovered from the Black Death, so when we look at early modern growth we should really be looking at what happens after the 1550s.

[17] It is assumed that there are no relative changes with respect to income levels, as Engel's law would suggest. As income rises, people are simply assumed to buy more baskets under the same proportions, instead of changing the relative proportion of different goods in the basket (e.g. by eating relatively more meat) or by starting to consume luxuries which are not included in the basket. Laspeyres indexes overestimate inflation as it assume that expenses are distributed in the same way over time, while the

changed due to different local conditions related to weather, land quality, technology, institutions, and culture.

These are problems that modern growth accounting studies also have.[18] For instance, it is difficult to account for the usage of new goods and technologies, especially when fast adoption and price drops do not adequately represent gains in consumer surplus – imagine a consumer surfing the internet, using Wi-Fi on a tablet for free. Tablets did not exist in 1980 (they would have had a price of infinity), and were perhaps already available in the 2000s but at a high price and low quality compared with those used today. Hedonic price indexes try to account for these changes, but often do in an unsatisfactory manner, which is potentially furthermore compounded for very distant time periods for which consumption patterns were very different from our own. Nonetheless, all of these considerations suggest that modern economic growth as even been stronger than it is conventionally assumed. Furthermore, non-market prices (e.g. of government services) mean that cost proxies must be used – this latter problem is actually mitigated for past economies for which the size of government (and the external sector) were small. The notion of GDP may even be more appropriate for the past to the extent that modern economies rely much more on government services and on a larger variety of goods – many of which intangible – than premodern economies did.

As is the case for modern economies, it is hard to control for not only different local consumption patterns[19] but also quality changes and the appearance of new goods, many of which appeared for the first time in Europe in the early modern period, including maize, potatoes, and tomatoes. Some studies have made adjustments to local and time-specific consumption patterns to mitigate for these problems, such as using substitutions in the form of olive oil and wine consumed in the South of Europe instead of butter and beer in the North (Allen 2001, p. 421; Palma and Reis 2019).

Paasche index underestimates inflation because it uses current period quantities. Also, housing costs are not part of the basket (Allen 2001, p. 422), but these may be subject to income effects as well.

[18] See for instance McAfee and Brynjolfsson (2014, p. 108-124).

[19] Even The Economist's modern single-good (Big Mac) Index which is designed to compare the cost of exactly the same good which is available in much of the world is faced with the problem that, for instance, in McChicken must be used instead in India. I would add to this the fact that in much of the developing world, McDonalds is considered much more of a novelty or luxury dining experience than it is in most rich countries, where it is definitely low-budget.

As for GDP, there can be historical countries and periods during which trends in GDP growth differ substantially from those of welfare improvements.[20] GDP per capita can diverge from specific measures of living standards of consumers and workers such as real wages, or more comprehensive measures of welfare that account for differences in health, leisure and inequality. But an aspect of GDP per capita is that it can be also used as the basis for productivity comparisons; these have the potential to shed light on the proximate and fundamental sources of income differences between countries.

Supply-side reconstructions (which use production or output data) have clear advantages over demand-side ones, but the latter have much less demanding data requirements. And if there is one thing the past has left us in great quantities, it is price evidence from the type of sources I discuss in this chapter – the type of evidence needed for demand-side reconstructions. Nonetheless, the major problems which plague this type of study are the lack of proper purchasing power parity (PPP) benchmarks before the World Bank and United Nations Statistical Commission's International Comparison Program started in the mid-twentieth century. Extrapolating backwards from the first available benchmark using real volume growth rates can lead to cumulative measurement errors.

Finally, as far as the historical account book sources themselves are considered, two prominent limitations of these sources are that they should record market transactions but the institutions could be buying (or selling) in bulk, or have access to certain privileges in buying below or selling above market prices, which could mean different prices than those faced by the typical consumer or supplier. These problems are less limiting that it may seem at first; for instance, the bulk discount argument is irrelevant for international comparisons as long as it applies roughly equally to the sources used for each country, and different sources can be used for the same year and region in order to make sure that the price is representative. Furthermore, prices can often be cross-checked with alternative sources such as probate inventories.

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[20] Two related matters are that GDP per capita ignores distribution (because it is an average measure), and that the impact on the environment and other externalities are not adequately considered (e.g. a factory that produces a high level of output by polluting a lot).

Conclusion

At a minimum, historians should always and as a rule give historical monetary values in modern equivalents. Having price indexes which give us a measure of inflation over time is hence necessary, despite the challenges involved with their construction and interpretation. Furthermore, these price indexes in turn form the backbone of the construction of real wage, GDP and several other measures of interest for our understanding of the past. Historical account books provide us with the required material needed unlock these possibilities.

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