

The Evolution of Global Labor Markets since 1830: Background Evidence and Hypotheses*

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Debate over the economic convergence of currently industrialized nations has suffered a number of shortcomings. First, the underlying data base has typically been limited to Angus Maddison's GNP and GNP per worker-hour estimates. This paper offers a new data base, purchasing-power-parity-adjusted real wage rates for unskilled labor. Second, the debate has typically focused on end points from the 19th century to the present, paying little attention to differential behavior in four distinct regimes: 1830 to midcentury, midcentury to World War I, the interwar decades, and the post-World War II experience. Third, with some recent exceptions, the search for explanations has focused primarily on technological advance, while ignoring the potential role of global factor and commodity market integration (and disintegration). The new real wage data base confirms some old stylized facts and offers some new ones. It also points out how these four regimes differed. They differed enough to suggest that different explanations will be nec-

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A number of appendices are omitted from this version in the interests of cost containment. They are available upon request from the author at 216 Littauer, Harvard University, Cambridge, MA 02138 (617) 495-2438 or e-mail jwilliam@husc4.harvard.edu.

I. WHERE DOES THE RECENT CONVERGENCE DEBATE LEAVE US?

Four strands of literature initiated in the 1950s and 1960s seem to be converging on better explanations of long run growth: empirically based country studies led by the cliometricians of the late 1950s and early 1960s; debates in comparative economic history about latecomers (Gerschenkron, 1952), about the demise of British leadership, and about the rise and fall of America's industrial supremacy (Abramovitz, 1986; Baumol, 1986); the empirical sources of growth tradition launched by Abramovitz (1956), Solow (1957), Kendrick (1961), and Denison (1962); and the formal models of the 1960s which have recently blossomed into the new "endogenous theories of growth." This paper reports a new data base for 15 European Old World and overseas New World countries covering the past century and a half. My hope is that this new data base will contribute to the new agenda designed to achieve the lofty goals set by those pioneers in the 1950s and 1960s. While I view this paper as only a provisional start of a longer project, it offers a novel data base which confirms some old facts and uncovers some new ones which I believe should be central in guiding our search for new and better theories of growth which are well grounded in history.

These four strands of literature almost always use GNP per capita or per worker hour as the dependent variable. This paper uses instead purchasing-power-parity-adjusted real wage rates per worker (typically urban unskilled) as the dependent variable. While I do not argue that the real wage data base used in this paper is necessarily superior to the GNP estimates, it can be argued that factor prices generally, and real wages specifically, are the better yardstick for assessing sources of long run convergence.

First, labor's marginal and average products differ, and all the more so as other factors of production, like natural resources and human capital, are added to conventional capital in the analysis. GNP per worker is, after all, nothing more than a sum of per unit factor returns weighted by specific factor endowments per worker. Any model of convergence must offer an explanation for the forces driving factor return (or price) equalization. Furthermore, factor price equalization rarely implies that all factor prices in the rich country will fall relative to the poor. For example, suppose the initial rich countries are New World land-abundant and labor-scarce, while the initial poor countries are Old World land-scarce and labor-abundant. While convergence implies that wages in the Old World catch up to those in the New, it also implies that land rents in the New

World catch up to those in the Old.¹ All of this suggests that wage convergence is likely to be far more dramatic than GNP per worker convergence. In short, GNP per worker is much too coarse an index to understand adequately the forces of convergence. It seems to me highly desirable to study the convergence of wage rates separately so as to isolate convergent behavior in national labor markets. Of course, what I have just said about wages could also be said about land rents, skill premia, and the rates of return to capital, a data base currently under construction.

Second, the GNP and the wage deflators differ. In a world of very incomplete commodity price equalization, the difference may matter a great deal, especially since laborers heavily consume commodities which are resource-intensive (e.g., food and dwelling space), items which are most expensive to move internationally, a statement that holds true with greater strength the farther back in history we look. These influences are likely to diminish over time for three reasons: transport costs decline, thus contributing to commodity price equalization (O'Rourke and Williamson, 1992); the ratio of value added to crude material inputs increases even for resource-intensive products; and Engel effects assure that resource-intensive products diminish as a share of workers' budgets (the share spent on food declines).

Third, the aggregate labor participation rate is likely to differ greatly between countries and over time in an environment of migration and differential rates of population growth, driving a wedge between per capita and per worker indices. This relationship is likely to matter especially in any comparison involving historical growth patterns in high-wage New World countries and low-wage Old World countries. After all, native labor supplies are responsive to conditions of labor scarcity and surplus, and these tend to influence child dependency rates and labor participation rates. Thus, high-wage New World countries have higher fertility and lower child mortality rates, both serving to raise the child dependency rate in contrast with those of low-wage Old World countries.² These distinctions may have mattered more in the 19th than in the 20th century. Thus, to the extent that per capita rather than per worker-hour figures typically characterize 19th century estimates, real wage rate data are likely

¹ The ratios of wage rates to farm land rents or land values converge dramatically between 1870 and 1913. In the New World, where land was abundant and labor scarce, the wage/rental ratio plunges downward from high levels across the period. In the Old World where free trade prevailed (e.g., Britain and Scandinavia), and where land was scarce and labor abundant, the wage/rental ratio surges upward across the period. In the Old World where the protectionist response was strong (e.g., Germany, France, and Spain), the wage/rental ratio was more stable but still rose. See O'Rourke *et al.* (1993).

² A survey of this evidence and its impact on domestic savings behavior, and thus on capital flows, can be found in Taylor (1993) and Taylor and Williamson (1994).

to be an improvement in tracking productivity for those important decades.

Fourth, even when expressed in per worker-hour terms, GNP can be viewed as a coarse index of long run performance, although it is used almost exclusively in what has come to be known as the "convergence" literature. Indeed, as Wolff (1991, pp. 568–569) has recently reminded us, almost everyone engaged in the long run convergence debate uses Maddison's (1982) output and hours worked data for the pre-World War II years. By his own admission, Maddison's pioneering 19th century GNP and man-hour estimates are inevitably based on partial data, often constructed by backward projection from assumed average growth rates. Perhaps in recognition of that fact, scholars using Maddison's data have selected only benchmark years separated by a decade or even longer. While it may suffer other flaws, my annual real wage data base does not, at least, suffer this disadvantage.

While it has little to do with the use of GNP measures, previous empirical studies have tended to slight important historical episodes and important country observations which are likely to enrich our understanding of the underlying forces producing economic convergence and divergence between nations. For example, when Baumol (1986) and his critics (DeLong, 1988) use the century 1870–1979 to explore the convergence hypothesis, they tend to ignore the intervening observations and focus on the end points. Even in Baumol's more recent work with collaborators (Baumol *et al.*, 1989, Chap. 5), the analysis tends to focus on end points with little attention to pre-World War II epochs. This seems a pity, since there may be quite different growth regimes within the century which are likely to offer additional insight into the growth process.³

There is another reason why I have made the effort to develop this real wage data base, and it should be apparent from the title. I am especially interested in the evolution of global labor markets since 1830, and rarely is there any mention of the role of international migrations and the development of integrated global labor markets in the convergence accounts.⁴ Nor is there any mention of the role of international commodity markets and the venerable factor price equalization theorem.⁵ Certainly there is no mention of either influence in Baumol and in the stream of literature that his work has sparked. Nor is there any significant mention of such forces in the empirical applications of the "new endogenous growth

³ A point with which Abramovitz (1986) agrees.

⁴ A recent survey by Hatton and Williamson (1992b) points out this imbalance, and two empirical papers have tried to fill the gap, one on Anglo-America (O'Rourke *et al.* 1993) and one on Ireland (Boyer *et al.* 1993).

⁵ However, O'Rourke and Williamson (1994) have shown recently that commodity price equalization between Britain and the United States had a profound impact on real wage convergence between the two countries 1870–1913.

theories." While this may be a useful simplification for the post-World War II decades, it is unlikely to be very helpful in understanding the late 19th century decades of free migration, or in understanding their contrast with the interwar decades of restricted migrations.

This paper deals next in Section II with a brief description of how the data base was constructed. The details are offered in three copious appendices; thus we are free to turn to the critical issue in Section III: what does the real wage history since 1830 tell us about international convergence? I conclude with an agenda in Section IV.

II. CONSTRUCTING THE REAL WAGE DATA BASE

I have been able to construct time series on real wage rates over the past century and a half for 15 countries, 4 in the overseas New World and 11 in the Old World. While I am still looking to augment the sample,⁶ I believe these 15 countries include most of the ones that matter.

New World	Old World		
Australia	Belgium	Great Britain	Norway
Argentina	Denmark	Ireland	Spain
Canada	France	Italy	Sweden
United States	Germany	Netherlands	

As I pointed out in the introduction, most participants in the recent convergence debate have relied on Maddison's (1982) GDP data. Thus, for example, Baumol and his collaborators (1989) use Maddison's sample of 16 countries. The Maddison sample includes 4 countries which are excluded here: Austria, Finland, Japan, and Switzerland. Japan could have been included in my sample, but since it was not a significant participant in international commodity and factor markets until the turn of the century, I have chosen to omit it. I have not been able to find adequate real wage evidence for Austria, Finland, and Switzerland, but at least two of these are very small countries and, hopefully, they are adequately represented in our sample by others like them. There are three very important additions to our sample that are missing from Maddison's: Argentina, Ireland, and Spain. (Brazil and Portugal are also in the Appendices, but not in the sample. See footnote 6.) Ireland offers an important observation given its enormous post-Famine emigration rates and the remarkable speed with which it became integrated into the global English-speaking labor market.⁷ And the addition of Argentina and Spain

⁶ Actually, the Appendices include information on Brazil and Portugal, countries excluded from the sample of 15 used throughout the paper. They were constructed too late to be included in the analysis.

⁷ The best statement on the integration of Ireland into a global English-speaking labor market was by O'Rourke (1989, 1990), although he and two collaborators have recently given even more empirical content to that process (Boyer *et al.*, 1994).

(joining Italy) makes it possible to say something about New World and Old World connections along Latin lines, as well as to say something about the integration or segmentation of global labor markets between the North and South within both the New and Old World.

The data base is built along the following lines.

First, I construct nominal wage time series from sources that country experts tend to favor (Appendix 1). These refer to wage *rates*, and, prior to 1914, they refer to *unskilled* labor with very few exceptions. Wherever possible, they measure hourly, daily, or weekly wages, although for a few countries early in their wage histories I had no other option but to use monthly wages. Only for Belgium do I use annual earnings. The goal is to focus on the cost of labor per unit of time, and to control as well as possible for the work/leisure choice. For the pre-WWI period, I try to restrict the focus wherever possible to unskilled wage rates; until the interwar period, the use of average wages in, say, manufacturing would be a mistake since the skill premium varied widely over time and across countries,⁸ as did the skill mix. Since these problems seem to have become far less serious by the 1950s, and since the data are readily available in standard ILO and OECD publications, I use manufacturing hourly wages for the post-World War II regime. Furthermore, and with few exceptions, the unskilled wage rates refer to *city* labor rather than farm labor. Like the skill premium, wage gaps between farm and city vary widely over time⁹ thus I have made every effort to stick with urban unskilled wage rates in what follows (a goal violated between 1860 and 1913 only for Belgium, France, Italy, and the Netherlands). Sources and methods underlying the nominal wage time series for each of the 15 countries are described in Appendix 1.

Second, I construct and apply cost of living deflators to the nominal wage time series. The cost of living figures refer to urban areas and, where possible, are derived from budget weights of the low-wage unskilled. Typically, the cost of living indices are comprehensive, including detail on foods, dwelling rents, fuel, light, and clothing. The cost of living series for each of the 15 countries are described in Appendix 1; like nominal wages, they come from sources that country experts tend to favor.

The third step is to convert these national real wages into internationally comparable units of measurement by establishing benchmarks, years where wages are quoted for comparable jobs and comparable workers, typically for the unskilled in the building trades, and deflated by purchasing-power-parity (PPP) price indices for comparable market baskets

⁸ The literature is large, but see most recently Williamson and Lindert (1980), Williamson (1985), and Allen (1990).

⁹ Some comparative evidence on this point can be found in three papers by Hatton and myself (1991a, 1991b, 1992a).

(Appendix 3). Such benchmarks are constructed at three points in time: the decade or so prior to World War I, based on the British Board of Trade, augmented by information reported in U.S. Senate documents published shortly before the turn of the century; the late 1930s, based on those rich ILO *Yearbook* sources which appear with great detail in either the 1927 or 1938 issue; and the post-World War II period, based on the purchasing-power-parity deflators reported by Kravis and his associates (1978, 1982). These sources make it possible to construct comparable real wages across countries at each of these three benchmarks, to which the national real wage time series are then linked (Appendix 2).

The PPP real wage benchmarks serve to define three distinct periods and I have made little effort to extend any of the national real wage time series across the breaks separating them, namely, the two World Wars. This point deserves stress. Since country-specific relative prices changed markedly over this century and a half, real wage cardinal rankings projected forward (based on the national time series) from the pre-World War I benchmark to 1938 would almost certainly yield a real wage cardinal ranking different from that implied by the 1938 ILO data themselves. Similarly, real wage cardinal rankings projected backward from a 1938 benchmark to the pre-World War I years would also differ from that implied by the Board of Trade benchmark. The problems are somewhat less severe when a 1927 benchmark is used for the interwar period, as I do here, but they do not disappear. These index number problems are certainly not unique to these real wage data: indeed, they even beset the famous PENN data set generated by Kravis and his associates for the post-World War II period. Thus, I make little effort to leap over these benchmarks in the time series analysis which follows.¹⁰

Of course, there have been others who have offered comparative real wage estimates even prior to World War I, and even for samples larger than mine. Perhaps the best known are Mulhall's (1896) estimates of "annual earnings per inhabitant" for 1894. His earnings figures are not PPP-adjusted, but rather converted into common currency units by use of quoted exchange rates. Furthermore, they are average annual earnings, not wage rates for comparable work. When Mulhall's estimates are regressed on those reported here, we find (*t* statistics in parentheses)

$$\text{Mulhall, 1894} = 19.50 + 0.64 \text{ Williamson, 1894} \quad R^2 = 0.71.$$

(1.76) (5.37)

¹⁰ In contrast, Maddison uses 1970 relative price benchmarks to project his GNP statistics backward into the 19th century. While my real wage data set may have other flaws, at least it offers three benchmarks, not just one.

Thus, his figures tend to overstate the real wages of poor countries and understate those of rich, and the differences are often large.

The new national real wage time series covering the past century and a half are presented in the Appendix 2. For the pre-World War I period, the national real wage observations are standardized by setting the British wage equal to 100 in 1905; for the interwar period, the British wage is set equal to 100 in 1927; and for the post-World War II period, the British wage is set equal to 100 in 1975.¹¹ To illustrate how the data in Appendix Table A2.1 can be used comparatively, U.S. real wages were more than four times those of Italy in 1895 ($151/37 = 4.08$) while Irish real wages were 71% of British in 1870 ($49/69 = 0.71$).

The real wage data base in Appendix 2 is, of course, only as good as the underlying national time series. If Canadian wages for the late 19th century are really of such doubtful quality as some suggest, then the fact that Table A2.1 has Canada's real wage almost 30% above that of the United States in 1913 will also be doubtful. Indeed, some of these series are undergoing additional repairs, while others, like Portugal and Brazil, can now be added. This then should be viewed as a provisional data base. If nothing else, my explicit use of them here for comparative purposes may provoke others to improve them.

III. THE REAL WAGE EVIDENCE: 1830–1988

Four Regimes since 1830

The evidence presented in this paper suggests that there have been four distinct global labor market regimes since 1830.

The first was associated with early industrialization in the Old World, settlement in the New World, modest international migrations, high transport costs on commodity trade, and, for the most part, barriers to trade. The regime covers the four decades from 1830 to 1869. Although the sample is relatively small (7 countries in the first half of the regime, rising to 11 at the end), it suggests nonetheless that disequilibrium characterized the first two decades, when real wages diverged sharply, reaching peak dispersion in the mid 1840s.

The second covers the period 1870 to 1913, the classic dating for what Argentineans call the "belle epoque," what North Americans call the post-Civil War age of industrialization and free international migration, what the English call the great Victorian boom amidst an age of high imperialism, and what most of us are taught was a classic world boom under free trade and the gold standard.¹² If the decade and a half prior

¹¹ Throughout this paper, I invoke poetic license and refer interchangeably to England and Britain. In fact, the figures refer to England up to 1913 and Great Britain thereafter. Ireland, of course, is always treated separately.

¹² And thus what Maddison (1982, p. 92) calls the "liberal" phase.

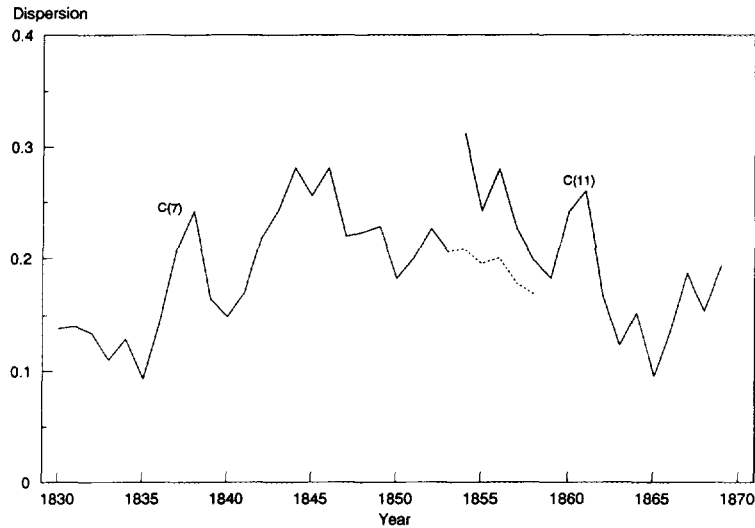


FIG. 1. International real wage dispersion, 1830–1869.

to 1870 is included, it was by far the most dramatic period of real wage convergence since 1830, including the better-known convergence of the post-World War II era. Most of the convergence, however, was completed by the turn of the century.

The third covers the two World Wars and the interwar period when world commodity and factor markets break down.¹³ Between 1914 and 1938, measures of real wage dispersion do not fall at all, implying that these two decades served to halt a spectacular real wage convergence which had been at work for six decades. World War II served to increase real wage disparities so much that our measure of global labor market (dis)integration retreats back to the levels of the late 1870s.

The fourth is the most studied regime, 1946–1988. The levels of global labor market integration which characterized the 1920s were not regained until the mid 1960s, after which the great pre-World War I convergence is resumed following a half-century pause.

As we shall see, not only do each of these regimes exhibit different convergence behavior, but the components of that behavior also differ. They may be sufficiently different, in fact, to warrant different explanations.

Disequilibrium and the Industrial Revolution: Pre-1870

Figure 1 documents real wage dispersion between 1830 and 1869. The summary statistic $C(N)$ plotted there, the unweighted coefficient of vari-

¹³ And thus what Maddison (1982, p. 92) calls the “beggar-my-neighbour” phase.

ation (where N is the sample size), has been used extensively in the convergence debate (e.g., Wolff, 1991, p. 565). Based on a sample of seven countries for which data are available (France, Great Britain, Ireland, the Netherlands, Spain, Sweden, and the United States), $C(7)$ rises from about 0.14 in 1830 to about 0.28 in 1846. (Each of the $C(N)$ series is extended as a dashed line in Fig. 1 when a new $C(N + X)$ series, augmented by X new observations, is added.) That is, the index of real wage dispersion doubles over the two decades. As Appendix Table A2.1 shows, this global labor market disequilibrium was driven primarily by a wage boom in the United States and a wage slump in Spain and the Netherlands. Relative to the European leader of the pack (Britain), Ireland and France held their own while Sweden lost some ground. While events in Europe were contributing to this disequilibrium phase up to the mid 1840s, the sharp rise in $C(7)$ is driven primarily by New World success: the United States increased her real wage advantage over England from 40% in 1830 to 83% in 1846.¹⁴ This is a surprising finding given that the British standard of living debate points to these decades as unambiguous evidence supporting the optimists' position. It is also surprising that American "exceptionalists" do not make more of the relative wage performance on this side of the Atlantic.

While I do not have similar real wage data for, say, Canada or Australia, the American evidence certainly suggests that the global labor market disequilibrium was being driven primarily by wage gaps between Old World and New, not by some more general process associated with Gerschenkron-like industrial revolutionary leader versus latecomer dynamics centered in Europe. Having said as much, we must remember an inherent selectivity bias determining this small sample of seven countries: since the availability of real wage data is correlated with the beginnings of modern economic growth, the sample is biased (since it excludes so many poor, latecomers) and the dispersion within Europe may have risen far more than these figures show.

By 1854, the sample is augmented to include Australia, Belgium, Germany, and Norway, and $C(11)$ tells the same story as $C(7)$: the dispersion statistic falls from the series' start in 1854. When the sample is augmented still further in 1864 to include another important New World country, Argentina, the summary statistic behaves the same way (not shown in Fig. 1).

Figure 1 suggests a secular turning point somewhere in the mid 1840s. It appears to initiate a long run convergence in international real wages that extends into the 1870–1913 regime. While a good share of the real wage convergence from the mid 1840s to 1865 can be explained by the

¹⁴ While per capita incomes were, apparently, still quite a bit higher in England, real wages were a different story.

well-known collapse in American wages during the Civil War (DeCanio and Mokyr, 1977; Williamson, 1974), the story is more general than that (see the Appendices for the American evidence and for the rest of what follows in this paper). First, the American post-Civil War “catch-up” in real wages (Goldin and Lewis, 1975) never regained the high wages relative to England achieved at the peak in 1854–1856, 97%. Second, relative wages fell everywhere in the New World, at least based on Australian and U.S. experience after 1854. Third, and once again, the results were mixed in Europe. While Sweden gained a lot of ground on England between the mid 1850s and 1869, none of the other European countries in our sample did (with the possible exception of Belgium), and two suffered losses, France and Norway. As with the sharp rise in real wage dispersion in the two decades or so following 1830, the fall in C up to 1869 was being driven primarily by the erosion of the wage gap between the Old World and the New.

There are three morals which emerge from this look at global labor markets between 1830 and 1869. First, there was a very sharp divergence in real wages up to the mid 1840s. Second, what turns out to be a long run convergence in real wages started after the mid 1840s. In that sense, the second regime of convergence might be dated 1845–1913. I have resisted this temptation since the New World sample is so small prior to the mid 1850s. The total sample rises to 15 by 1870 (including 4 New World countries); thus we should be more certain about these convergence trends starting then, a date which is commonly used by economic historians in describing other events anyway. Third, there is no comprehensive European support for the Gerschenkron hypothesis that some leader and laggard dynamic was contributing to divergence and labor market disintegration. Fourth, and perhaps most important, the dispersion statistic was driven primarily by the behavior of wage gaps between the Old World and the New, rather than by divergence or convergence patterns *within* the New World or *within* the Old World.

A Century of Convergence: 1870–1988

Typically, the convergence hypothesis is usually tested by using end points. Long run convergence documented by others using GNP per capita or per worker evidence is confirmed with this new data on real wages. As Fig. 2 illustrates with the late 19th century decades, countries with high real wages in 1870 (like those important three in the New World—Australia, Canada, and the United States), underwent relatively slow real wage growth up to 1913; countries with low real wages in 1870 (like the poorest in the Old World—Denmark, Italy, Norway, and Sweden) underwent relatively fast real wage growth up to 1913; and those clustered in the middle (Argentina and the early European industrializers or their contiguous neighbors—Belgium, France, Germany, Great Britain, Ire-

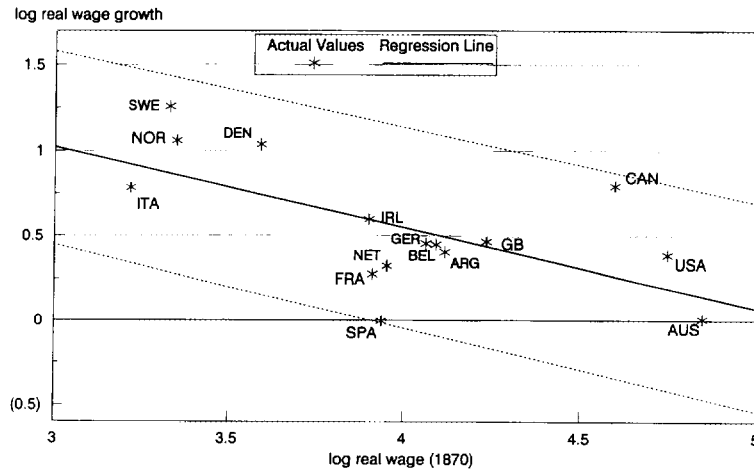


FIG. 2. Pre-WWI real wage growth regressed on 1870 level: $\log RW (1913) - \log RW (1870) = C + \log RW (1870)$.

land, the Netherlands, and, surprisingly, Spain) started with average wages and underwent average wage growth.

How fast was real wage convergence over the full century following 1870 compared with what other researchers have found when using Maddison's GNP estimates? The following regression results (constant omitted), compared with revisions of DeLong's (1988, p. 1139), implies that real wage convergence was far stronger than GNP per worker hour, even when the analysis is limited to those 12 countries which appear in both samples.

Independent variable	Dependent variable	Slope coefficient (<i>t</i> statistic)	Sample description
Log 1870 labor productivity	Annual percentage growth labor productivity	-0.748 (10.542)	Maddison's 16: DeLong revision
Log 1870 labor productivity	Annual percentage growth labor productivity	-0.887 (9.069)	Overlapping sample of 12
Log 1870 income per capita	Log difference of 1979 and 1870 incomes	-0.959 (10.241)	Maddison's 16: DeLong revision
Log 1870 income per capita	Log difference of 1979 and 1870 incomes	-1.045 (6.683)	Overlapping sample of 12
Log 1870 wage	Log difference of 1988 and 1870 wages	-1.215 (4.930)	Williamson's 15
Log 1870 wage	Log difference of 1988 and 1870 wages	-1.159 (9.032)	Overlapping sample of 12

Real wage convergence among the lesser skilled over the past century has been more dramatic than GNP per worker hour, a result consistent with the prediction offered earlier in this paper. Namely, it suggests that

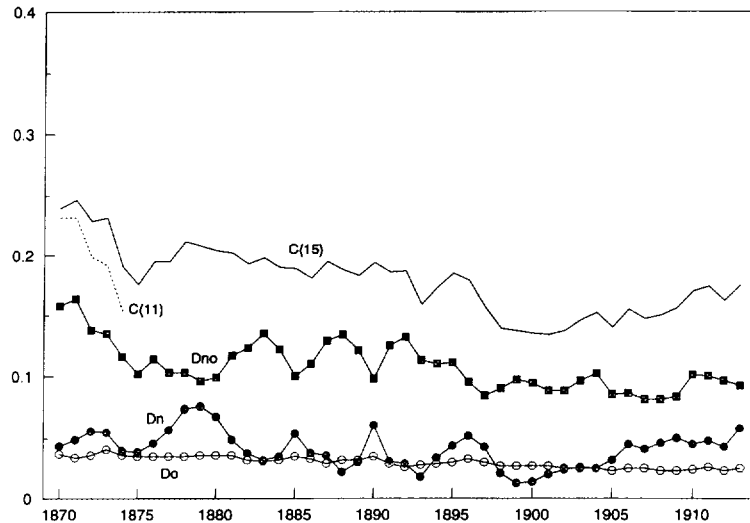


FIG. 3. International real wage dispersion, 1870–1913.

as New World relative resource abundance diminished over time and as land rents in the New World tended to converge on the Old (O'Rourke *et al.*, 1993), the contribution of real wage convergence to total income or output convergence was partially offset, and thus average labor productivity converged less dramatically than did real wages.

Four Decades of Convergence: 1870–1913

As Fig. 3 shows, the striking convergence which started after the mid 1840s continued up to 1900, after which it ceased. In fact, the coefficient of variation is almost cut in half over the three decades 1870–1900 (falling from 0.24 to 0.14), and perhaps by two-thirds over the 46 years 1854–1900. The unweighted coefficient of variation, C , can be decomposed into three additive parts: D_n , dispersion within the New World, a variable weight times the coefficient of variation there; D_o , dispersion within the Old World, a variable weight times the coefficient of variation there; and D_{no} , dispersion between the Old World and the New, a variable weight times the square of the average wage gap between the two. Along with C , Fig. 3 plots each of these three components. The results are striking and repeat those we found for the first regime. First, throughout the period 1870–1913, the average wage gap between the New World and the Old accounts for about 60% of the real wage variance across these 15 countries. The remainder, 40%, is explained by the variance within the Old and New Worlds. Furthermore, real wage variance within the New World accounts for more of the total variance than does real wage

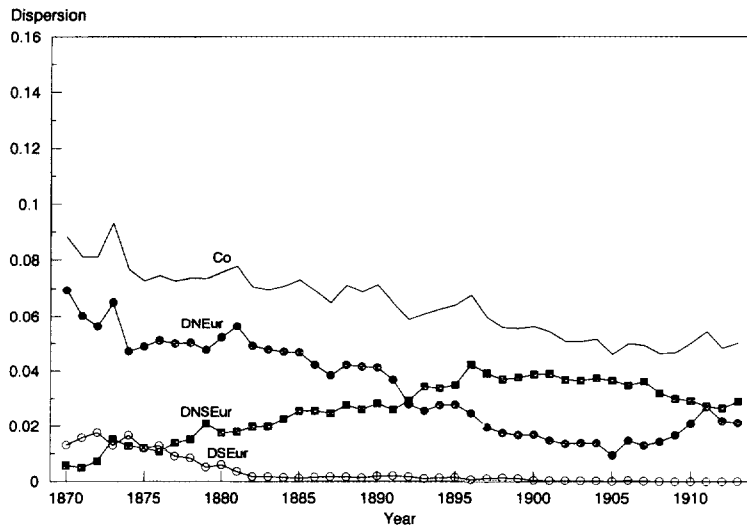


FIG. 4. International real wage dispersion, Europe, 1870–1913.

variance within the Old World, 24 and 16%, respectively. All of this implies that real wage variance among our 11 late 19th century European countries was a very modest part of “global” real wage variance. Second, about 60% of the convergence between 1870 and 1900 is explained by the collapse in the wage gap between New World and Old.

It appears that this regime of dramatic convergence is primarily a story about the Old World catching up with the New, and of Argentina and Canada catching up with Australia and the United States. It is much less a story about latecomers catching up to leaders in the Old World. Nonetheless, and as Fig. 4 documents, convergence *did* take place within Europe. Furthermore, the European pattern (Fig. 4) closely resembles that of the full sample (Fig. 3), with one exception: while European convergence continued throughout the late 19th century, it ceased in the full sample around the turn of the century, the latter reflecting an American surge to industrial dominance.

The convergence in Europe following 1870 deserves a more detailed look. Given the great debate about Britain’s loss of industrial leadership to her close competitors, there is a tendency to look for evidence of, say, German catch-up on the leader. What matters far more, however, is the behavior of the poorer European countries relative to the richer, and the latter included Belgium, France, and Germany, not just Britain. From 1870 to 1900, five of the poorest countries improved their real wages relative to the average: Denmark, from 52 to 85% of Britain; Ireland, from 71 to 88; Italy, from 38 to 40; Sweden, from 41 to 82; and Norway,

from 41 to 65; only one, Spain, lost ground (a lot of ground, from 74 to 48). Over the same period, and with the exception of Great Britain, all but one of the richer countries underwent a real wage deterioration relative to the average: Germany, from 84 to 83% of Britain; France, from 72 to 68; the Netherlands, from 75 to 71; the exception being Belgium, from 87 to 91. There was indeed convergence within Europe between 1870 and 1900, but, ironically, Britain was not a major part of it. Throughout the late 19th century, convergence in Europe was slower than it was globally in our total sample (between 1870 and 1900, the dispersion statistic declines by about 0.1 in Fig. 3, or by about 40%; it declines by about 0.03 in Fig. 4, or by about 33%). Figure 4 makes it apparent why: it was not due to some weakness of convergence trends in the non-Latin North since that convergence continues and is very robust (at least to 1905: DNEUR, Fig. 4). Convergence is relatively slow in Europe as a whole because of a rise in the wage gap between the Latin South and the non-Latin North (DNSEUR, Fig. 4), especially up to the mid 1890s. This rise in the historically persistent wage gap between the Latin South and the non-Latin North accounted for much of the slow European convergence in the late 19th century, and this in spite of so much attention to an alleged late Victorian and Edwardian failure in England.¹⁵ Late Victorian and Edwardian failure helps explain continued convergence in the North of Europe, but what dominated European experience was not so much Britain's failure (which contributed to convergence), but rather the failure of the Latin economies (which retarded convergence).

Let us now return to the average wage gap between New World and Old, the variable which drove such a large share of the convergence over the three decades or so after 1870 and the five decades or so after the mid 1840s. Three countries illustrate the process best, Ireland and Sweden (with heavy emigrations from the late 1840s onwards), and the United States (with heavy immigrations from the late 1840s onwards). In 1856, real wages in Sweden were only 47% of Britain, while in 1913 they were 89%, an impressive doubling in Sweden's wage relative over the 57 years. In 1852, and shortly after the famine, real wages in Ireland were only 59% of Britain, a figure that had changed hardly at all over the previous three decades. Real wages in Ireland started a dramatic convergence on Britain during the 1850s (and, notably, in the absence of any Irish industrialization¹⁶) so that they were 71% of Britain by 1870. By 1905 they were 92% of Britain, before slipping a bit to 82% by 1913. Ireland was transformed over this period of convergence from a poverty-stricken, peasant economy which had served as a source of elastic labor supply for

¹⁵ See, for example, the seminal survey by McCloskey (1970).

¹⁶ Abramovitz (1986, p. 398), O'Rourke (1989, 1990), and, more recently, Boyer *et al.* (1994) all make the same point.

Britain's booming cities, to an economy at the start of the 20th century which boasted wages close to those prevailing across the Irish Sea, and which came to exceed British wages in the 1920s (O'Rourke, 1990). The Irish convergence toward real wages in the United States must have been even more dramatic since relative real wages were falling in America during most of this period. In 1855, real wages in the United States were 98% above Britain, while in 1913 they were 54% higher, almost a halving in the American wage advantage over Britain, a spectacular decline that has gone almost unnoted by American economic historians.¹⁷ These patterns were comprehensive enough to have contributed to real wage convergence over the half century, and, as we have seen, it was the decline in the wage gap between the New and Old World which was doing most of the work.

But there are some deviant countries and periods well worth our attention.

First, the Latin experience was very different. Through dramatic booms and busts, Argentina increased her real wage advantage over Spain and Italy, the source of the vast majority of her immigrants from the Old World. Indeed, Argentina improved her real wage position relative to Britain, from 66% in 1864 to 84% in 1913, and her real wages actually exceeded Britain in 1893, 1899, 1900, and 1904, an achievement that Argentineans view with nostalgia (Cortes-Conde, 1979).

Second, the experience in the English-speaking New World varied over the regime. While Australia experienced a steady and much-studied (McLean and Pincus, 1983) erosion in her real wage position over the whole period of convergence—from 138% above the British real wage in 1854, to 84% above in 1870, to 35% above in 1890 and to just 16% above in 1913, the other New World countries enjoyed a partial resurrection in their real wage advantage late in the regime. This was especially true of North America. Relative to Britain, real wages in the United States, were 98% higher in 1855, 67% higher in 1870, 32% higher in 1880, but 54% higher in 1913. Real wages in Canada were 43% higher than in Britain in 1870, 42% higher in 1880, but 99% higher in 1913 (after the great wheat boom and railroad expansion of which so much is made by Canadian economic historians¹⁸). In short, both Canada and the United States bucked the convergence tide after the mid 1890s. This result is consistent with the North America's emerging industrial dominance about that time (Wright, 1990), and it makes America's successful defense of her economic leadership for so long thereafter all the more impressive.

Thus, even during this period of dramatic convergence, when trends in

¹⁷ With the exception, perhaps, of Shergold (1982).

¹⁸ For the classic paper, see Chambers and Gordon (1966).

the wage gap between the Old World and the New were doing most of the work, there was a variety of experience that remains to be explained.

It seems worth noting that the two most prominent contributors to the historical convergence literature, Abramovitz and Baumol, make very little of the convergence forces 1870–1913 which seem to be so pronounced in the real wage data used here. In Abramovitz's words, "the rate of convergence . . . showed marked strength only during the first quarter-century following World War II," and "in the years of relative peace before 1913 . . . the process [of convergence] left a weak mark on the record" (1986, pp. 385 and 395). These are puzzling statements since Abramovitz's own Table 1 reports the coefficient of variation falling by more than a third, from 0.51 in 1870 to 0.33 in 1913 (Abramovitz, 1986, p. 391). True, our real wage data document an even greater convergence, and it is also true that in percentage change per year, Abramovitz's variance statistic drops faster 1950–1973 than with 1870–1913, but his use of Maddison's GNP data reveals a very strong convergence prior to 1913 nonetheless. Based on his own evidence, it is not clear why Abramovitz thinks convergence left only a "weak mark" on the record. Since Baumol and his associates also use Maddison's data, it will come as no surprise that *Productivity and American Leadership* replicates Abramovitz's findings. In their Fig. 5.2, they show the coefficient of variation falling between 1870 and World War I and further state that "the downward trend in this dispersion measure is strong and steady in each of the two periods separated by World War II" (Baumol *et al.*, 1989, p. 92). Having confirmed Abramovitz's finding, Baumol and his associates move on to the post-World War II period where concern about America's loss of leadership pulls them, ignoring this earlier and spectacular period of convergence for the remainder of their book.

It seems to me that the pre-1913 convergence deserves far more attention than the literature has given it thus far. After all, no other period since the mid-19th century shares so much in common with the amazing post-World War II epoch.

Convergence Ceases: 1914–1945

The World Wars and the interwar decades offer nothing but contrasts to the long run convergence experience initiated in the mid-19th century. As Fig. 5 confirms, the convergence ceased from 1914 to 1934 since C is roughly the same in both years. The cessation of real wage convergence documented here offers a very different characterization than that found in *Productivity and American Leadership*. When Baumol and his associates plot the coefficient of variation (based on Maddison's GNP data) beyond 1913 and up to the mid-1930s, their C continues its long run decline

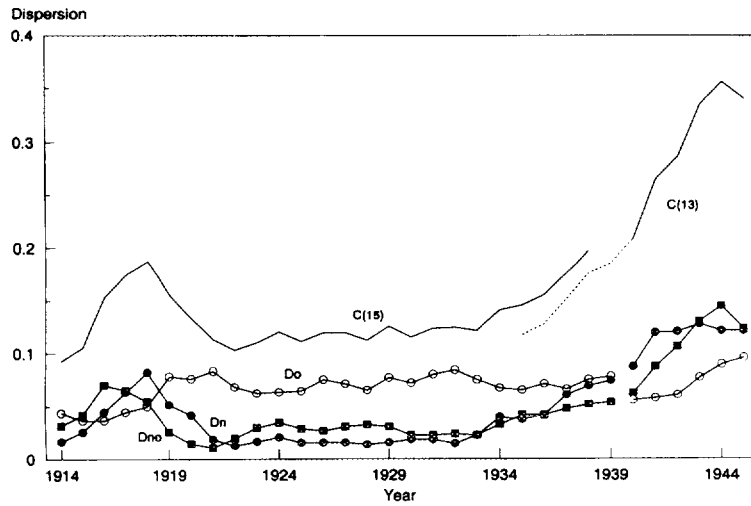


Fig. 5. International real wage dispersion, 1914–1945.

initiated in 1870.¹⁹ Indeed, they state that convergence “has proceeded steadily, with the exception of a brief but sharp fallback during and after World War II” (Baumol *et al.*, 1989, p. 92). The real wage data suggest the contrary: long run convergence ceased between 1914 and 1934. Fur-

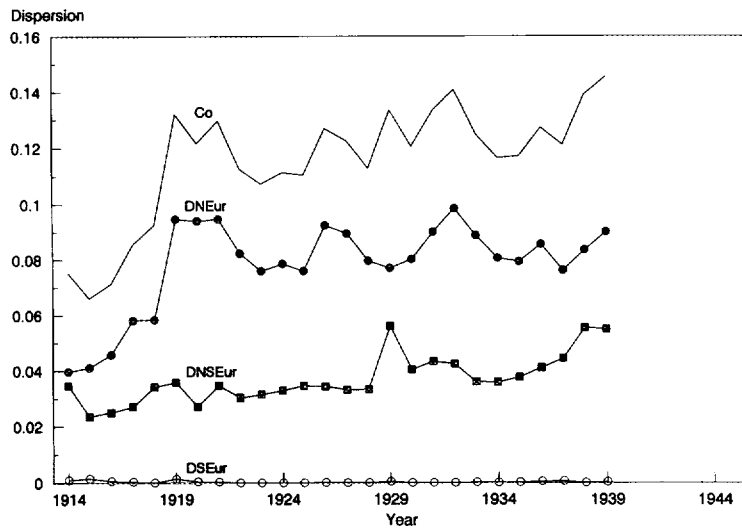


Fig. 6. International real wage dispersion, Europe, 1914–1945.

¹⁹ Abramovitz (1986, Table 1, p. 391) found the same.

thermore, after World War I it was the variance in real wages within the Old World (D_o) that dominated, not the average real wage gap between New World and Old that was so true of the classic period of convergence prior to 1913 (see Fig. 6). In addition, divergence took place after 1934 and up through World War II and it took place everywhere—within the Old World, within the New World, and between the two. A large share of that divergence was driven by the spectacular surge in real wages in the United States.²⁰

The result of all this was that the level of real wage dispersion of the early 1880s had been regained by 1945: the Great Depression and World War II lost almost everything that had been gained over the four decades or so prior to 1913. Indeed, since our real wage rates do not take account of unemployment, and since unemployment rates in the United States in 1934 were higher than those elsewhere, the surge in American unemployment-adjusted real wages would be even greater and the measured divergence greater as well. As we shall see, a good part of the post-World War II convergence served simply to regain what had been lost between 1934 and 1945.

The most interesting question suggested by the war and interwar experience, it seems to me, is how much of the cessation in long run real wage convergence can be explained by the breakdown of international commodity and factor markets. This research avenue seems at least equal in promise when compared to that well-traveled street which appeals to the cessation of international technological transfer.

Convergence Resumes: 1946–1988

The post-World War II convergence has, of course, been well studied. But there are two aspects of this experience that may not have been fully appreciated. First, and in contrast with the position taken by Abramovitz and others, it was *not* the period of most dramatic convergence. I believe the pre-1913 epoch deserves that prize. Second, there were three distinct episodes within the period, not just one.

Figure 7 displays C over the full postwar period. Postwar recovery in the Old World generated a short, dramatic convergence so that by 1950 much, but not all, of the global labor market integration that had been lost after 1913 was regained. Across the 1950s, there was no convergence, and this was not simply due to continued American success in retaining her leadership. Figure 8 shows that *within* Europe there was no convergence at all until the mid 1960s. Indeed, there was some divergence at work, and it was driven entirely by that North–South wage gap along the Latin divide, a repeat performance of the 1890–1913 experience.

Our real wage evidence therefore suggests that the pre-1913 long run

²⁰ See also Abramovitz (1986), p. 395, and Wolff (1991), p. 569.

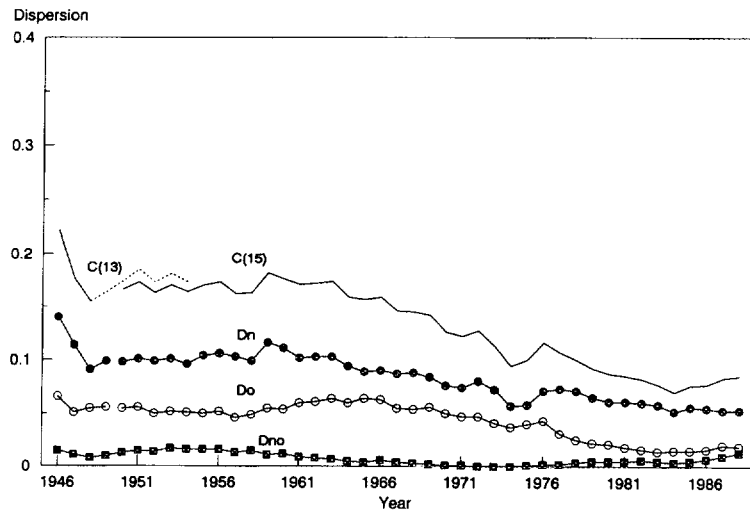


FIG. 7. International real wage dispersion, 1946–1988.

convergence did not resume until the mid-1960s. Post-World II real wage convergence, therefore, is a relatively recent story that started unfolding only 25 years ago. The story has two parts: the first is well known—the European Old World’s final catch up to the New World, especially the leader, the United States—and the second is less well known—the spec-

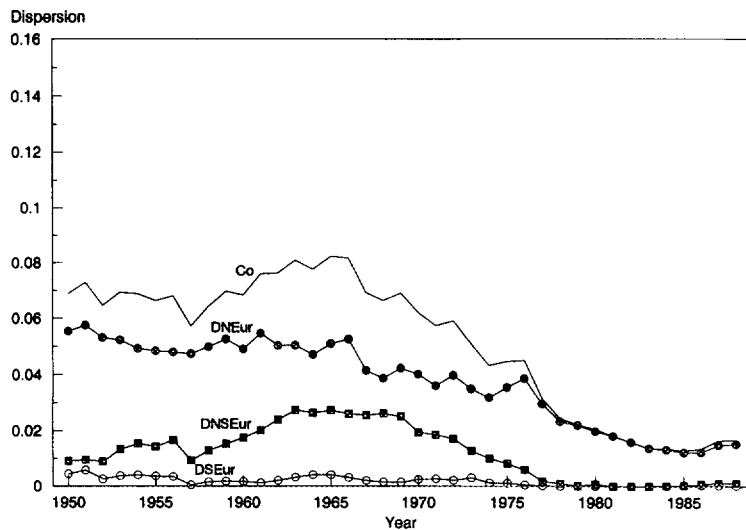


FIG. 8. International real wage dispersion, Europe, 1946–1988.

tacular rise in Old World Latin real wages in Italy, Spain, and even France relative to everyone else. This latter event is especially notable since these three countries as a group hadn't made much progress at all in joining the convergence club from the mid-19th century onward. In 1870, Italy, Spain, and France had real wages that were, respectively, 38, 74, and 72% of Britain, for an average of 61; in 1913, they were 50, 46, and 60, for an average of 52; in 1938, they were 42, 47, and 67, for an average of 52; in 1946, they were 38, 77, and 51, for an average of 55; and in 1980, they were 115, 112, and 91, for an average of 106. Over the seven decades between 1870 and 1946, these three countries were able to erase none of the 39% wage gap between themselves and Britain, while over the four decades between 1938 and 1980, they were able to erase all of it and more.

IV. A RESEARCH AGENDA

This real wage data base should add new fuel to the fires burning on the determinants of economic growth generally, and the forces of convergence and divergence specifically. The evidence confirms much of what has been said about convergence based on Maddison's GNP data. By itself, the addition of a completely new data base which reinforces some of the conventional wisdom about long run growth should be welcome. But the new data base also rejects some conventional wisdom, adds new facts, and sharpens the agenda.

It might be helpful to summarize the new facts and confirmation of the old. Recall, however, that these facts are based on the experience of a sample of 15 countries, all of whom have achieved economic success since 1830. The sample excludes all of Eastern Europe and includes only Italy and Spain from Southern Europe. The New World group is limited only to 4—Argentina, Australia, Canada, and the United States. No Third World countries are included, or even Japan for that matter. Subject to that sample limitation, here is what we find:

- * The convergence that others have documented for the period between 1870 and 1988 is confirmed. However, wage convergence started in the mid-1840s, not in 1870.

- * Real wage convergence since 1870 has been considerably more dramatic than GNP per capita or GNP per worker-hour convergence.

- * Wage convergence between the mid-1840s and 1913 was at least as dramatic as it has been since 1950, and probably more so.

- * The long run wage convergence between the mid-1840s and 1913 has two phases, a very steep descent to about 1900, and stability thereafter.

- * Between the mid-1840s and 1913, the average wage gap between the New World and the Old was doing most of the work in driving overall convergence (and divergence). The cessation of wage convergence after 1900 was driven by a cessation in the erosion of the average wage gap

between the Old World and the New, in particular by a relative wage boom in North America as it rose to world industrial leadership. The cessation of convergence within Europe was driven by a rising wage gap between the Latin South and the non-Latin North.

* Long run wage convergence ceases between 1913 and the mid-1930s, and sharp divergence takes place thereafter until 1945. This war and interwar episode was sufficiently dramatic that much of the long run convergence achieved after 1870 was lost by 1945.

* The post-World War II wage convergence has been very recent—since the mid-1960s—and it has been driven primarily by an erosion of two wage gaps—between the Old World and the New, and between the Latin South and the non-Latin North within the Old World.

In short, there has been significant variance in the rate of convergence since the mid-19th century, so much so that it suggests that the world economic environment mattered a great deal, and that different explanations may be more relevant for some epochs than for others. I do not mean by this that a “general theory” of convergence is out of reach, but only that the forces driving convergence (or divergence) are likely to have had very different quantitative significance within different epochs. What remains is to uncover the sources of convergence within these epochs. How much can be attributed to labor supply responses, and international migrations in particular? We have only started to attack this important question for the late 19th century decades of mass migrations.²¹ How much can be attributed to capital accumulation responses, and international capital flows in particular? After all, capital typically chased after labor migrating to the New World thus muting the convergence impact of international migrations on capital–labor ratios in the labor-scarce New World and the labor-abundant Old World (Hatton and Williamson, 1992b). How much can be attributed to world commodity market integration and disintegration, and thus to the real wage gap implications of Heckscher–Ohlin thinking embedded in trade theory? In the late 19th century, it appears that commodity price convergence—generated by transport improvements—made a profound contribution to real wage convergence.²² And exactly how did experience in each of these three markets—labor, capital, and commodities—interact? It seems to me that economic historians should attack these issues first before elevating international technological transfer to the status of prime mover, a thesis so ably argued by Gerschenkron that it has dominated the convergence debate ever since.

²¹ The argument is offered in Hatton and Williamson (1992b). The argument is supported with Anglo-American evidence in O'Rourke *et al.* (1994), and with Irish evidence in Boyer *et al.* (1994).

²² At least between Britain and the United States; see O'Rourke and Williamson (1994).

APPENDIX 1

Nominal Wage, Cost of Living, and Real Wage Series:
Sources and Methods

Wages are specified as being hourly, daily, weekly, etc., unless this information is omitted in the sources. Resulting real wage indices are reported in Table A1.1. In most cases, the indices in Table A1.1 have a base year of 1900 for the entire 1830–1988 period. Breaks in the real wage indices could not be avoided, however, for Belgium, Brazil, Denmark, Germany, and Portugal. Such breaks are indicated in Table A1.1 by a horizontal line. Observations in Table A1.1 subsequent to a break have a base year of either 1929 or 1955.

Argentina (ARG)

Nominal wage. 1864–1870: Simple average, average monthly wages of porteros and peones (pesos fuertes); Republica Argentina, *Ley de Presupuesto General*, various years, Buenos Aires. Linear interpolation used for peones in 1866.

1870–1883: Simple average, average monthly wages of porteros and peones (pesos fuertes); Republica Argentina, *Memoria de Hacienda*, various years, Buenos Aires. Linear interpolation used in 1871, 1875, and 1882.

1883–1903: Average monthly wage, peones de policia (pesos moneda nacional); R. Cortés Conde, *El Progreso Argentino, 1880–1914*, Buenos Aires, Editorial Sudamericana, 1979, p. 226.

1903–1914: Daily wage of peones albañiles (pesos mn); Republica Argentina, *Boletín del Departamento Nacional del Trabajo*, Buenos Aires, no. 21, Nov. 30, 1912, p. 460, and no. 33, Jan. 30, 1916, p. 132. Linear interpolation for 1913.

1914–1940: Average nominal wage in Buenos Aires, 1929 = 100; Republica Argentina, *Investigaciones Sociales 1943–1945*, Buenos Aires, Dirección de Estadística Social, 1946, p. 258.

Cost of living. 1864–1890: Cost of living index, 1882 = 100; R. Cortés Conde, unpublished worksheets. Based on wholesale prices of 16 items with fixed weights.

1890–1910: Cost of living index, 1903 = 100; R. Cortés Conde, *El Progreso Argentino, 1880–1914*, p. 226. Straight line interpolation based on food price index (*ibid.*) in missing years.

1910–1914: Cost of living index, 1910 = 100; A. E. Bunge, *Los Problemas Económicos del Presente*, vol. 1, Buenos Aires, n.p., 1920, p. 269.

1914–1940: Cost of living index for Buenos Aires, 1929 = 100; Republica Argentina, *Investigaciones Sociales 1943–1945*, p. 258.

Real wage. 1940–1980: Average real wage in manufacturing, 1970 = 1; J. J. Llach and C. E. Sánchez, “Los Determinantes del Salario en la

TABLE A1.1
National Real Wage Indices, 1830-1988 (1900 = 100)

Year	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1830				47			52		50	36		50		132	30	55	
1831				48			53		51	35		45		110	30	54	
1832				49			56		54	37		47		95	30	72	
1833				46			66		59	39		50		98	29	32	
1834				52			67		60	41		54		119	29	32	
1835				47			64		58	44		60		108	29	48	
1836				54			63		52	38		58		97	29	49	
1837				61			60		51	37		60		84	28	45	
1838				62			58		49	35		51		83	28	39	
1839				52			55		47	34		48		94	28	42	
1840				50			55		49	34		48		97	28	35	
1841				54			61		50	36		46		110	28	37	
1842				62			60		54	38		46		103	28	55	
1843				69	48		61		60	43		48		114	28	53	
1844				74	48		61		58	41		52		118	28	54	
1845				71	46		61		59	42		47		132	28	45	
1846				69	46		57		56	40		43		105	28	42	
1847				54	42		56		49	34		35		89	28	48	
1848				64	41		59		60	42		52		99	28	45	
1849				70	45		62		66	46		53		128	28	53	
1850				68	46		65	79	65	53		62	34	132	28	60	79
1851				69	49		66	72	68	48		61	31	126	28	55	94
1852				70	51		64	61	66	46		54	32	132	28	59	95
1853				68	53		63	57	55	49		56	32	119	28	68	75
1854		89		65	46		61	53	49	43		53	36	122	29	54	67
1855		74		64	46		60	50	49	49		53	39	118	30	53	76
1856		84		66	47		61	53	51	53		56	39	99	30	56	60
1857		80		64	50		63	67	55	47		59	42	103	31	56	76
1858		76		68	52		69	68	65	56		65	40	105	31	62	86
1859		74		67	56		73	67	64	54		65	41	112	32	64	76
1860		85		68	56		66	65	55	48		63	41	109	33	72	80
1861		89		66	53		64	55	55	46		60	40	103	40	72	77
1862		75		59	49		65	64	55	46		61	41	108	48	71	88
1863		66		53	53		65	69	54	45		55	43	100	46	66	89
1864	40	76		50	60		66	75	55	45		57	41	99	42	63	85
1865	43	58		53	61		67	71	56	46		63	42	103	44	65	89
1866	50	67		56	60		67	70	61	51		65	40	101	35	64	85
1867	49	79		60	60		67	60	63	53		67	40	98	36	73	76

1868	48	72		62	61		68	62	64	54		66	41	97	45	66	73
1869	52	90		69	63		75	68	65	55		67	42	114	51	57	73
1870	58	91	63	74	65	42	73	69	66	55		72	43	108	34	58	76
1871	56	92	65	75	65	40	68	68	65	54	63	69	43	110	41	69	79
1872	49	87	67	75	70	44	72	70	62	54	60	67	46	113	45	69	85
1873	48	85	70	76	74	45	74	74	62	53	56	70	50	102	43	75	69
1874	56	80	70	79	75	48	75	75	67	56	58	72	62	115	51	71	89
1875	56	83	67	81	76	53	79	80	72	58	68	83	59	116	50	87	90
1876	55	78	77	82	70	52	77	77	72	59	68	88	59	117	46	86	91
1877	45	83	78	72	66	49	77	74	74	60	69	89	57	107	52	83	81
1878	41	89	86	72	68	46	80	79	78	64	71	95	59	109	59	79	84
1879	39	91	84	72	69	57	82	76	82	66	72	96	59	100	54	86	89
1880	44	97	76	71	77	56	83	74	77	63	73	93	53	103	54	91	100
1881	55	98	75	75	73	54	85	74	76	64	78	93	55	98	49	87	97
1882	63	96	74	82	74	55	88	78	77	65	83	92	55	93	56	98	96
1883	71	101	79	84	76	58	85	81	76	64	85	99	59	96	59	93	110
1884	67	98	82	87	78	59	87	82	80	67	87	106	62	96	62	103	123
1885	53	96	87	87	85	61	88	83	86	72	89	110	65	96	66	105	126
1886	67	94	93	89	85	64	90	84	88	78	89	112	66	100	69	107	123
1887	75	110	93	88	84	66	92	86	89	81	90	107	65	102	71	113	123
1888	88	111	93	88	89	69	90	90	89	83	88	105	66	100	68	115	125
1889	77	97	97	90	84	66	91	87	88	84	91	105	67	99	68	102	112
1890	55	94	100	93	94	66	93	91	89	84	88	105	71	103	71	101	99
1891	78	103	98	91	88	63	91	87	92	90	88	97	77	104	71	98	102
1892	86	101	107	91	85	70	92	88	92	86	88	107	81	102	76	91	105
1893	95	96	103	92	92	73	93	91	96	96	91	112	89	99	81	85	94
1894	81	110	109	92	94	79	91	92	100	96	93	114	92	105	86	87	91
1895	75	115	112	96	93	84	94	93	103	101	93	121	89	106	88	109	101
1896	70	110	118	95	97	90	96	96	103	109	95	124	98	99	93	92	97
1897	75	97	116	96	96	97	99	95	101	106	96	119	99	105	96	95	91
1898	97	92	110	97	94	99	98	96	103	103	96	114	100	108	97	81	87
1899	108	99	110	99	99	100	99	101	106	106	99	111	107	108	97	93	98
1900	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1901	94	94	103	102	94	100	101	8	101	102	101	102	104	100	106	117	106
1902	94	92	107	104	99	100	102	98	101	102	105	103	106	102	105	128	105
1903	95	92	111	105	92	103	103	99	100	103	105	101	104	101	105	131	95
1904	101	96	117	105	94	106	106	101	99	103	107	95	112	101	109	130	106
1905	89	88	111	107	88	104	108	100	99	103	110	102	118	101	106	140	114
1906	87	87	122	110	98	106	110	104	98	102	111	98	121	110	107	142	112
1907	85	88	117	110	91	109	111	106	95	100	112	100	123	105	109	126	101
1908	84	87	123	107	91	109	110	103	98	104	120	101	116	108	115	131	102
1909	83	88	126	110	93	115	111	102	96	104	125	98	114	110	117	128	103
1910	90	97	131	109	95	114	102	104	94	102	125	98	106	109	122	127	100

TABLE A1.1—Continued

Year	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1911	89	98	134	106	92	121	94	105	93	101	126	96	111	113	125	134	95
1912	92	94	130	105	96	120	96	104	91	100	134	98	110	108	120	120	94
1913	87	92	140	109	102	118	96	109	97	100	136	100	125	107	119	129	
1914	85	89	136	108	107	62	94	105	85	103	152	100	136	106	119	149	
1915	76	78	132	109			82	93	74	94	154	89	119	104	110	129	
1916	71	81	131	124			72	83	69	82	134	87	113	100	108	120	
1917	61	81	120	132		49	69	74	70	88	129	88	121	99	106	94	
1918	52	79	126	141		56	68	76	80	101	123	100	110	102	110	76	
1919	71	75	131	143		85	73		91		162	123	139	107	120	75	
1920	73	79	125	141	92	93	82		97		178	123	142	136	138	69	
1921	91	101	129	131	108	106	95		106		184	152	150	143	162	102	
1922	104	104	131	129	120	97	96		95		175	158	147	149	144	100	
1923	107	101	139	139	115	89	97		93		164	156	142	147	147	84	
1924	106	105	139	144	109	89	96	85	95	135	159	150	133	145	148	86	
1925	111	105	131	139	112	95	96	98	96	121	158	150	136	145	149	83	
1926	112	106	129	140	96	100	92	105	97	121	159	156	142	152	157	107	
1927	118	109	134	145	106	99	85	105	100	129	172	159	142	147	158	112	70
1928	126	110	137	148	114	99	91	111	99	124	171	160	147	152	160	108	
1929	124	108	138	152	125	100	97	114	100	124	127	167	156	138	170	112	
1930	113	112	143	153	130	107	97	121	103	125	168	173	159	155	179	130	
1931	122	112	146	161	125	113	98	124	109	132	174	181	169	152	183		82
1932	129	111	144	157	110	115	100	120	109	133	168	178	162	157	183		88
1933	119	111	143	166	112	112	105	118	112	138	173	176	162	174	180		96
1934	123	109	144	191	117	109	111	113	110	136	175	169	167	170	178		
1935	126	108	162	193	111	105	113	109	110	133	167	168	166	168	181		94
1936	118	109	163	193	112	106	106	107	110	131	155	172	167	166	181		
1937	119	110	151	212	128	104	108	106	108	124	146	170	172	163	183	114	
1938	119	113	149	222	135	108	101	107	110	129	143	171	176	140	189		
1939	121	113	150	229	133	109	98	107	109	127	165	173	178	123	196		85
1940	122	111	153	233		97	98	104	108	111	160	159	159	109	185		89
1941	120	112	149	248		93	90	102	107	104	147	148		91	174		92
1942	120	112	173	254		94	76	100	115	94	144	137		100	178		73
1943	124	115	186	264		100	65	100	120	87	105	134		101	181		79
1944	141	116	192	272		104	92		125	87	40	130	137	97	183		92
1945	134	117	194	273		110	104		128	89	39	133	154	95	192	74	85
1946	129	118	198	279		122	99		139	93	88	152	174	80	204	80	90
1947	158	124	198	279	86	125	103		143	114	145	148	189	71	223	68	94
1948	194	127	195	275	83	138	98		139	121	185	149	200	66	241	70	

1949	200	128	200	289	89	141	100	—	140	131	194	142	210	66	242	86	106
1950	194	130	203	298	92	136	101	78	145	130	204	144	212	62	247	91	107
1951	182	135	214	300	94	135	100	82	144	121	206	138	207	59	255	86	101
1952	165	158	224	310	98	145	112	86	143	143	207	140	212	69	281	86	100
1953	174	161	244	324	96	150	122	92	147	148	208	143	218	64	294	73	103
1954	193	162	248	330	97	154	131	95	156	149	211	152	222	63	301	92	101
1955	190	163	257	346	100	149	141	100	163	144	218	159	231	67	318	100	100
1956	198	161	268	358	103	153	148	106	167	150	218	162	240	67	331	102	98
1957	199	161	279	364	107	159	151	109	171	147	223	171	249	88	334	106	99
1958	210	162	295	363	108	164	151	111	170	148	225	174	247	79	342	105	103
1959	156	164	309	375	109	172	155	116	179	153	229	178	263	79	353	104	109
1960	166	167	334	380	113	178	160	125	182	163	231	186	272	79	360		113
1961	185	168	331	386	116	192	169	135	194	161	231	191	285	82	383		122
1962	179	171	352	393	121	198	179	143	190	177	238	197	296	78	395		125
1963	180	172	360	401	128	202	188	150	198	175	246	201	304	73	410	122	127
1964	202	174	370	406	136	210	199	158	207	186	266	221	304	75	434	121	129
1965	219	174	381	413	142	221	209	168	215	180	275	230	318	77	453	116	141
1966	221	175	433	418	148	233	217	171	212	179	279	240	330	84	460	140	145
1967	221	181	453	423	153	237	229	171	216	237	285	248	338	93	482	141	147
1968	205	187	467	431	159	246	254	179	222	248	290	253	354	98	502	148	148
1969	211	194	508	434	166	265	260	192	230	261	309	266	375	106	533	153	149
1970	219	201	522	432	178	277	272	208	248	270	356	282	369	114	565	153	156
1971	227	214	571	440	185	301	286	224	253	301	381	295	393	121	567	162	159
1972	211	216	604	455	202	316	301	231	269	292	399	311	399	132	612	206	167
1973	225	234	624	459	220	333	321	237	284	309	449	324	406	143	622	227	181
1974	251	261	617	447	235	345	336	248	289	320	462	353	437	168	628	229	223
1975	244	247	644	448	248	374	352	255	295	333	497	361	476	184	657	254	276
1976	162	247	682	458	254	383	367	258	299	346	518	358	508	206	704	267	286
1977	154	243	694	468	258	379	378	267	287	386	561	362	506	236	673	278	262
1978	150	241	684	472	264	380	391	272	303	412	580	367	505	252	664	316	250
1979	174	237	680	460	268	387	400	275	308	420	595	371	495	275	668	297	239
1980	193	239	684	438	273	383	405	276	302	426	584	361	487	257	640	312	252
1981	180	243	677	436	274	376	408	274	303	413	605	351	474	277	630	339	255
1982	165	250	657	437	272	375	421	272	310	425	608	354	469	278	631	379	248
1983	206	243	672	440	267	374	427	272	322	430	609	352	471	280	621	542	231
1984	249	252	672	439	265	368	429	273	335	429	614	345	477	260	629	311	213
1985	210	247	674	440	260	369	428	281	342	442	627	355	487	257	630	341	219
1986	211	237	667	442	260	373	435	292	356	456	619	361	501	254	649	367	233
1987	200	229	657	435	258	392	435	304	369	467	630	368	533	257	663	310	243
1988	186	224	661	430	263	399	437	312	381	492	636	369	531	265	677	318	247

Argentina. Un Diagnóstico de Largo Plaza y Propuestas Depolíticas," *Estudios*, año VII, no. 29, Enero/Marzo 1984, p. 5.

1980–1984: Real wage in industry, 1982 = 100; Estudio M.A.M. Brody y Asoc., *Carta Económica*, año 2, no. 23, April 1985. From the FIEL (Fundación de Investigaciones Económicas Latinoamericanas) database.

1984–1988: Real wage in industry, usual calculation, January 1984 = 100; Estudio M.A.M. Brody y Asoc., *Carta Económica*, año 6, no. 73, June 1989. From the FIEL database.

Australia (AUS)

Nominal wage. 1854–1860: Unweighted average of indices of wage rates in New South Wales and Victoria; indices derived from annual percentage changes reported in R. Maddock and I. McLean, "Supply-Side Shocks: The Case of Australian Gold," *Journal of Economic History* 44(4), 1984, Table 2, p. 1055. The New South Wales and Victoria wage rates are themselves employment-weighted averages of wage rates (mostly daily and weekly) of seven occupations: farm laborers, shepherds, workers in building trades, blacksmiths, female servants, general laborers, and goldminers (implicit wage rate).

1860–1861: Money wages of urban general laborers in Victoria; G. Withers, unpublished database, n.d.

1861–1913: See *Real wage* below.

1913–1975: Money wages in industry; B. R. Mitchell, *International Historical Statistics: The Americas and Australasia* (hereafter *IHS*), Gale Research, Detroit, 1983, Table C4, p. 177.

1976–1977: Money wages in industry; International Labour Office (hereafter ILO), *Yearbook of Labour Statistics*, Geneva, 1980. A continuation of the above.

1977–1988: Hourly wage in all activities; OECD, *Main Economic Indicators 1969–1988*, (hereafter *MEI*), Paris, 1989, p. 159.

Cost of living. 1854–1861: Consumer price index; I. W. McLean and S. J. Woodland, "Consumer Prices in Australia, 1850–1914," mimeo, Department of Economics, University of Adelaide, revised April 1992, Series W6, Appendix Table 3.

1861–1913: See *Real wage* below.

1913–1975: Consumer price index; B. R. Mitchell, *IHS*, Table I2, p. 841.

1975–1988: Consumer price index; OECD, *MEI*, p. 160.

Real wage. 1861–1900: Geometric mean of real wages of urban general laborers in Queensland, South Australia, and Victoria, weighted by each colony's workforce share; based on colony-level nominal wage, price level, and workforce estimates from G. Withers, unpublished database, n.d. (The colony-level price indices in the Withers database are derived from N. G. Butlin, *Australian Domestic Product, Investment and Foreign Bor-*

rowing, 1861–1938/39, Cambridge Univ. Press, Cambridge, 1962, Table 78, p. 158.)

1900–1913: Real wage of laborers in Sydney; R. C. Allen, "Real Incomes in the English Speaking World," mimeo, University of British Columbia, Vancouver, November 1990, p. 45.

Belgium (BEL)

Nominal wage. 1843–1939: Composite index of annual wages in several occupations (varying from 6 to 25); P. Scholliers, "A Century of Real Wages: A Methodological and Empirical Contribution on Belgium, 1840–1940," paper presented at the conference on *International Migration and Labor Market Integration in the 19th and 20th Centuries, Bellagio, Italy, June 14–18, 1993*, Annex 2, "Scholl-3, 4, 5" series are used, pp. 21–22.

1940–1946: Data not available.

1947–1969: Daily wages of males in manufacturing; B. R. Mitchell, *European Historical Statistics 1750–1975* (hereafter EHS), Columbia Univ. Press, New York, 1978, p. 75.

1969–1988: Hourly wage in manufacturing; OECD, *MEI*, p. 240.

Cost of living. 1843–1880: F. Michotte, "L'évolution des prix de détail en Belgique de 1830 à 1913," *Bulletin de l'Institut des Sciences Economiques de Louvain*, May 1934, pp. 354–357; reprinted in J. Singer-Kerel, *Le coût de la vie à Paris de 1840 à 1954*, A. Colin, Paris, 1961, pp. 108–109.

1880–1939: Scholliers, "A Century of Real Wages," Annex 1, "Scholl-1, 2, 3" series are used, pp. 19–20.

1939–1969: Consumer price index; Mitchell, *EHS*, p. 781.

1969–1988: Consumer price index; OECD, *MEI*, p. 244.

Brazil (BRZ)

Nominal wage. 1830–1930: Unweighted average of monthly wages for laborers, carpenters, bricklayers, and porters in Rio de Janeiro; E.M.L. Lobo, *História do Rio de Janeiro (do capital comercial ao capital industrial e financeiro)*, Instituto Brasileiro do Mercado de Capitais (IB-MEC), Rio de Janeiro, 1978, pp. 803–813.

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1938–1944: No data available.

1945–1988: Industrial wage index; J. Wilkie (Ed.), *Statistical Abstract of Latin America*, UCLA Latin American Center Publications, Los Angeles, Vol. 29, Pt. 1, p. 534. The years 1960–1962 are missing.

Cost of living. 1830–1850: Price index using 1919 consumption weights; Lobo, *História do Rio de Janeiro*, pp. 748–751.

1850–1870: Price index; K. W. Goldsmith, *Brasil, 1850–1984*, Harper & Row, Sao Paulo, 1986, pp. 30–31.

1870–1913: Wholesale price index; L. A. V. Catao, "A new wholesale price index for Brazil during the period 1870–1913," *Revista Brasileira de Economica* 46(4) (October/December, 1992), Appendix 1, Table 1, p. 530.

1913–1947: Global price deflator; *Estatísticas Históricas do Brasil*, IBGE, Rio de Janeiro, 1987, Vol. 3, p. 159.

1947–1988: Consumer price index; Wilkie (Ed.), *Statistical Abstract of Latin America*, Vol. 29, Pt. 1, p. 534.

Canada (CAN)

Nominal wage. 1870–1889: Wages of construction workers; T. O. Dick, "Output, Prices and Real Wages: The Canadian Experience 1870–1915," mimeo, Harvard University, 1982, p. 25.

1889–1901: Average daily wage, laborers in the building trades (Ottawa and Toronto); F. H. Leacy (Ed.), *Historical Statistics of Canada*, Ottawa, 1983, Tables D-472 and D-480.

1901–1974: Weighted average by provincial population of hourly wages of laborers in the building trades (Halifax, Montreal, Toronto, Winnipeg, Vancouver); *ibid.*, Tables E-248 and E-267.

1974–1988: Hourly earnings in manufacturing; OECD, *MEI*, p. 30.

Cost of living. 1870–1913: Wholesale price index; Leacy, *Historical Statistics of Canada*, Table J1.

1913–1969: Consumer price index; *ibid.*, Table K8.

1969–1988: Cost of living index; OECD, *MEI*, p. 34.

Denmark (DEN)

Nominal wage. 1870–1980: Hourly wage of unskilled males in crafts and industry; H. Chr. Johansen, *Dansk Økonomisk Statistik, 1814–1980*, Copenhagen, 1985, pp. 294–296.

1980–1988: Hourly earnings in manufacturing; OECD, *MEI*, p. 271.

Cost of living. 1870–1980: Consumer price index; Johansen, *Dansk Økonomisk Statistik, 1814–1980*, pp. 298–302.

1980–1988: Consumer price index; OECD, *MEI*, p. 273.

France (FRA)

Nominal wage. 1830–1840: All France wage rate index; M. Levy-Leboyer and F. Bourguignon, *The French Economy in the Nineteenth Century: Essays in Econometric Analysis*, Cambridge Univ. Press, Cambridge, 1990, Table A-IV.

1840–1939: All France, nonfarm daily wage rate index; J. Singer-Kerel, *Le coût de la vie*, pp. 536–537.

1939–1946: Hourly wage rates, males, Paris; *ibid.*, pp. 538–539.

1946–1969: Hourly industrial wage; Mitchell, *EHS*, p. 75.

1969–1988: Hourly industrial wage; OECD, *MEI*, p. 335.

Cost of living. 1830–1840: M. Levy-Leboyer and F. Bourguignon, *The French Economy in the Nineteenth Century*, Table A-IV.

1840–1948: J. Singer-Kerel, *Le coût de la vie*, pp. 141, 452–453.

1948–1969: Wholesale price index; Mitchell, *EHS*, pp. 388–390, 392.

1969–1988: Consumer price index; OECD, *MEI*, p. 338.

Germany (GER)

Real wage. 1850–1871: Real wage; J. Kuczynski, *Darstellung der Lage der Arbeiter in Deutschland von 1789 bis 1949*, Berlin, 1961, p. 246.

1871–1943: Real wage of unskilled in the building trades; G. Bry, *Wages in Germany 1871–1945*, Princeton Univ. Press, Princeton, 1960, Table A-4, pp. 335–336 (no data available 1919–1923).

Nominal wage. 1950–1969: Weekly industrial wage, West Germany; Mitchell, *EHS*, p. 197.

1969–1988: Hourly wage in manufacturing; OECD, *MEI*, p. 384.

Cost of living. 1950–1969: Cost of living index; Mitchell, *EHS*, p. 781–783.

1969–1988: Consumer price index; OECD, *MEI*, p. 385.

Great Britain (GB)

Nominal wage. 1830–1834: Weekly farm wages; Mitchell, *EHS*, p. 78.

1834–1860: Weekly wage of a common laborer in the building trades computed as an unweighted average of wages in Manchester, Southern England and nine towns. Sources: Up to 1838, A. L. Bowley, *Wages in the United Kingdom in the Nineteenth Century*, Cambridge Univ. Press, Cambridge, 1900, p. 60; 1839–1860, A. L. Bowley, “The Statistics of Wages in the UK during the last 100 years,” *Journal of the Royal Statistics Society* **43**, June 1900, pp. 300–311.

1860–1880: Weighted average of weekly wages of bricklayers’ laborers in Birmingham, Leeds, London, and Manchester. Source: G. Boyer, T. Hatton, and K. O’Rourke, “Emigration and Economic Growth in Ireland, 1850–1914,” paper presented to the conference on *International Migration and Labor Market Integration in the 19th and 20th Centuries*, Bellagio, Italy, June 14–18, 1993; based on Board of Trade’s unpublished document, *Rates of Wages and Hours of Labour in Various Industries in the United Kingdom*, 1908.

1880–1913: Weighted average of weekly wages for bricklayers’ laborers in 10 cities. Source: G. Boyer, T. Hatton, and K. O’Rourke, “Emigration and Economic Growth in Ireland.”

1913–1969: Weekly wages, adult males, in manufacturing; Mitchell, *EHS*, p. 71–76.

1969–1988: Industrial wages; OECD, *MEI*, p. 698.

Cost of living. 1830–1851: P. H. Lindert and J. G. Williamson, “English

Workers' Real Wages: Reply to Crafts," *Journal of Economic History* 45, March 1985, Table 1, pp. 148–149.

1851–1860: J. G. Williamson, *Did British Capitalism Breed Inequality?*, Allen & Unwin, London, 1985, Table A.8, p. 220.

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1913–1914: C. H. Feinstein, "A New Look at the Cost of Living, 1870–1914," in J. Foreman-Peck (Ed.), *Reinterpreting the Victorian Economy: Essays in Quantitative Economic History*, Cambridge Univ. Press, Cambridge, 1990, Table 4, pp. 32–33.

1914–1969: Cost of living index; Mitchell, *EHS*, pp. 780–782.

1969–1988: Consumer price index; OECD, *MEI*, p. 702.

Ireland (IRL)

Nominal wage. 1830–1860: Daily wages of general laborers in the Dublin building trades; F. A. D'Arcy, "Wages of Labourers in the Dublin Building Industry, 1667–1918," *Saothar* 14, 1989, Tables 6 and 7, pp. 23 and 24.

1860–1913: Weighted average of laborers' weekly wages in Dublin and Cork building trades. Source: G. Boyer, T. Hatton, and K. O'Rourke, "Emigration and Economic Growth in Ireland;" based on F. A. D'Arcy, "Wages of Labourers" and the Board of Trade's *Rates of Wages and Hours of Labour in Various Industries in the United Kingdom*, 1908.

1913–1918: Daily wages of general laborers in the Dublin building trades; F. A. D'Arcy, "Wages of Labourers," Table 8, p. 26.

1918–1931: Weekly wages in agriculture, males; International Labor Office, *Annual Review*, Geneva, 1931, Table 1, p. 323; and ILO, *Yearbook*, Geneva, 1931, Table 1, p. 297.

1931–1967: Industrial wages, in [Irish] *Statistical Abstract*, several issues.

1967–1969: Weekly earnings in manufacturing; Mitchell, *EHS*, p. 76.

1969–1988: Hourly wage in manufacturing; OECD, *MEI*, p. 441.

Cost of living. 1830–1860: K. H. O'Rourke, *Agricultural Change and Rural Depopulation in Ireland 1845–1876*, Ph.D. Thesis, Harvard University, 1989, pp. 129, 212–226.

1860–1914: Cost of living in United Kingdom (see GB sources).

1914–1969: ILO, *Yearbook*, several issues.

1969–1988: Consumer price index; OECD, *MEI*, p. 443.

Italy (ITA)

Nominal wage. 1871–1890: Hourly industrial wage, males; Mitchell, *EHS*, p. 72.

1890–1913: Daily wage in industry; V. Zamagni, "An International Comparison of Real Industrial Wages 1890–1913: Methodological Issues

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1913–1922: Daily wage for industrial operatives; V. Zamagni, “La alterazione nella distribuzione del reddito in Italia nell’immediato de guerra 1918–1922,” in *La transizione dell’economia di guerra all’economia di pace in Italia e in Germania dopo la Prima Guerra Mondiale*, Società editrice il Mulino, Bologna, 1983, p. 531.

1922–1969: Daily wage in industry; Mitchell, *EHS*, pp. 74–76.

1969–1988: Hourly industrial wage; OECD, *MEI*, p. 468.

Cost of living. 1871–1890: Mitchell, *EHS*, p. 778.

1890–1914: ISTAT cost of living series, in V. Zamagni, “An International Comparison of Real Industrial Wages 1890–1913: Methodological Issues and Results,” in P. Scholliers (Ed.), *Real Wages in 19th and 20th Century Europe*, p. 134.

1914–1969: Cost of living index; Mitchell, *EHS*, pp. 780–783.

1969–1988: Consumer price index; OECD, *MEI*, p. 474.

The Netherlands (NET)

Real wage. 1830–1850: Real wage of craftsmen in Amsterdam; H. Nusteling, *Welvaart en Werkgelegenheid in Amsterdam 1540–1860*, De Baatafsche Leeuw, Amsterdam, 1985, Table 6.3, p. 265.

Nominal wage. 1850–1913: Wages of unskilled laborers in building trades; based on A. Vermaas, “Real Industrial Wages in the Netherlands, 1850–1913,” paper presented to the conference on *International Migration and Labor Market Integration in the 19th and 20th Centuries, Bellagio, Italy, June 14–18, 1993*, unskilled component by personal communication.

1913–1939: Daily wages in industry; D. J. van der Veen and J. L. van Zanden, “Real Wage Trends and Consumption Patterns in the Netherlands, 1870–1940,” in P. Scholliers (Ed.), *Real Wages in 19th and 20th Century Europe*, pp. 205–228.

1939–1969: Monthly/weekly industrial wages; Mitchell, *EHS*, p. 76.

1969–1988: Hourly wages in manufacturing; OECD, *MEI*, p. 514.

Cost of living. 1850–1913: Cost of living index, 1910 weights; A. Vermaas, “Real Industrial Wages in the Netherlands,” Appendix 1.

1913–1939: van der Veen and van Zanden, “Real Wage Trends,” pp. 227–228.

1939–1969: Cost of living index; Mitchell, *EHS*, p. 282.

1969–1988: Consumer price index; OECD, *MEI*, p. 517.

Norway (NOR)

Nominal wage. 1850–1940: Average daily wage, workers at public road and railway construction; F. Hodne, O. Grytten, and J. Alme, “Norwegian Real Wages: Trends in Prices and Wages, 1850–1940,” paper

presented to the conference on *International Migration and Labor Market Integration in the 19th and 20th Centuries, Bellagio, Italy*, June 14–18, 1993, Appendix 1, Table 4.3; based on data from *Norges Officielle Statistik* and the Wedervang archive.

1940–1969: Hourly wages in industry, adult males; Mitchell, *EHS*, p. 198.

1969–1988: Hourly earnings in manufacturing, males; OECD, *MEI*, p. 548.

Cost of living. 1850–1940: Ramstad–CBS index as constructed in F. Hodne, O. Grytten, and J. Alme, “Norwegian Real Wages,” Appendix 1, Table 3.1.

1940–1969: Cost of living index; Mitchell, *EHS*, pp. 780–782.

1969–1988: Consumer price index; OECD, *MEI*, p. 550.

Portugal (POR)

Nominal wage. 1850–1912: Unskilled urban nominal wage index constructed using series I, J, M, and N from D. Justino, “Preços e Salários em Portugal (1850–1912),” *História Económica*, Banco de Portugal, Lisbon, no date, p. 22.

1913–1930: Data not available.

1931–1955: Wages of laborers in building trades; *International Labour Review* and *Yearbook of Labour Statistics*, ILO, Geneva, various issues.

1955–1988: Industrial wage index; B. R. Mitchell, *International Historical Statistics: Europe 1750–1988* (hereafter *IHSE*), Stockton Press, New York, 1992, pp. 186–187; supplemented by agricultural wage index when industrial wage data are missing (1969–1971), pp. 194–195.

Cost of living. 1850–1912: Surrogate cost of living index; A. B. Nunes, E. Mata, and N. Valério, “Portuguese Economic Growth, 1833–1985,” *Journal of European Economic History* **18**, 1989, pp. 292–295.

1913–1930: Data not available.

1931–1988: Cost of living index; Mitchell, *IHSE*, pp. 849–851.

Real wage. 1927–1930: Extrapolation from the 1931–1988 real wage series based on data described above.

Spain (SPA)

Nominal wage. 1830–1899: Unweighted average of wage indexes, workers in Madrid building trades (“peon” and “official” series); D. Reher and E. Ballesteros, “Precios y salarios en Castilla la Nueva: la construcción de un índice de salarios reales, 1501–1991,” *Revista de Historia Económica* **11**, 1(1993), Appendix 1, Table 1, in press.

1899–1925: Weekly wage of unskilled laborers in textiles (wool); E. Déu, “Els salaris de la indústria tèxtil llanera a Sabadell 1896–1925,” UB Conference paper on *Wages and Labor Markets in Spain*, Barcelona, March 1987.

1925–1933: Average wage in the textile industry; J. Maluquer de Motes, “Precios, Salarios y Beneficios. La Distribución Funcional de la Renta,” in A. Carreras (Ed.), *Estadísticas Históricas de España, S. XIX–XX*, Fundación Banco Exterior, Madrid, 1989, Table 12.14, p. 520.

1933–1941: Unweighted average of wage indexes, workers in Madrid building trades (“peon” and “oficial” series); D. Reher and E. Ballesteros, “Precios y salarios en Castilla la Nueva,” Appendix 2, Table 6.

1941–1963: Hourly wage of unskilled laborers in railways; S. Garcia, “Los Salarios de la ‘Maquinista’ 1940–1985,” UB Conference paper on *Wages and Labor Markets in Spain, Barcelona, March 1987*.

1963–1983: Average hourly wage of unskilled laborers in the building trades; Maluquer de Motes, “Precios, Salarios y Beneficios,” Table 12.12, p. 523.

1983–1988: Hourly earnings, all activities; OECD, *MEI*, p. 592.

Cost of living. 1830–1899: General price index; D. Reher and E. Ballesteros, “Precios y salarios en Castilla la Nueva,” Appendix 1, Table 1.

1899–1913: Price index reported in F. Bustelo and G. Tortella-Casares, “Monetary Inflation in Spain, 1800–1970,” *The Journal of European Economic History* 5(1), 1976, Table I, p. 142, and Table 2, p. 145.

1913–1933: Consumer price index (Barcelona); Maluquer de Motes, “Precios, Salarios y Beneficios,” Table 12.12, pp. 518–519.

1933–1941: General price index; D. Reher and E. Ballesteros, “Precios y salarios en Castilla la Nueva,” Appendix 1, Table 1.

1941–1983: Consumer price index; Maluquer de Motes, “Precios, Salarios y Beneficios,” Table 12.16, pp. 521–522.

1983–1988: Consumer price index; OECD, *MEI*, p. 595.

Sweden (SWE)

Nominal wage. 1830–1860: Daily wage, males, in agriculture (average of counties, mid-point average for 5-year periods, interpolating between mid-points); L. Jörberg, *A History of Prices in Sweden, 1732–1914*, CWK Gleerup, Lund, Sweden, 1972, Vol. II, p. 229.

1860–1913: See *Real wage* below.

1913–1926: Daily earnings in industry; *Statistik Årsbok*, Helsingfors, 1924, Table 168, p. 194, and subsequent issues.

1926–1938: Daily wage in industry, commerce and communications; Mitchell, *EHS*, p. 196.

1938–1950: Hourly wage, adult males, in industry, commerce and communications; *ibid.*, p. 198.

1950–1969: Hourly wage, adult males, in industry; *ibid.*, p. 198.

1969–1988: Hourly wage, manufacturing and mining; OECD, *MEI*, p. 624.

Cost of living. 1830–1860: Cost of living index (mid-point average for

5-year periods, interpolating between mid-points); L. Jörberg, *A History of Prices*, p. 350.

1860–1913: See *Real wage* below.

1913–1926: Cost of living index; Staff of the Institute for Social Sciences, University of Stockholm, *Wages, Cost of Living and National Income in Sweden, 1860–1930*, P. S. King, London, 1933, Vol. I, col. 7, Table 28, p. 189.

1926–1969: Cost of living index; Mitchell, *EHS*, pp. 782–783.

1969–1988: Consumer price index; OECD, *MEI*, p. 627.

Real wage. 1860–1913: Real unskilled industrial wage Index constructed from Staff of the Institute for Social Sciences, University of Stockholm, *Wages, Cost of Living and National Income in Sweden, 1860–1930*, Vol. II.

United States of America (USA)

Nominal wage. 1830–1856: Unweighted average of: (a) wages of civilian common laborers and teamsters at army forts in the northeastern United States, from C. Goldin and R. A. Margo, “Wages, Prices, and Labor Markets before the Civil War,” in C. Goldin and H. Rockoff (Eds.), *Strategic Factors in Nineteenth Century American Economic History: A Volume to Honor Robert W. Fogel*, Univ. of Chicago Press: Chicago, 1992, Table 2A.2, p. 95; and (b) wages of nonfarm common or unskilled labor, from P. A. David and P. Solar, “A Bicentenary Contribution to the History of the Cost of Living in America,” *Research in Economic History* 2, 1977, Table B.1, pp. 59–60.

1856–1889: Wages of urban unskilled workers; J. G. Williamson and P. H. Lindert, *American Inequality: A Macroeconomic History*, Academic Press, New York, 1980, Appendix G, p. 319.

1889–1945: Wages of nonfarm common or unskilled labor, from P. A. David and P. Solar, “A Bicentenary Contribution,” Table B.1, pp. 59–60.

1945–1985: Average hourly earnings, all manufacturing, in U.S. Department of Commerce, *Historical Statistics of the United States, Part I*, Bureau of the Census, 1975, Table D-802, pp. 169–170, and ILO, *Yearbook*, various issues.

1985–1988: Hourly wages in manufacturing; OECD, *MEI*, p. 76.

Cost of living. 1830–1856: Unweighted average of: (a) price index for the northeastern United States, from C. Goldin and R. A. Margo, “Wages, Prices, and Labor Markets,” Table 2A.4, p. 97; and (b) index of consumer prices, from P. A. David and P. Solar, “A Bicentenary Contribution,” Table 1, pp. 16–17.

1856–1974: Index of consumer prices; P. A. David and P. Solar, “A Bicentenary Contribution,” Table 1, pp. 16–17.

1974–1985: ILO, *Yearbook*, various issues.
 1985–1988: Consumer price index; OECD, *MEI*, p. 79.

APPENDIX 2

International Real Wage Series

The national real wage indices in Appendix 1 have been used in conjunction with benchmark real wage comparisons in Appendix 3 to calculate international real wage indices for which the real wage in GB for some given year (Table A2.1, 1905; Table A2.2, 1927; Table A2.3, 1975) is set equal to 100. The derivation of these indices utilizes the identity

$$\frac{w_t^i}{w_t^{GB}} = \frac{(w_t^i/w_r^i)}{(w_t^{GB}/w_s^{GB})} \frac{w_r^i}{w_s^{GB}},$$

where w_t^i is the real wage in country i in year t . The ratios w_t^i/w_r^i and w_t^{GB}/w_s^{GB} are calculated from the individual national real wage indices. The term w_r^i/w_s^{GB} is the benchmark comparison—derived using nominal wage quotations and purchasing power parity measures—of real wages in country i in year r and real wages in GB in year s .

Via the additional identity

$$\frac{w_t^i}{w_q^{GB}} = \frac{w_t^i}{w_r^{GB}} \frac{w_r^{GB}}{w_q^{GB}},$$

the values of w_t^i/w_t^{GB} have been used along with the GB national real wage index to derive a set of international real wage indices in which each country's real wage is expressed relative to the real wage in GB in a particular year q . These indices are summarized in Tables A2.1–A2.3. *Please note* that each country's real wage in each year is expressed relative to GB = 100 in year q . For those using these data for country time series, this basing will not matter (and the results should be consistent with Table A1.1). For those interested in wage gaps between countries, divide one series by the other.

A few of the values in Tables A2.1–A2.3 have been calculated based on interpolation or extrapolation of the underlying w_t^i/w_t^{GB} series. Results derived by linear interpolation are accompanied by a †; those derived by extrapolation of a five-year trend are followed by the letter e .

An asterisk, *, accompanies those values in Tables A2.1–A2.3 which, for the sake of sample size consistency, have been excluded from the dispersion calculations summarized in Figs. 1 and 3–8 of the text.

APPENDIX 3

Purchasing Power Parities and Real Wage Benchmarks

Purchasing Power Parities and Real Wages, 1905–1914

Notes and definitions. The relevant data are presented in Tables A3.1 and A3.2.

TABLE A2.1
International Real Wages, 1830-1913 (100 = GB Real Wage in 1905)

Year	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1830				74			36		53	32		36		63	24	37	
1831				75			37		54	31		32		53	24	36	
1832				76			39		57	33		34		45	24	48	
1833				72			45		61	35		36		47	24	21	
1834				82			46		63	36		39		57	24	21	
1835				73			44		61	39		43		51	24	32	
1836				85			43		54	34		41		46	24	33	
1837				96			42		54	33		43		40	23	30	
1838				97			40		51	31		36		39	23	26	
1839				81			38		49	30		35		45	24	29	
1840				78			38		51	31		35		46	24	23	
1841				85			42		53	32		33		52	24	25	
1842				96			41		57	34		33		49	24	37	
1843				107	44*		42		63	38		35		54	23	36	
1844				116	44*		42		60	36		37		56	23	36	
1845				110	42*		42		62	37		34		63	23	30	
1846				108	42*		40		59	36		31		50	23	28	
1847				85	39*		38		51	30		25		43	23	32	
1848				101	38*		41		63	37		37		47	23	30	
1849				109	41*		43		69	41		38		61	23	35	
1850				106	42*		45	67*	69	47		45	22*	63	23	40	34
1851				107	45*		45	60*	71	43		44	21*	60	23	37	40
1852				110	47*		44	51*	70	41		39	21*	63	23	39	40
1853				106	48*		43	48*	58	44		40	21*	56	23	46	32
1854		124		102	42		42	44	52	39		38	24	58	24	36	28
1855		104		101	42		41	42	51	43		38	25	56	24	35	32
1856		118		104	43		42	44	53	47		40	26	47	25	38	25
1857		111		100	46		43	56	57	42		42	28	49	25	37	32
1858		106		106	48		48	57	68	50		47	27	50	26	42	37
1859		104		105	52		50	56	67	48		46	27	54	26	43	32
1860		119		107	51		46	54	58	43		46	27	52	27	48	34
1861		124		103	49		44	46	56	41		43	26	49	33	48	33
1862		105		92	45		45	54	59	41		44	27	51	40	48	37
1863		92		83	49		45	58	63	40		40	29	48	38	44	38
1864	42*	106		77	55		45	63	64	40		41	27	47	34	42	36

1865	45*	81		83	56		46	60	64	41		46	28	49	36	44	38
1866	53*	94		88	55		46	59	62	45		47	26	48	29	43	36
1867	52*	110		94	55		46	51	57	48		48	26	47	30	49	32
1868	51*	101		98	56		47	52	59	48		47	27	46	37	44	31
1869	55*	126		107	57		52	57	69	49		49	27	54	42	39	31
1870	61	127	99	115	60	36	50	58	69	49	26e	52	28	51	28	39	32
1871	59	128	102	117	60	35	47	57	68	48	26	50	29	53	33	46	33
1872	51	121	105	117	64	38	49	59	70	48	24	49	30	54	37	46	36
1873	51	118	110	119	68	39	51	62	74	47	23	50	33	48	35	51	29
1874	59	111	110	124	68	41	51	63	78	50	23	52	41	55	42	47	38
1875	59	117	105	126	70	45	55	67	80	52	27	60	39	55	41	58	38
1876	58	109	121	128	64	45	53	65	81	53	27	63	39	56	38	57	38
1877	48	116	123	113	61	42	53	62	82	54	28	64	38	51	43	56	34
1878	43	124	135	113	63	40	55	66	84	57	29	68	39	52	48	53	35
1879	41	127	131	113	64	49	56	64	87	59	29	69	39	48	45	58	38
1880	46	136	119	111	71	48	57	62	84	56	29	67	35	49	45	61	42
1881	58	137	117	116	67	47	58	62	85	57	31	67	36	47	40	58	41
1882	67	134	116	128	68	48	60	65	85	58	33	66	36	44	46	66	40
1883	75	141	124	132	70	50	59	68	87	58	34	71	39	46	48	62	47
1884	71	137	129	135	72	51	60	68	90	60	35	76	41	46	51	69	52
1885	56	134	136	137	78	53	61	70	93	65	36	79	43	46	54	70	53
1886	71	132	146	139	78	55	62	70	94	70	36	81	44	48	57	72	52
1887	79	154	146	138	77	57	63	72	94	72	36	77	43	48	58	76	52
1888	93	155	146	137	81	60	62	75	96	74	36	75	44	48	56	77	53
1889	81	135	152	140	77	57	62	73	96	75	36	75	44	47	56	69	47
1890	58	131	157	145	86	57	64	76	97	75	35	76	47	49	59	68	42
1891	82	143	153	143	81	54	63	73	96	80	36	70	51	50	59	66	43
1892	91	141	168	143	78	60	63	74	96	77	36	77	53	49	63	61	44
1893	101	134	162	144	84	63	64	76	98	85	37	81	58	47	67	57	40
1894	86	153	171	144	86	68	63	77	105	86	37	82	61	50	71	58	39
1895	79	160	177	151	86	73	65	78	105	90	37	87	59	51	72	73	43
1896	74	153	186	148	89	77	66	81	107	98	38	89	65	47	77	62	41
1897	79	135	182	150	88	83	68	80	106	95	39	86	65	50	79	64	38
1898	102	129	172	152	87	85	67	81	104	92	39	82	66	51	80	55	37
1899	114	138	172	154	91	86	68	85	106	95	40	80	71	51	80	63	41
1900	106	140	157	156	92	86	69	84	101	89	40	72	66	48	83	67	42
1901	99	132	161	159	87	86	69	83	101	91	41	73	68	48	87	78	45
1902	99	128	168	162	90	86	70	82	101	91	42	75	70	49	87	86	44

TABLE A2.1—Continued

Year	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1903	100	129	174	164	85	89	71	83	100	92	42	73	68	48	87	88	40
1904	107	134	183	163	86	92	73	85	100	92	43	68	74	48	90	88	45
1905	94	124	174	167	81	90	75	84	100	92	44	73	78	48	88	94	48
1906	92	122	192	172	90	92	76	87	110	91	45	70	80	52	88	95	47
1907	89	124	184	171	84	94	76	89	108	89	45	72	81	50	90	85	43
1908	89	122	193	166	84	94	75	86	107	93	48	73	76	52	95	88	43
1909	88	123	197	172	85	100	76	86	107	93	50	71	75	52	96	86	44
1910	95	135	205	170	87	99	71	87	105	91	50	70	70	52	100	85	42
1911	94	137	210	166	84	105	64	88	104	90	51	69	73	54	103	90	40
1912	97	132	204	165	88	104	66	87	101	89	54	71	73	51	99	80	40
1913	92	128	219	169	94	102	66	92	110	90	55	72	82	51	98	87	

TABLE A2.2
International Real Wages, 1914-1945 (100 = GB Real Wage in 1927)

	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1914	71	111	120	124	41	92	69	86	85	88	50	78	101	39	79	48	
1915	64	98	116	124	35†	80†	60	77	74	80	50	69	88	38	73	41	
1916	60	101	115	142	31†	74†	53	68	69	70	44	67	84	37	72	38	
1917	51	101	105	150	29†	74	50	61	70	75	42	69	90	37	70	30	
1918	44	98	110	161	32†	83	50	63	80	86	40	78	82	37	73	24	
1919	60	94	115	163	35†	127	53	71†	91	101†	53	95	103	39	79	24	
1920	62	98	110	161	36	139	60	75†	97	109†	58	96	105	50	91	22	
1921	76	127	113	150	42	158	70	80†	106	121†	60	118	112	53	107	33	
1922	88	130	115	147	47	144	70	72†	96	111†	57	122	109	55	95	32	
1923	90	126	122	159	45	132	71	69†	93	111†	54	121	105	54	97	27	
1924	89	131	122	164	42	132	70	70	95	115	52	117	99	53	98	28	
1925	93	131	115	159	43	142	71	80	96	103	52	116	101	53	99	27	
1926	94	133	113	160	37	149	67	86	97	103	52	121	105	56	104	34	
1927	99	137	117	166	41	147	62	87	100	110	56	123	105	54	105	36	22
1928	106	137	120	169	44	147	67	91	99	105	56	125	109	56	106	35	22†
1929	105	134	122	174	48	149	71	94	100	106	41	130	115	51	112	36	23†
1930	95	140	126	175	50	159	71	99	103	107	55	135	118	57	118	42	24†
1931	102	141	128	185	48	168	71	102	109	113	57	141	125	56	121	43†	26
1932	109	139	126	180	42	171	73	99	109	114	55	139	120	58	121	42†	28
1933	100	139	125	190	43	166	77	97	112	117	57	137	120	64	119	42†	30
1934	103	137	126	219	45	163	81	93	110	116	57	132	124	62	117	40†	30†
1935	106	136	142	221	43	157	83	90	110	114	55	131	123	62	120	39†	30
1936	99	136	143	221	43	157	78	88	110	111	51	134	124	61	120	38†	29†
1937	100	137	132	243	50	154	79	87	109	105	48	132	128	60	121	37	29†
1938	100	142	131	254	52	160	74	88	111	109	47	133	130	52	125		29†
1939	102	141	132	262	51	163	72	88	109	108	54	134	132	45	130		28
1940	103	139	135	266		144	72	86*	108	94	53	123	118	40	122		27
1941	101	140	131	283		138	66	84*	107	88	48	115	109†	33	115		29
1942	101	139	152	290		139	56	82*	115	80	47	107	109†	37	118		23
1943	105	144	163	302		148	48	82*	120	74	34	104	106†	37	120		25
1944	119	145	169	311		155	68		125	74		101	101	36	121		29
1945	112	146	170	312		164	76		128	76		103	115	35	127		29

TABLE A2.3
International Real Wages, 1946–1988 (100 = GB Real Wage in 1975)

	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1946	20	37	50	98		50	23		47	26	18	50	48	36	48	17	19
1947	24	39	50	98	41*	51	24		49	32	29	49	52	32	52	14	20
1948	29	40	49	97	40*	57	23		47	35	37	49	55	30	56	14	21†
1949	30	40	50	101	42*	58	23		48	37	39	47	57	30	57	18	23
1950	29	41	51	105	44	56	24	34	49	37	41	47	58	28	58	19	23
1951	27	42	54	105	45	56	23	35	49	34	42	45	57	26	60	18	22
1952	25	50	56	109	47	60	26	37	48	41	42	46	58	31	66	18	22
1953	26	51	61	114	46	62	28	40	50	42	42	47	60	29	69	15	22
1954	29	51	62	116	46	63	31	41	53	42	43	50	61	28	71	19	22
1955	29	51	65	122	48	61	33	43	55	41	44	52	63	30	75	21	21
1956	30	50	67	125	49	63	34	46	57	43	44	53	66	30	78	21	21
1957	30	51	70	128	51	66	35	47	58	42	45	56	68	40	78	22	21
1958	32	51	74	128	51	67	35	48	58	42	45	57	67	36	80	22	22
1959	24	52	78	132	52	71	36	50	61	43	46	58	72	35	83	22	23
1960	25	53	84	134	54	73	37	54	62	46	47	61	74	36	84	22†	24
1961	28	53	83	136	55	79	39	59	66	46	47	63	78	37	90	24†	26
1962	27	54	88	138	58	82	42	62	65	50	48	65	81	35	93	24†	27
1963	27	54	90	141	61	83	44	65	67	50	50	66	83	33	96	25	27
1964	30	55	93	143	65	87	46	68	70	53	54	72	83	34	102	25	28
1965	33	55	96	145	68	91	49	73	73	51	56	76	87	35	106	24	30
1966	33	55	109	147	71	96	50	74	72	51	56	79	90	37	108	29	31
1967	33	57	114	148	73	98	53	74	73	67	58	81	93	42	113	29	31
1968	31	59	117	151	76	102	59	77	75	70	59	83	97	44	118	31	32
1969	32	61	128	152	79	109	60	83	78	74	62	87	103	47	125	32	32
1970	33	63	131	151	85	114	63	90	84	77	72	92	101	51	132	32	34
1971	34	67	144	154	88	124	67	97	86	86	77	97	107	54	133	34	34
1972	32	68	152	160	96	130	70	100	91	83	81	102	109	59	143	43	36
1973	34	73	157	161	105	137	75	103	96	88	91	106	111	64	146	47	39
1974	38	82	155	157	112	142	78	107	98	91	93	116	120	75	147	47	48
1975	37	78	162	157	118	154	82	110	100	95	100	119	130	82	154	53	59
1976	24	78	171	161	121	158	85	112	101	98	105	118	139	92	165	55	61

1977	23	76	174	164	123	157	88	116	97	110	113	119	138	106	158	58	56
1978	23	76	172	166	126	157	91	118	103	117	117	121	138	113	156	66	54
1979	26	74	171	161	128	159	93	119	104	119	120	122	135	123	156	61	51
1980	29	75	172	154	130	158	94	120	103	121	118	119	133	115	150	65	54
1981	27	76	170	153	131	155	95	119	103	117	122	115	130	124	148	70	55
1982	25	79	165	153	130	155	98	118	105	121	123	116	128	125	148	79	53
1983	31	76	169	155	128	154	99	118	109	122	123	116	129	126	145	112	50
1984	37	79	169	154	126	152	100	118	113	122	124	113	130	117	148	64	46
1985	32	77	169	154	124	152	100	122	116	126	127	116	133	115	148	71	47
1986	32	75	167	155	124	154	101	126	121	130	125	119	137	114	152	76	50
1987	30	72	165	153	123	162	101	132	125	133	127	121	146	115	155	64	52
1988	28	70	166	151	125	165	102	135	129	140	129	121	145	119	159	66	53

TABLE A3.1
Purchasing Power Parities and Real Wages, 1905-1914

	USA	CAN	AUS	ARG	DEN	IRL	GB	SWE	GER	FRA	BEL	ITA
Year	1909	1905	1905	1914	1905	1905	1905	1914	1905	1905	1905	1905
Food prices	d			\$mn		d	d	öre	d	d	d	lira
Tea and coffee (lb)	15.415	—	—	0.950	—	22.750	18.000	71.202	11.000	19.250	7.625	2.023
Sugar (lb)	2.750	—	—	0.177	—	1.979	2.000	29.025	2.375	2.875	3.000	0.676
Bacon and sausage (lb)	9.250	—	—	0.727	—	8.667	8.000	61.224	9.525	9.611	7.875	0.726
Beef and veal (lb)	7.375	—	—	0.179	—	8.750	8.000	47.779	8.250	8.438	7.938	0.862
Pork (lb)	6.500	—	—	0.262	—	8.200	8.000	58.050	10.000	9.250	8.500	0.762
Lamb and mutton (lb)	7.375	—	—	0.109	—	8.542	8.250	61.678	9.750	8.375	7.000	0.621
Cheese (lb)	10.000	—	—	0.405	—	8.083	7.000	53.968	7.500	8.831	8.500	0.590
Butter and margarine (lb)	16.750	—	—	0.650	—	13.750	13.000	88.504	13.875	12.500	13.000	1.270
Potatoes (7 lb)	7.000	—	—	0.350	—	2.583	3.000	20.317	2.625	3.000	2.750	0.381
Flour and meal (7 lb)	12.500	—	—	0.509	—	9.417	9.000	96.466	12.625	13.750	9.625	1.206
Bread (4 lb)	11.125	—	—	0.364	—	5.417	5.000	77.040	5.625	5.750	4.750	0.653
Milk (qt)	4.500	—	—	0.160	—	2.750	3.500	10.727	2.625	2.500	2.250	0.227
Eggs (doz)	14.400	—	—	0.810	—	16.248	12.000	102.600	9.842	12.000	11.077	1.261
Rent	d			\$mn		d	d	öre	d	d	d	lira
3 rooms/week	32.667	—	—	—	—	13.167	23.250	224.359	24.500	19.083	10.417	—
Exchange rates (per £)	\$	£	£	\$mn	Kr	£	£	Kr	mark	Fr	Fr	lira
E	4.86	1.00	1.00	11.45	18.16	1.00	1.00	18.16	20.43	25.23	25.23	25.23
PPP	6.48	—	—	14.84	18.71	0.94	1.00	19.27	21.05	25.78	20.35	25.88
Price levels												
PF	132	—	—	105	—	105	100	102	103	107	92	103
PR	141	—	—	344	—	57	100	128	105	82	45	99
P	133	—	—	130	103	94	100	106	103	102	81	103
Nominal wages	s/wk			\$mn/day	öre/hr	s/wk	s/wk	Kr/wk	s/wk	s/wk	s/wk	s/wk
Skilled building	98.14	—	—	—	—	33.94	37.69	31.52	28.54	26.15	22.35	14.00
Unskilled building	59.38	—	—	2.83	—	17.00	25.64	27.13	21.75	17.83	16.50	9.00
Skilled engineering	75.88	—	—	—	45.00	36.25	34.50	—	29.90	27.28	22.21	17.00
Unskilled engineering	40.63	—	—	—	34.00	17.00	20.00	—	20.00	17.38	14.58	12.00
Real wage index	171.58	173.80	123.52	89.24	89.93	92.33	100.00	98.29	84.26	74.58	80.86	44.23

TABLE A3.2
Purchasing Power Parity Budget Shares, 1905–1914

	USA	GB	SWE	GER	FRA	BEL	ITA	Average
Year	1909	1912	1914	1905	1905	1905	1905	
Tea and coffee	0.067	0.068	0.040	0.047	0.051	0.051	0.051	0.053
Sugar	0.051	0.059	0.084	0.028	0.031	0.020	0.038	0.044
Bacon and sausage	0.053	0.058	0.040	0.143	0.038	0.072	0.048	0.064
Beef and veal	0.199	0.180	0.060	0.121	0.151	0.155	0.106	0.139
Pork	0.056	0.020	0.041	0.088	0.034	0.054	0.072	0.052
Lamb and mutton	0.041	0.062	0.003	0.014	0.230	0.013	0.018	0.054
Cheese	0.017	0.033	0.025	0.024	0.031	0.021	0.039	0.027
Butter and margarine	0.113	0.128	0.190	0.125	0.071	0.178	0.018	0.117
Potatoes	0.069	0.055	0.041	0.062	0.047	0.079	0.044	0.057
Flour and meal	0.076	0.064	0.091	0.020	0.000	0.020	0.148	0.060
Bread	0.081	0.138	0.128	0.196	0.223	0.243	0.298	0.187
Milk	0.091	0.076	0.202	0.089	0.050	0.051	0.078	0.091
Eggs	0.087	0.060	0.056	0.043	0.044	0.045	0.044	0.054
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Food	0.733	0.800	0.745	0.836	0.857	0.888	0.880	0.820
Rent	0.267	0.200	0.255	0.164	0.143	0.113	0.120	0.180
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

- E* Official exchange rate.
 PPP Purchasing power parity based on food and rent relative prices.
 PF Relative price of food converting via *E*.
 PR Relative rent converting via *E*.
P Relative price of food and rent based on weighted average of PF and PR.

The principal sources used are abbreviated as follows:

- BOTBEL Board of Trade, "Report of an Enquiry by the Board of Trade into Working Class Rents, Housing and Retail Prices Together with the Rates of Wages in Certain Occupations in the Principal Industrial Towns of Belgium," Parliamentary Papers, 1910, *Accounts and Papers* (37), cd. 5065, vol. XCV.
- BOTFRA Board of Trade, "Report of an Enquiry by the Board of Trade into Working Class Rents, Housing and Retail Prices with the Rates of Wages in Certain Occupations in the Principal Industrial Towns of France," Parliamentary Papers, 1909, *Accounts and Papers* (42), cd. 4512, vol. XCI.

BOTGER	Board of Trade, "Report of an Enquiry by the Board of Trade into Working Class Rents, Housing and Retail Prices Together with Rates of Wages in Certain Occupations in the Principal Industrial Towns of the German Empire," Parliamentary Papers, 1908, <i>Accounts and Papers</i> (47), cd. 4032, vol. CVIII.
BOTUK1	Board of Trade, "Report of an Enquiry by the Board of Trade into Working Class Rents, Housing and Retail Prices Together with the Standard Rates of Wages Prevailing in Certain Occupations in the Principal Industrial Towns of the United Kingdom," Parliamentary Papers, 1908, <i>Accounts and Papers</i> (46), cd. 3864, vol. CVII.
BOTUK2	Board of Trade, "Report of an Enquiry by the Board of Trade into Working Class Rents and Retail Prices with the Rates of Wages in Certain Occupations in Industrial Towns of the United Kingdom in 1912," Parliamentary Papers, 1913, <i>Accounts and Papers</i> (26), cd. 6955, vol. LXVI.
BOTUSA	Board of Trade, "Report of an Enquiry by the Board of Trade into Working Class Rents, Housing and Retail Prices Together with the Rates of Wages in Certain Occupations in the Principal Industrial Towns of the United States of America," Parliamentary Papers, 1911, <i>Accounts and Papers</i> (44), cd. 5609, vol. LXXXVIII.
ISS	The Institute for Social Sciences, University of Stockholm, <i>Wages, Cost of Living and National Income in Sweden 1860-1930</i> , London, P. S. King, 1933.

The following abbreviations are used for countries and their currencies:

USA	United States	\$	U.S. dollar.
CAN	Canada	£	Pound sterling (see GB).
AUS	Australia	£	Pound sterling (see GB).
ARG	Argentina	\$mn	Peso moneda nacional (peso papel).
DEN	Denmark	Kr	Kronor; 1 kronor = 100 öre.
IRL	Ireland	£	Pound sterling (see GB).
GB	Great Britain	£	Pound sterling; s, shilling; d, penny; £1 = 20s = 240d.
SWE	Sweden	Kr	Kronor; 1 kronor = 100 öre.
GER	Germany	mark	German mark.
FRA	France	Fr	French franc.
BEL	Belgium	Fr	Belgian franc.
ITA	Italy	lire	Italian lire.

Data are not available to calculate PPPs for BRZ, POR, NET, NOR,

and SPA. Interwar benchmarks are carried back through the pre-World War I period for NET, NOR, and SPA. The BRZ real wage is set equal to ARG in 1905, while the POR real wage is set equal to SPA in 1905.

Budget shares. These are detailed in Table A3.2. A simple average of budget weights in the seven-country Board of Trade sample is used. These are simply expenditure shares of the given items in the food consumption basket computed from price and quantity data, and the weights scaled to sum to unity. The average represents an international budget weight and is used for all countries in the sample. The food and rent shares are drawn from budget data in the same sources, again with weights scaled to sum to unity.

Food prices. Averages used as appropriate.

GB	BOTUK1, pp. xiv, xxxiii, xvi–xxviii.
GER	BOTGER, pp. xx–xxi, xxv, Appendix III.
FRA	BOTFRA, pp. xvii, xxii.
BEL	BOTBEL, pp. xiii, xvii.
ITA	V. Zamagni, "The Daily Wages of Italian Industrial Workers in the Giolittian Period (1898–1913)," <i>Rivista di Storia Economica</i> 1 (International Issue), 1984, p. 90, except prices and budget shares of tea and coffee and eggs taken from FRA data. Other weights re-normalized as appropriate.
SWE	ISS, vol. I, pp. 161–162.
USA	BOTUSA, pp. xxix, xlvi, 1.
IRL	BOTUK2, pp. 286–297.
ARG	Tornquist, Ernesto & Co., Ltd., <i>The Economic Development of the Argentine Republic in the Last Fifty Years</i> , Buenos Aires, Tornquist, 1919, pp. 267–269. Ham proxies for bacon.

Rent. Averages used as appropriate. Based on rates for three rooms.

GB	BOTUK1, pp. xiv. London and towns, minimum and maximum.
GER	BOTGER, pp. xiii. Berlin and towns, minimum and maximum.
FRA	BOTFRA, pp. xii. Paris and towns, minimum and maximum.
BEL	BOTBEL, pp. xiii, xvii. Towns, minimum and maximum.
SWE	ISS, vol. I, p. 178. Note that 1 kronor = 100 öre. Kitchen counts as one room.
USA	BOTUSA, pp. xxii. Towns, minimum and maximum.

IRL BOTUK2, pp. 286–297. Belfast, Cork, Dublin, Limerick, Londonderry, and Waterford.

Exchange rates. *E* is the pre-World War I (gold standard) par value. Quotes are taken from *The Economist*, London, January 3, 1920, p. 37.

Purchasing power parities and price levels. Cobb–Douglas indices throughout, weighting by budget weights. GB, GER, FRA, BEL, SWE, USA, ITA, ARG: PPPF and PF from price data, *E*, and international average budget shares (Table A3.2). ITA: PR from Zamagni, “The Daily Wages of Italian Industrial Workers in the Giolittian Period (1898–1913),” p. 91. Implicit PPPR derived via *E*. ARG: PR from A. E. Bunge, *Riqueza y renta de la Argentina, su distribución y su capacidad contributiva*, Buenos Aires, Agencia General de Librería y Publicaciones, 1917, p. 267. Based on three-room rate. GB, GER, FRA, BEL, SWE, USA: PPPR and PR from rent data. *P* and PPP derived from PF and PR using international average food and rent budget weights (Table A3.2) and *E*. DEN: Use *P* from GER.

Nominal wages. In Board of Trade sources, skilled building is an average wage for bricklayers, masons, carpenters, stonemasons, joiners, cabinet makers, plumbers, plasterers, iron workers, stucco workers, and painters (as available); unskilled building is an average wage for bricklayers’ laborers, masons’ laborers, plasterers’ laborers, and other laborers; skilled engineering is an average wage for moulders, fitters, turners, machinists, smiths, and pattern-makers; unskilled engineering is an average wage for laborers.

GB	BOTUK1, p. xxxiii. England and Wales.
GER	BOTGER, p. xxx. Municipal workers excluded.
FRA	BOTFRA, p. xxvi. Municipal workers excluded.
BEL	BOTBEL, p. xxi.
ITA	Zamagni, “An International Comparison of Real Industrial Wages 1890–1913: Methodological Issues and Results,” in P. Scholliers (Ed.), <i>Real Wages in 19th and 20th Century Europe</i> , Table 5.1.
SWE	ISS, Vol. II, p. 27. Municipal workers only, as a proxy for building trades. Based on a 57-hour week (see p. 15).
USA	BOTUSA, p. xvi.
IRL	BOTUK1, p. xxxiii.
DEN	Hourly wages of skilled and unskilled males in crafts and industry; H. Chr. Johansen, <i>Dansk Økonomisk Statistik, 1814–1980</i> , Copenhagen, 1985, pp. 294–296.

ARG Daily wage of peones albañiles, representing unskilled work in the building trades. Republica Argentina, *Boletín del Departamento Nacional del Trabajo*, Buenos Aires, no. 33, Jan. 30, 1916, p. 132.

Real wages. AUS and CAN: For these countries analagous calculations comparing real wages in terms of purchasing power have already been performed by R. Allen, "Real Incomes in the English Speaking world," mimeograph, Vancouver, University of British Columbia, November 1990, pp. 45–46. Average of bricklayers and laborers relative real wage index (GB = 100). For AUS use Sydney, for GB use Manchester, and for CAN average Toronto and Vancouver.

All other countries: Simple average of relative real wage index (GB = 100) in all categories available, with conversion using PPP. DEN, assume a 56-hour week for comparison; ARG, assume a 6-day week for comparison; BRZ, real wage set equal to ARG in 1905; POR, real wage set equal to SPA in 1905.

Purchasing Power Parities and Real Wages, 1927

Notes and definitions. The relevant data are presented in Tables A3.3 and A3.4.

E Official exchange rate.
 PPP Purchasing power parity based on food and rent relative prices.
 PF Relative price of food converting via *E*.
 PR Relative rent converting via *E*.
P Relative price of food and rent based on weighted average of PF and PR.

The principal sources used are International Labour Office, *Yearbook of Labour Statistics*, Geneva (hereafter denoted *YLS* or *YLS x*, where *x* denotes a particular year), and International Labour Office, *International Labour Review*, Geneva (hereafter denoted *ILR*).

The following abbreviations are used for countries and their currencies:

USA	United States	\$	U.S. dollar.
CAN	Canada	\$	Canadian dollar.
AUS	Australia	£	Pound sterling (see GB).
ARG	Argentina	peso	Peso moneda nacional (peso papel).
DEN	Denmark	D Kr	Danish kronor.
IRL	Ireland	£	Pound sterling (see GB).
GB	Great Britain	£	Pound sterling; s, shilling; d, penny; £1 = 20s = 240d.
SWE	Sweden	S Kr	Swedish kronor.
GER	Germany	RM	German Reichmark.

TABLE A3.3
Purchasing Power Parities and Real Wages, Interwar Period

	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
Year	1938	1927	1927	1927	1927	1927	1927	1927	1927	1927	1927	1927	1926	1927	1927	1937	1927
Food prices	peso	d	cent	cent	B Fr	D Kr	F Fr	RM	d	d	lira	G	N Kr	pta	S Kr	mil	esc
Bread (kg)	0.32	6.9	17.0	20.7	2.56	0.83	2.10	0.78	5.0	5.8	2.00	0.25	0.88	0.65	0.74	1.60	2.40
Rye Bread (kg)	(0.32)	(6.9)	(17.0)	(20.7)	2.50	0.24	(2.10)	0.46	(5.0)	(5.8)	(2.00)	0.18	0.46	(0.65)	0.64	1.50	2.40
Flour (kg)	0.19	5.1	12.8	11.5	3.51	0.40	3.05	0.58	6.0	5.7	2.20	0.29	0.52	0.80	0.47	1.80	3.80
Rice (kg)	0.46	8.5	24.9	24.9	5.29	0.84	4.80	0.68	6.4	6.6	2.33	0.25	1.01	1.00	0.52	1.60	2.40
Beef (kg)	0.40	17.9	52.0	84.5	25.34	2.73	19.00	2.30	41.5	37.5	9.50	1.40	3.21	5.40	2.09	2.50	8.60
Bacon (kg)	0.75	52.9	78.5	100.8	17.08	2.35	13.80	2.80	36.4	33.1	8.00	1.00	2.44	3.20	2.37	4.50	10.00
Milk (liter)	0.15	9.6	8.8	11.5	1.90	0.33	1.60	0.33	6.1	5.3	1.50	0.17	0.35	0.80	0.26	1.05	2.20
Butter (kg)	1.60	59.5	93.7	119.5	29.88	3.85	23.55	4.30	49.0	46.3	17.50	2.53	4.43	5.00	3.85	9.50	26.00
Cheese (kg)	0.89	36.5	76.0	88.2	(24.16)	1.73	17.15	1.50	29.1	35.3	13.50	1.40	0.84	5.00	1.81	5.95	20.00
Eggs (each)	0.05	1.8	4.9	4.3	1.31	0.16	1.01	0.14	2.3	2.5	0.70	0.11	0.16	0.20	0.15	0.22	0.55
Potatoes (kg)	0.14	4.8	4.6	7.7	0.94	0.21	0.85	0.10	2.4	1.9	0.85	0.10	0.12	0.27	0.18	0.95	0.80
Sugar (kg)	0.42	10.2	14.8	14.8	3.63	0.60	3.90	0.64	7.9	7.7	7.00	0.52	0.83	1.60	0.64	1.25	3.80
Coffee (kg)	1.14	57.9	72.4	86.4	(21.20)	3.35	24.00	6.60	(61.7)	61.7	29.00	1.39	4.42	9.00	3.60	3.70	10.00
Rent	peso		\$	\$		D Kr	F Fr	RM	£	£		G			S Kr		
3 rooms/month	—	—	—	—	—	—	—	—	2.50	—	—	—	—	—	85.50	—	—
4 rooms/month	—	4.36	20.16	43.58	—	—	—	—	2.57	1.74	—	24.42	—	—	—	—	—
5 rooms/month	—	—	—	—	—	54.70	227.4	—	3.24	—	—	—	—	—	—	—	—
Exchange rates (per £)	peso	£	\$	\$	B Fr	D Kr	F Fr	RM	£	£	lira	G	N Kr	pta	S Kr	mil	esc
E	20.55	1.00	4.86	4.86	174.7	18.19	123.9	20.46	1.00	1.00	94.41	12.12	18.66	28.49	18.13	57.30	96.66
PPP	9.27	1.27	5.67	7.57	117.6	16.86	89.1	18.08	1.00	0.90	73.21	8.99	22.08	25.58	20.45	42.29	74.97
Price levels																	
PF	35	116	105	121	64	93	77	92	100	98	85	73	102	104	96	67	86
PR	100	170	161	349	78	93	57	78	100	68	57	78	189	57	189	100	57
P	45	127	117	156	67	93	72	88	100	90	78	74	118	90	113	74	78
Nominal wages/hr	peso	£	\$	\$	B Fr	D Kr	F Fr	RM	£	£	lira	G	N Kr	pta	S Kr	mil	esc
Unskilled building	0.630	0.118	0.450	0.850	3.25	1.68	3.75	1.06	0.07	0.07	2.80	0.75	1.57	0.94	1.45	1.05	1.13
Real wage index	100.4	136.8	117.2	165.9	40.8	147.1	62.2	86.6	100.0	109.6	56.5	123.3	105.0	54.1	104.7	36.7	22.2

TABLE A3.4
Purchasing Power Parity Budget Shares,
Interwar Period

	Average
Bread	0.114
Rye bread	0.103
Flour	0.048
Rice	0.012
Beef	0.091
Bacon	0.134
Milk	0.139
Butter	0.067
Cheese	0.026
Eggs	0.059
Potatoes	0.050
Sugar	0.064
Coffee	0.091
Total	1.000
Food	0.763
Rent	0.237
Total	1.000

FRA	France	F Fr	French franc.
BEL	Belgium	B Fr	Belgian franc.
NET	Netherlands	G	Gulden.
NOR	Norway	N Kr	Norwegian kronor.
ITA	Italy	lira	Italian lira.
SPA	Spain	pta	Spanish peseta.
BRZ	Brazil	mil	Milreis.
POR	Portugal	esc	Escudo.

Wage and food price data in particular cities are generally used for the construction of the interwar benchmarks. In particular, wage and food price data for AUS are from Sydney, for CAN are from Ottawa, for USA are from Philadelphia, for BEL are from Brussels, for DEN are from Copenhagen, for FRA are from Paris, for GER are from Berlin, for GB are from London, for IRL are from Dublin, for ITA are from Rome, for NET are from Amsterdam, for NOR are from Oslo, for SPA are from Madrid, for SWE are from Stockholm, for POR are from Lisbon, and for BRZ wages are from Rio de Janeiro while food prices are from Rio de Janeiro and Sao Paulo.

Budget shares. Budget shares are based on price and quantity data from a large sample of countries. An international set of budget weights was

computed for selected items in the food basket. Likewise for food and rent shares. Items chosen were common to most countries. Sources are

YLS 1933, pp. 497–503, Tables IX, XI, X.

YLS 1934, 1935, pp. 144–148, Tables XIV, XV, XVI.

YLS 1935, 1936, pp. 177–193, Tables XV, XVI, XVII, XVIII.

YLS 1937, pp. 189–192, 195, Tables XVIII, XIX, XX.

YLS 1939, pp. 176–183, 187, 192–193, Tables XVII, XVIII, XX, XXII.

Food item budget shares were computed for the following countries: Austria, Belgium, Brazil, Bulgaria, Colombia, Czechoslovakia, Denmark, Estonia, Finland, Great Britain, Germany, Hungary, the Netherlands, Norway, Poland, South Africa, Sweden, Switzerland, and the United States. The shares were then averaged across countries. The resulting average budget shares were then rescaled to sum to unity. Note that expenditures on bacon, pork, and lard are combined. Food and rent shares are averages across the following countries: Germany, Austria, Argentina, Belgium, Brazil, Bulgaria, Canada, China, Colombia, Denmark, Estonia, the United States, Finland, Hungary, India, Japan, Latvia, Mexico, Norway, New Zealand, the Netherlands, Poland, Sweden, Switzerland, Czechoslovakia, and South Africa. Based on *YLS 1939*, Table XX, p. 187.

Food prices and rents. Food prices are taken from *ILR*, January, 1928. Since the *YLS* does not report 1927 rents in national currencies, the rent figures for 1927 (with the exception of AUS) are calculated using 1938 rents (in currency units from *YLS*) which are then carried back to 1927 using time series for national rent indexes. Australian food and rent prices are from the *Quarterly Summary of Australian Statistics*, December, 1927, p. 79, and have been converted to metric units. There are no rent data reported in *YLS* for ARG, GER, BEL, NOR, ITA, SPA, BRZ, and POR for 1938 or earlier years. Bread is occasionally used to proxy rye bread prices, the home produce ribs price represents beef prices, Ireland's coffee price proxies Britain's, France's cheese price proxies Belgium's (converted via *E*), and Portugal's cheese price is for 1926. Proxies are signified by parentheses.

Exchange rates. *E* is the average official exchange rate over the course of the given year; from League of Nations, *Statistical Year-Book of the League of Nations 1927*, Geneva, 1928, Table 101, pp. 202–207.

Purchasing power parities and price levels. Cobb–Douglas indices are constructed using budget weights. PF is based on food prices and food item budget weights. PR is based on rent data, except for ARG (uses 100), GER (uses NET), BEL (uses NET), NOR (uses SWE), ITA (uses FRA), SPA (uses FRA), POR (uses FRA), and BRZ (uses 100). *P* is based on PF and PR using food and rent shares. PPP is based on *P* and *E*.

Nominal wages. Nominal wages are average hourly for unskilled building occupations in the given year. The Australian wage is reported in

TABLE A3.5
Purchasing Power Parities and Real Wages, 1970s

	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR	
Year	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	1975	
Exchange rates (per \$)	peso	A\$	C\$	\$	B Fr	D Kr	F Fr	RM	£	£	lira	G	N Kr	pta	S Kr	cruz	esc	
<i>E</i>	36.60	1.31	1.02	1.00	36.78	5.75	4.29	2.46	0.45	0.45	652.85	2.53	5.23	57.41	4.15	8.13	25.55	
PPP	19.03	1.51	1.02	1.00	39.72	7.07	4.76	2.85	0.41	0.38	581.04	2.73	6.32	41.33	5.02	5.77	17.89	
Price level																		
PC	52	115	100	100	108	123	111	116	91	84	89	108	121	72	121	71	70	
Nominal wage	21.50	3.59	5.06	4.83	144.32	33.50	11.99	9.69	1.26	1.10	1794	9.95	25.30	104.73	23.79	9.32	32.60	
Real wage index	36.75	77.53	161.87	157.14	118.21	154.21	81.99	110.46	100.00	94.57	100.45	118.52	130.15	82.44	154.05	52.58	59.30	

TABLE A3.6
International Real Wage Benchmark Summary

	ARG	AUS	CAN	USA	BEL	DEN	FRA	GER	GB	IRL	ITA	NET	NOR	SPA	SWE	BRZ	POR
1905	—	124	174	—	81	90	75	84	100	92	44	—	—	—	—	—	—
1909	—	—	—	172	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	89	—	—	—	—	—	—	—	—	—	—	—	—	—	98	—	—
1926	—	—	—	—	—	—	—	—	—	—	—	—	105	—	—	—	—
1927	—	137	117	166	41	147	62	87	100	110	56	123	—	54	105	—	22
1937	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	37	—
1938	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1975	37	78	162	157	118	154	82	110	100	95	100	119	130	82	154	53	59

ILR, April, 1927; the Norwegian wage is reported in *ILR*, January, 1927; the Brazilian wage is from *YLS 1938*, and the Argentinian wage is from *YLS 1939*, Table XIV. All other countries reported in *ILR*, January, 1928.

Real wages. The relative real wage in unskilled building occupations is based on nominal wage rates, with conversion using PPP.

Purchasing Power Parities and Real Wages, 1970s

Notes and definitions. The relevant data are presented in Table A3.5.

- E* Annual average market exchange rates.
PC Price level of consumption.
PPP Purchasing power parity based on *E* and *PC*.

Exchange rates. *E* from International Monetary Fund, *International Financial Statistics Yearbook 1982*, Washington, DC.

Purchasing power parities and price levels. *PC* from R. Summers and A. Heston, "Improved International Comparisons of Real Product and its Composition, 1950-1980," *Review of Income and Wealth*, 1984, series 30, no. 2, pp. 207-262.

Nominal wages. Average hourly wage in 1975 of male and female employees in all manufacturing industries. Most observations are from International Labour Office, *Yearbook of Labour Statistics 1980* (hereafter denoted *YLS 1980*, with issues for other years referred to as *YLS 19xx*) Geneva, 1982, Table 18A. Exceptions are

- AUS** Weighted average of male and female manufacturing wage rates in 1975 from *YLS 1980*, Table 18A; weights are the number of male and female wage earners (respectively) in all manufacturing industries in 1975, from *YLS 1982*, Table 5A.
- ARG** Unweighted average of wages in 1975 of unskilled and skilled workers in all manufacturing industries, from *YLS 1982*, Table 17A.
- GB** Weighted average of male and female manufacturing wage rates in 1975 from *YLS 1980*, Table 18A; weights are the number of male and female wage earners (respectively) in all manufacturing industries in 1975, from *YLS 1980*, Table 6A.
- NOR** Average hourly wage in 1975 of male and female employees in all manufacturing industries, from *YLS 1982*, Table 17A.
- BRZ** Average monthly earnings in manufacturing industries in 1975, from *YLS 1980*, Table 18A.

Real wages. Relative real wage in manufacturing based on nominal wage rates, with conversion using PPP.

International real wage benchmark summary presented in Table A3.6.

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