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on  
HISTORICAL FACTORS IN LONG RUN GROWTH

THE EVOLUTION OF GLOBAL LABOR  
MARKETS IN THE FIRST AND SECOND  
WORLD SINCE 1830: BACKGROUND  
EVIDENCE AND HYPOTHESES

Jeffrey G. Williamson

Working Paper No. 36

NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.



**Union of historical and theoretical-statistical research should contribute . . . to a much better understanding of current problems by economists, and to a more valid appraisal by them of the changes that take place under their very eyes. A broader historical background might have prevented some economists from ignoring the dependence of their generalizations upon transient historical conditions.**

**Simon Kuznets 1941**

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ABSTRACT

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. 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 the late 1850s, the 1850s 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 necessary to account for the convergence over the past century and a half.

Jeffrey G. Williamson  
Department of Economics  
216 Littauer Center  
Harvard University  
Cambridge, MA 02138  
and NBER

## 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 late comers (Alexander Gerschenkron, 1952), about the demise of British leadership, and about the rise and fall of America's leadership (Abramovitz, 1986; Baumol, 1986); the empirical sources of growth tradition launched by Moses Abramovitz (1956), Robert Solow (1957), John Kendrick (1961) and Edward 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 fifteen First World (or European Old World) and Second World (or overseas New World) countries covering the past century and a half. My hope is that this new data base will help set 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.

It seems to me that the empirical record carrying each of the four strands literature has been unnecessarily constrained by the typical choice of GNP per capita or per worker-hour as the dependent variable. Instead, this paper uses purchasing-power-parity adjusted real wage

rates per (unskilled) worker as the dependent variable. Under what conditions are real wages a better unit of long run analysis than GNP?

First, whether expressed in per capita or per worker-hour terms, GNP is 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 Edward Wolff (1991, pp. 568-9) has recently reminded us, almost everyone engaged in the long run convergence debate uses Angus Maddison's (1982) output and hours worked data for the pre World War II years. By his own admission, Maddison's 19th century GNP and man-hour estimates are based on partial data, often constructed by backward projection from assumed average growth rates. This and random measurement errors at period end points tends to bias results in favor of convergence (Wolff, 1991, p. 568; Abramovitz, 1986). Although Maddison supplies annual observations, being extrapolated they are not very useful. Perhaps in recognition of that fact, scholars using Maddison's data have selected only benchmark years separated by a decade or even longer. My real wage data base does not suffer this disadvantage.

Second, labor's marginal and average product differ, and all the more so as factors of production, like natural resources and human capital, are added to conventional capital in the analysis. It seems to me highly desirable to study the convergence of unskilled labor wage rates separately so as to isolate the differences between the convergent behavior in national labor markets and from that of average labor productivity. While both are driven by related forces, the former deserves far more attention than it has been given in the convergence literature. Another way of saying the same thing is that differences in income inequality drive a wedge between the real wage and GNP per

capita. The wedge may vary significantly over time and across countries (Williamson, 1990).

Third, the GNP and the wage deflator differ. In a world of very incomplete commodity price equalization, the difference may matter a great deal, especially since laborers consume heavily commodities which are resource-intensive (e.g., food and dwelling rents), commodities 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; 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.

Fourth, 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 low-wage Old World countries. 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 to be an improvement in tracking productivity for those

important decades.

Fifth, by insisting on the use of GNP measures, previous empirical studies have ignored 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 William Baumol (1986) and his critics (e.g., 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 his more recent work with collaborators (Baumol et al., 1989, Chp. 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 (a point with which Moses Abramovitz agrees: Abramovitz, 1986). One can only assume that Baumol proceeds as he does because of a (sensible) concern with the quality of the GNP data over the medium term, and because the GNP estimates are for many countries in the pre World War II period quoted for benchmark years only. To offer another example, the "endogenous growth theorists" almost exclusively restrict their empirical attention to the post World War II years when macro accounts are available for a large number of countries at widely differing levels of development. Thus, the "endogenous growth theorists" tend to ignore the century of modern economic growth experience prior to World War II, while Baumol tends to ignore regimes and epochs within the century of growth after 1870. This paper shows how a real wage data base can release us from those constraints.

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, when the British industrial revolution really picked up steam a decade or so after the French Wars. Rarely is there any mention of the role of international migrations and the development of integrated global labor markets in the convergence accounts. Certainly there is none 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 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. Indeed, Timothy Hatton and I hope to use this new data base to explore the extent to which our thinking about the evolution of domestic wage gaps between farm and city is transferrable to any assessment of the evolution of global labor markets. We have learned a great deal about the migrations that link these two domestic labor markets in response to price shocks, demographic events and industrial revolutionary forces. Is that knowledge applicable to understanding the evolution of international real wage gaps between New World and Old, or between early industrializers and latecomers (Hatton and Williamson, 1991a, 1991b, 1991c)?

With that motivation, this paper deals next in Section II with theory before turning in Section III to a brief description of how the data base was constructed. The details are offered in copious appendices, so we are free to turn to the critical issue in Section IV: what does the history since 1830 tell us? I conclude with an agenda.

## II. Back to Basics: What Does Theory Tell Us?

If we had excellent data documenting the time series of real wages (for comparable jobs and comparable workers) for both Old or First World and New or Second World (but excluding Third World) countries from 1830 to the present, what would we expect to find? Wage convergence or divergence between labor scarce and labor abundant economies? When would the convergence trends be most dramatic? Would we expect different behavior from different clusters of countries? Were some being integrated into the "club" while others were being segmented from the "club"? These are hardly new questions, but because I think current conventional wisdom has ignored some critical factors that have been important in the past century and a half, a review should be helpful in motivating the evidence offered in Section IV.

What follows is an attempt to explore what growth and trade theory tell us, starting first with the simple one-commodity, two-factor, closed-economy model of the 1960s. I say "model," but the reader should be warned that I make no attempt to be formal in what follows since it would do little to help us organize our thoughts on the matter. Rather, I am interested in the underlying theorems that emerge from this kind of thinking and how that thinking relates to the historical evidence. The model is then opened up to the reality of international labor and capital flows which took place in increasing amounts as the 19th century progressed, before being interrupted dramatically during the interwar years. The model is then expanded to include two commodities so that we can explore the implications of growing 19th century commodity market integration, again before being interrupted dramatically during the

interwar years. What distinguishes the Old World from the New more than anything else, however, is natural resource endowment, so the model is then expanded to include capital, labor and resources. The final step is to explore the implications of adding a fourth factor, human capital, a path already well-blazed by early pioneers to make the settlement by the "new endogenous growth theories" possible.

Three key questions motivate the exercise in what follows. First, which of these ways of thinking holds the most promise in assessing the real wage gap trends, for which cluster of countries, and when? Second, how much of the long run trends in international real wage gaps is likely to be explained without any appeal to differential rates of technological progress and technology transfer? Ever since Gerschenkron started us thinking about the catching up of late comers, technology transfer has been central to our thinking, and it also dominates the post World War II American productivity slowdown and loss of leadership debate. Yet recent research by Alan Taylor (1991) and Edward Wolff (1991) suggests that more conventional explanations involving trends in capital-labor ratio gaps are likely to play at least as important a role, especially during 19th century experience when conventional capital formation was a much bigger "source" of growth on both sides of the Atlantic (Abramovitz and David, 1973; Williamson, 1984). What role did these more conventional forces play in contributing to the evolution of more integrated global labor markets? In particular, what was the direct contribution of international migration compared with the indirect forces serving to erode international wage gaps? Finally, this exercise will show us why and under what conditions real wages are the appropriate unit of analysis rather than GNP per capita or per worker-hour.

## The Simple Closed Economy Model of the 1960s

Under the restrictive assumptions of exogenous labor supplies, fixed savings rates, exogenous and neutral technical progress, and absence of commodity trade and international factor flows, the model makes straight-forward predictions. The high-wage country got that way due to some previous and unexplained historical event which endowed it with a high capital-labor ratio, that is, with scarce labor and abundant capital. The opposite is true of the low-wage country. The rate of accumulation is slow in the high-wage country and fast in the low-wage country due to diminishing returns: the high-wage country has high capital-output ratios (and thus low rates of accumulation, since the latter is the product of the fixed investment = saving share in output times capital's productivity), while the opposite is true of the low-wage country. Where these restrictive conditions hold, labor productivity and real wage convergence will take place over time.

As we shall see, Section IV does indeed document convergence across more than a half century prior to 1914. However, it did not take place in every epoch (sharp divergence took place from 1830 to the late 1850s), nor did it take place for every country (relative to Britain, high-wage North America enjoys a rise in relative real wages from 1880 to World War I). While this experience has been noted by others (e.g., Baumol et al., Chp. 5), the variety deserves far more attention to help in the search for underlying causes.

Although the simple model rarely explored the fact, labor scarce economies in the 19th century also tended to have higher fertility, lower mortality, and more rapid rates of labor force growth, reinforcing

those accumulation effects briefly described above. However, since labor scarce economies tended to have more children, aggregate labor participation rates were lower. Thus, per capita and per worker indices diverged for reasons unrelated to the real costs of labor. The glut of children in the high-wage countries (and their dearth in low-wage countries) had another effect which must have further reinforced the convergence of capital-labor ratios across countries: high dependency-rates (big shares of children in total population) in the high-wage countries should, according to the life-cycle model (Leff, 1969), have lowered the domestic savings rate there, and in the absence of completely integrated world capital markets this too should have lowered, ceteris paribus, the rate of accumulation in the high-wage country relative to the low wage country. There is strong support for the view that these dependency-rate effects mattered a great deal in the late 19th century (McLean, 1990; Taylor, 1991; Taylor and Williamson, 1991), although they faded away over time.

#### Opening Up the Simple Model to International Factor Flows

Real wage convergence will be faster the better integrated are world factor markets. That is, and still in the simple two-factor model, labor should migrate from the low-wage to the high-wage country, and capital should migrate from the high-wage (low returns) to the low-wage (high-returns) country. The better integrated are world factor markets, the faster the convergence. And if world factor markets become better integrated over time, the rate of convergence should accelerate, and if world factor markets break down, convergence should slow down.

Crude correlations would appear to be consistent with these

predictions. Section IV reports evidence of divergence up to 1856, a regime of apparent disequilibrating shocks which overwhelm any forces of equilibration. More countries can be added to the sample by 1870, and they confirm that 1856 was a secular turning point. That is, there was dramatic convergence during the second half of the 19th century, trends we believe track evolving world capital and labor market integration. These convergence trends level off around 1900, in part, I think, because those convergence forces were strained by favorable price shocks in the high wage New World. In any case, long run convergence is interrupted by the two World Wars and the interwar decades, a regime in which world factor markets broke down. Convergence picks up again in the post World War II regime when world factor markets, or at least world capital markets, regained what they had lost in 1914 (Zevin, forthcoming). How much of the historical experience with real wage convergence in the late 19th century, and its cessation in the interwar decades, is likely to be explained directly by the labor migrations? How much indirectly by the capital migrations? How much by the diffusion of technology and its effect on both international labor migration and capital flows?

There is also plenty of evidence that capital chased after labor; that is, labor emigrated from capital exporting Old World countries and labor immigrated into capital importing New World countries. The fact that capital often (but not always, as with eastern and southern Europe) chased after labor is inconsistent with the simple model. It also implies that capital migration, to the New World at least, played no indirect role in contributing to real wage convergence, but rather offset it. Convergence within the Old World would be another matter entirely since there capital did not chase after labor, but rather

convergence between Old World and New. Natural resources motivate the concept of New World "dual scarcity" (Temin, 1966). Resources were abundant there, while both capital and labor were scarce. Resource "discovery" can be viewed as the disequilibrating event that created high wages in the New World early in the 19th century to which equilibrating convergence eventually responded. Addition of the third factor can also help explain why international capital chased after labor from Old World to New. Furthermore, the erosion of the New World resource endowment advantage as the century progressed may help explain the convergence of both real wages and returns to capital in the New World towards the Old. These forces included the exhaustion of Australia's gold fields by the 1860s, and the filling of the United States frontier and the Argentine pampas by the 1890s. They also included the decline in transport costs, the discovery and exploitation of raw materials around the world, and the decline in the importance of crude material inputs as a share of finished goods' cost. In any case, with natural resources playing their rightful role in the analysis, it is no longer clear that per capita or even per worker-hour GNP will be a very good proxy for real wages since we now have to worry about resource rents as well as the impact of increasing resource scarcity on real wages relative to the rate of return to capital.

This last point is important, and it may be best illustrated by thinking in two sectors again. The New World exports the resource-intensive product (grain, meat, cotton, sugar) while the Old World exports textiles. Compared with textiles, does the resource-intensive product have high or low capital-labor ratios? If it has low capital-labor ratios, then the gradual disappearance of the New World resource advantage will release more labor than the textile sector

can absorb at the going factor prices and real wages will converge for two reasons -- less resources per worker and diminished labor demand. But if the resource-intensive product has high capital-labor ratios, then the gradual disappearance of the New World resource advantage will release less labor than the textile sector wants and convergence of real wages is not so obvious -- less resources per worker is at least partially offset by stronger labor demand.

For the same reasons, the impact of commodity price equalization on convergence is also now ambiguous. Its central impact in the 19th century was to reduce resource abundance in the New World and raise it in the Old World. As commodity price equalization reinforced comparative advantage, and as the resource-intensive sectors in the New World were stimulated, did they absorb a lot of labor or a lot of capital? If the resource-intensive sectors had low capital-labor ratios, then commodity price equalization should have served to raise real wages in the New World, offsetting any convergence tendency. If the resource-intensive sectors had high capital-labor ratios, then commodity price equalization would have served to reinforce convergence. Things get even more complex when non-tradables are added to the model.

While this supply-side analysis has introduced some theoretical ambiguities, there is one inference that is unambiguous: the disappearance of resource advantages in the New World and commodity price equalization must have had offsetting influences on real wage convergence.

These ambiguities can be partially erased when we turn to what I might call the expenditure side. Recall an issue raised in the introduction, namely that GNP deflators and nominal wage deflators differed sharply in the past. The farther back we go in history, the



seemed to conform to the predictions of conventional theory.

Furthermore, there is evidence of international labor market segmentation which may have served to complicate even these simple predictions. Labor market integration was weak between the high-wage European North and the low-wage South, reflected by a lack of migration between them and little evidence of wage convergence until the post World War II years. Labor migrated freely from Italy and the Iberian Peninsula to the high-wage New World Latin economies, but, due to policy and preference, it did not migrate freely to the even higher-wage English-speaking New World. Labor migrated freely from the rest of Europe to the high-wage English-speaking New World, but avoided the Latin New World where wages were less high. All of this must have implied somewhat different convergence dynamics among various clusters of New World and Old World countries.

#### Opening Up the Simple Model to Commodity Trade

The simplest way to open up this model to trade issues is to invoke the classic Ricardian version, allowing for two commodities, say grain and textiles. What happens in such model when trade increases in response to world commodity market integration induced by some movement to free trade or by some massive decline in transport costs? These forces serve to raise the relative price of the export product in both countries, trade is stimulated and comparative advantage is reinforced. But what happens to real wage gaps? Since the high-wage country exports the capital-intensive good, and since the low-wage country exports the labor-intensive good, the demand for labor booms in the low-wage country while it sags in the high-wage country. World commodity market

integration therefore tends to hasten the convergence. Indeed, world commodity market integration is a partial substitute for world factor market integration.

The historical evidence seems to be roughly consistent with this theorem from the standard trade model. In the New World, only the United States moved to a regime of high tariffs during the convergence after the late 1850s, and in the Old World, Britain led the way towards free trade. Perhaps more importantly, international transport costs fell sharply to 1914. These trends toward world commodity market integration were sharply reversed between 1914 and 1945 when real wage convergence ceased. The forces of commodity market integration were resumed following World War II as the world economy (at least in the First and English-speaking Second World) regained what it had lost after 1914 and much more.

Under restrictive assumptions, the standard trade model in fact argues that commodity price equalization will induce factor price equalization. But since the assumptions are very restrictive, we have little sense if the argument is upheld by history. In any case, no one to my knowledge has ever explored the implications of the factor-price equalization theorem on the long run historical evidence regarding convergence.

#### Adding Natural Resources

To repeat the obvious, what really distinguished the Old World from the New was natural resource endowment, and what follows is therefore less relevant to convergence within the Old World, but rather to

more does this distinction matter: compared with 1913, resources were much more abundant in the New World in 1870 and much higher transport costs served to drive much bigger wedges between international commodity prices. Both served to make the domestic relative price of resource-intensive goods much lower in the New World and much higher in the Old World. Since workers consumed resource-intensive goods (food and rents) so heavily, real wages were far higher in the New World than real GNP per worker indicators would suggest while the opposite was the case in the Old World. Any forces which served to lower this international gap in the relative price of resource-intensive goods 1870-1913 would also have produced, now from the expenditure side, a more dramatic convergence in real wages than in real GNP, the latter used almost exclusively in the convergence debate. We have been discussing two forces which served to have this effect: the gradual erosion of the New World resource endowment advantage and the integration of world commodity markets through free trade and falling transport costs.

As a final comment, I am well aware that this theoretical excursion has begun talking more and more about real wage gaps between the New World and Old, rather than more generally about real wage gaps within both the New World and Old. Section IV will show that this emphasis is well justified by the evidence. It is an important historical fact which, with few exceptions (e.g., Abramovitz, 1986), has not been stressed in the convergence literature, perhaps because that literature has focused largely on post World War II experience.

#### Adding Human Capital: The "New Growth Theories"

The old theory of economic growth in the 1960s assigned all steady

state growth to exogenous factors, the rate of technological advance and population growth. The new growth theorists endogenize one or both of these processes, but what seems most novel is their effort to endogenize the rate of technological advance through human capital accumulation, most notably through formal schooling or through informal skill development on-the-job (or what Abramovitz calls "social capability": 1986, p. 388). These new theories of endogenous growth stress that the rate of physical capital accumulation is an increasing function of the level of human capital. However, there is likely to be a threshold of human capital: below it an "underdevelopment trap" confines the economy to slow growth and divergence from the leaders; above it, convergence on the leaders is possible. Thus, for a given level of GNP and real wages, large differences in initial human capital endowments from the historical past imply very different current growth performance. That is, growth is path dependent and history matters.

Empirical support for the new endogenous theories of growth appears to be quite favorable, although the evidence brought to bear has been limited so far to the post World War II regime (e.g., Barro, 1989, 1991). Although Richard Easterlin (1981) suggested some time ago that the new endogenous growth theories might be applicable to much earlier periods, I believe it is mostly a story about gaps between the Third World and the First and Second Worlds, and that it is less useful for understanding First and Second World experience prior to World War II. In any case, the empirical applications of the new growth theory reports that no country has grown fast in the post World War II decades without initial high levels of human capital (proxied by literacy) relative to initial GNP. Those countries starting with poor human capital endowment, remained poor. Those countries with a favorable human capital

endowment, converged on the leaders. To continue the post World War II new growth theory story, when initial levels of human capital per capita are held constant, there is an inverse correlation between initial GNP and subsequent growth (i.e., convergence) even within this expanded sample which includes the Third World. Furthermore, countries with higher initial human capital endowments have higher investment to GNP ratios. Thus, if human to physical capital ratios are initially high, a country's subsequent economic performance will feature high rates of physical capital investment, rapid per capita income growth, and convergence.

The new theories of endogenous growth certainly suggest that a fourth factor of production should be added to any effort to model the historical behavior of international real wage gaps since 1830. More human capital can raise the real wages of unskilled labor for many reasons: newly skilled labor exits from the unskilled labor class, making for more scarce unskilled labor and higher real wages; if skilled labor is also a complement to unskilled labor, more skills augment the demand for unskilled labor raising real wages; skilled labor is used in the production of capital goods, so the supply of capital goods is augmented (perhaps along the lines of DeLong and Summers, 1991), labor's capital endowment is increased, and real wages rise; and, so argues the new theories of growth, more skills augment the rate of technological progress, raising real wages.

The addition of human capital to any explanation of convergence is especially interesting for another reason: it is a relatively immobile factor. True, those with special skills tend to be highly mobile internationally since they can best afford the investment in the move. But the more general focus of the new theories of endogenous growth is

on mass education and literacy for the many, not just skills for some favored few. While capital and unskilled labor were relatively mobile, and increasingly so as the 19th century progressed, natural resources were immobile, and human capital probably lay somewhere in between. After all, while labor can be equipped with capital financed through foreign markets, it cannot be so equipped with literacy.

So, will the addition of human capital offer additional insight into international real wage gap experience in the First and Second World since 1830? I suspect it will depend on the cluster of countries and the period being considered. In the first place, and leaving technological progress aside, there is reason to suspect that 19th century industrial revolutions were being driven much less by human capital and much more by conventional capital and natural resources. In addition, differences in human capital endowment within the English-speaking New World, within northern Europe, and between the two were modest in the 19th century. Furthermore, since none of the fifteen countries in my 1830-1988 sample "remain poor", and since all eventually converge on the leaders, I take it that all of my fifteen countries were initially above the new growth theory threshold (a point with which Abramovitz agrees: 1986, p. 394). My guess, therefore, is that the new theories of endogenous growth will be more useful in accounting for experience in lagging southern Europe and the Latin New World, than for convergence within the first and second worlds more generally.

### III. 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 fifteen countries, four in the overseas

New World and eleven in the Old World. While the Yearbooks of the International Labour Organization and other sources would make it possible to augment the sample starting with the 1930s, and while the post World War II decades offer evidence to augment the sample still further, I wanted a consistent sample representing the First and Second World which at least covered the period since 1870. While I am still looking to augment the sample, I believe these fifteen countries include most of the ones that matter. They are:

<u>New World</u>	<u>Old World</u>	
Australia	Belgium	Netherlands
Argentina	Denmark	Norway
Canada	France	Spain
United States	Germany	Sweden
	Ireland	United Kingdom
	Italy	

As I pointed out in the introduction, most participants in the recent convergence debate have relied on Angus Maddison's (1982) GDP data. Thus, for example, Baumol et al. (1989, Table 5.1, p. 88) use Maddison's sample of sixteen countries. The Maddison sample includes four 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 each of these is a very small country 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. 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 (O'Rourke, 1989, 1990). And the addition of Argentina and Spain (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 constructed in the following steps.

First, I construct nominal wage time series. These refer to wage rates of unskilled labor. 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. Nowhere 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 (about which Gregory Clark has written so much of late: Clark, 1987a, 1987b, 1990). With very few exceptions, the wage rates refer to unskilled labor. Until the post World War II period, the use of average wages in, say, manufacturing would be a mistake since the skill premium varied widely over time and across countries (Williamson and Lindert, 1980; Williamson, 1985; Allen, 1990), 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 time (Hatton and Williamson, 1991a, 1991b, 1991c), so I have made every effort to stick with urban unskilled wage rates in what follows. Sources and methods underlying the nominal wage time series for each of the fifteen countries can be found 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. Sources and methods underlying the cost of living series for each of the fifteen countries can also be found in Appendix 1.

The third step is to convert these national real wages into 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 price indices for comparable commodities. Such benchmarks are constructed at three points to construct comparable real wages across countries at each of these benchmark periods, to which the national real wage time series can be linked (Appendix Figure A2). These benchmarks serve to define three distinct periods and I have made no effort to extend any of the national real wage time series across the breaks separating them, namely, the two world wars. In contrast, Maddison uses 1970 relative price benchmarks to project his GNP statistics backwards into the 19th century (Maddison, 1982, A to construct comparable real wages across countries at each of these benchmark

periods, to which the national real wage time series can be linked (Appendix Figure A2). These benchmarks serve to define three distinct periods and I have made no effort to extend any of the national real wage time series across the breaks separating them, namely, the two world wars. In contrast, Maddison uses 1970 relative price benchmarks to project his GNP statistics backwards into the 19th century (Maddison, 1982, Appendix A, p. 159; and see the comments by Abramovitz, 1986, pp. 386 and 391). Sources and methods regarding the construction of these three real wage benchmarks can be found in Appendices 5 and 6.

The national real wage time series resulting from this exercise and used in Section IV are reported in Appendix 2.

#### IV. 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 (six countries in the first half of the regime, rising to ten at the end), it suggests nonetheless that disequilibrium characterized most of these four decades, and that real wages diverged sharply, at least until 1856.

The second covers the period 1870 to 1913, the classic dating for what Argentinians 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 capital exports in this age of high imperialism, and what most of us are taught was the classic trade boom under free trade and the gold standard (and thus what Maddison calls the "liberal phase": Maddison, 1982, p. 92). If the decade and a half from 1856 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.

The third covers the two World Wars and the interwar period when world commodity and factor markets break down. Between 1914 and 1938, measures of real wage dispersion changed hardly at all, so these two decades served to halt the spectacular real wage convergence that had been at work for the six decades after 1856. World War II served to increase real wage disparities so much in our sample of fifteen 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, 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 variation (where  $N$  is the sample size), has been used extensively in the convergence debate (e.g., see Wolff, 1991, p. 565). Based on a sample of six countries for which data are available (France, Ireland, the Netherlands, Sweden, the United Kingdom, and the USA),  $C(6)$  rises from about 0.10 in 1830 to about 0.28 in 1856. (Each of the  $C(N)$  series is extended as a dashed line in Figure 1 when a new  $C(N+X)$  series, augmented by  $X$  new observations, is added.) That is, the index of real wage dispersion almost triples over the quarter century. As Figure 13 and Appendix Table A2.1 show, the global labor market disequilibrium was driven primarily by events in the USA. While the Netherlands underwent a modest real wage decline relative to the European leader of the pack, the United Kingdom, Sweden held her own, while Ireland and France showed some modest gains. Events in Europe were, therefore, mixed during this disequilibrium phase up to 1856. The sharp rise in  $C(6)$  is, therefore, driven by New World success: the USA increased her real wage advantage over the United Kingdom from 11 percent in 1830 to 94 percent in 1856.

While I do not yet have similar real wage evidence for, say, Canada or Australia, the American evidence certainly suggests that the global labor market disequilibrium was being driven by wage gaps between Old World and New, not some more general process associated with Gerschenkron-like industrial revolutionary leader versus late-comer dynamics centered in Europe. Having said as much, we must remember an inherent selectivity bias determining this small sample of six 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, late-comers) and the dispersion within Europe may have risen far more than these figures show. I hope to augment the

sample in the future so as to lay this doubt to rest.

The sample is augmented in 1850 to include Germany and Belgium, and C(8) tells the same story as C(6): the dispersion statistic rises up to 1856. Only one of these countries underwent real wage erosion compared with the United Kingdom, again failing to offer comprehensive support for Gerschenkron-like thinking. The sample is augmented still further in 1864 to include two additional New World countries, Argentina and Australia, and the summary statistic C(10) plots the result.

Figure 1 suggests a secular turning point in the mid 1850s. 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 1850s to 1864 can be explained by the well-known collapse in American wages during the Civil War (Williamson, 1974; DeCanio and Mokyr, 1977), the story is more general than that (see Figure 13 and Appendix Table A2.1 for the American evidence and for the rest of what follows in this paragraph). First, the American post-Civil War "catch-up" in real wages (Goldin and Lewis, 1975) never regains the high wages relative to the United Kingdom achieved at the peak in 1856. Second, relative wages fall everywhere in the New World, at least based on Australian and US experience after 1861. Third, and once again, the results were mixed in Europe. While Sweden gained some ground on the United Kingdom between 1856 and 1869, none of the other European countries in our sample did (with the possible exception of Belgium). As with the sharp rise in real wage dispersion up to 1856, the fall in C between 1856 and 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 is a very sharp divergence

in real wages up to 1856. Second, what turns out to be a long run convergence in real wages starts after 1856. In that sense, the first regime of divergence should be dated 1830-1856, while the second regime of convergence should be dated 1856-1913. I have resisted this temptation since the data base rises to fifteen by 1870 so 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. Does this characterization hold for the second regime between 1870 and 1913? I shall return to this issue after exploring the full period 1870 to 1988.

#### A Century of Convergence: 1870-1988

Typically, the convergence hypothesis is tested on this period by using endpoints as in Figure 2. On the horizontal axis we measure the log of real wages in 1870, countries poor in 1870 close to the origin and countries rich distant from the origin. The vertical axis measures real wage growth between 1870 and 1988, summarized here as the difference in log real wages at the beginning and the end of the century. Longrun convergence documented by others using GNP per capita or per worker evidence is confirmed with this new data on real wages: countries with high real wages in 1870 (like those important

four in the New World -- Argentina, Australia, Canada, and the USA), underwent relatively slow real wage growth over the century; countries with low real wages in 1870 (like the poorest in the Old World -- Denmark, Italy, Norway, Spain and Sweden), underwent relatively fast real wage growth over the century; and those clustered in the middle (the early industrializers or their contiguous neighbors -- Belgium, France, Germany, Ireland, the Netherlands and the United Kingdom) started with average wages and undergo average wage growth.

The steeper is the regression line in Figure 2, the more dramatic was convergence over the century. How steep is that regression line in Figure 2 compared with what other researchers have found when using Maddison's GNP estimates? The following regression results (constant omitted) comparing Figure 2 with J. Bradford DeLong (1988, p. 1139) implies that my Figure 2 is steeper, and the convergence of real wages stronger:

Independent Variable	Dependent Variable	Slope Coefficient	t-statistic	R <sup>2</sup>
Log 1870 labor productivity	Annual percent labor productivity growth	-0.749	9.987	.87
Log 1870 income	Log difference of 1979 and 1870 income	-0.995	10.585	.88
Log 1870 wage	Log difference of 1988 and 1870 wage	-1.236	6.185	.75

Real wage convergence among the lesser skilled over the past century has been quite a bit more dramatic than GNP per worker or even GNP per

capita, it seems.

#### Four Decades of Convergence: 1870-1913

As Figure 3 shows, the striking convergence from 1856 to 1869 is continued up to 1900, after which it levels off. In fact, the coefficient of variation is cut in half over the three decades 1870-1900 (falling from 0.290 to 0.145), and perhaps by two thirds over the forty-five years 1856-1900. Appendix 3 offers a means by which 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  $C$ , Figure 3 plots each of these three components (see also Appendix Table A3.1). 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 on average for 71 percent of the real wage variance across these fifteen countries. Thus, almost three quarters of the observed variance in real wages in our sample can be attributed to average real wage gaps between New World and Old, while only a quarter can be explained by variance within each combined, and the contribution of each of the two is about equal. Second, two thirds 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 the New World



losing much of its big real wage advantage to the Old. It is much less a story about latecomers catching up to leaders in the Old World, or of Canada and Argentina catching up to Australia and the USA in the New World. Nonetheless, and as Figure 6 documents, convergence did take place within Europe, and the pattern closely resembles that of the full sample in Figure 3: C falls sharply between 1870 and the late 1880s before levelling off for the remainder of the regime.

The convergence in Europe following 1870 deserves a more detailed look. The relative real wage experience of all fifteen countries is displayed in Figure 14 (see also Appendix Table 2.1), while Figures 21 and 25 isolate, respectively, the two Latin and the nine non-Latin Old World countries. 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 more, however, is the behavior of the poorest European countries relative to the rich, and the latter included Belgium, France and Germany, not just the UK. From 1870 to 1890, all of the poorest countries improved their real wages relative to the average: Denmark, from 52 to 59 percent of the UK; Sweden, from 40 to 61; Norway, from 44 to 51; the Netherlands, from 60 to 65; Italy, from 34 to 36; and Spain, from 42 to 50. Over the same period, and with the exception of the UK, all of the richer countries underwent a real wage deterioration relative to the average: Germany, from 84 to 79 percent of the UK; France, from 72 to 66; and Belgium, from 72 to 67. There was indeed convergence within Europe between 1870 and 1890, but, ironically, the United Kingdom was not a major part of it. After 1890, the convergence in Europe ceases, but it is not due to any cessation of convergence trends in non-Latin Europe relative to the North since that convergence continues

(DNEUR, Figure 6). Convergence ceases in Europe as a whole because of a rise in the wage gap between the Latin South and the non-Latin North (DNSEUR, Figure 6). This rise in the historically persistent wage gap between the Latin South and the non-Latin North accounts for all of the cessation in the European convergence trends after 1890, and this in spite of so much attention to late Victorian and Edwardian failure in England (e.g., McCloskey, 1970). While late Victorian and Edwardian failure helps explain continued convergence in the North of Europe, it explains none of it in Europe as a whole since, indeed, divergence took place.

Let us now return to the average wage gap between New World and Old, the variable which drives such a large share of the convergence over the four decades after 1870 and the forty-five years after 1856. Three countries illustrate the process best, Ireland and Sweden (with heavy emigrations from the late 1840s onwards), and the USA (with heavy immigrations from the late 1840s onwards). In 1856, real wages in Sweden were only 47 percent of the UK, while in 1913 they were 89 percent, an impressive doubling in Sweden's wage relative over the forty-five years. In 1852, and shortly after the famine, real wages in Ireland were only 53 percent of the UK, a figure that had changed hardly at all over the previous three decades. Real wages in Ireland started a dramatic convergence on the UK during the 1850s (and, notably, in the absence of any Irish industrialization: see Abramovitz, 1986, p. 398) so that they were 71 percent of the UK by 1870. By 1905 they were 92 percent of the UK, before slipping to 83 percent by 1913. That is, 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 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: see O'Rourke, 1990). The Irish convergence towards real wages in the USA must have been even more dramatic since relative real wages were falling in America during most of this period. In 1856, real wages in the USA were 94 percent above the UK, while in 1913 they were 54 percent higher, almost a halving in the American wage advantage over the UK, a spectacular decline that has gone almost unnoticed by American economic historians (but see Shergold, 1982). 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 were some deviant countries and periods well worth our attention. First, the Latin experience was very different, as Figure 21 shows. 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 the UK, from 77 percent in 1864 to 98 percent in 1913, and her real wages actually exceeded the UK 1898-1905 and 1910-1912 (an achievement that Argentinians view with nostalgia: see 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; Allen, 1990) erosion in her real wage position over the whole period of convergence -- from 129 percent above the UK real wage in 1861, to 87 percent above in 1870, and to just 17 percent above in 1913, the other New World countries enjoyed a partial resurrection in their real wage advantage late in the regime. Relative to the UK, real wages in the USA were 94 percent higher in

1856, 67 percent higher in 1870, 32 percent higher in 1880, but 54 percent higher in 1913. Real wages in Canada were 43 percent higher than in the UK in 1870, 36 percent higher in 1882, but 99 percent higher in 1913 (after the great wheat boom and railroad expansion of which so much is made by Canadian economic historians: e.g., Chambers and Gordon, 1966).

Thus, even during this period of dramatic convergence, when trends in the wage gap between the Old World and the New was 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 convergence literature, Moses Abramovitz and William 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 (1986) words: "the rate of convergence ... showed marked strength only during the first quarter-century following World War II (p. 385)"; and "in the years of relative peace before 1913 ... the process [of convergence] left a weak mark on the record (p. 395)." These are puzzling statements since Abramovitz's own Table 1 (p. 391) reports the coefficient of variation falling by more than a third, from 0.51 in 1870 to 0.33 in 1913. 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 compared 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 (1989) replicates Abramovitz's findings. In their Figure 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 (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, leaving behind this earlier and spectacular period of convergence for the remainder of their book.

It seems to me that the period 1870-1913 or 1856-1913 deserves far more attention than the convergence 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.

#### A Word About Weights, Wages and Population Growth

So far, we have followed the tradition of the convergence literature by weighting all countries equally, that is, the coefficient of variation is unweighted by size of labor market. We are likely to get somewhat different results if instead each country's real wage is weighted by the size of its labor market, proxied by population. After all, and at least during the early stages of the demographic transition, we expect population to be positively correlated with the real wage. Rich countries in the New World attracted immigrants from poor countries in the Old World, and rich countries in the New World had both higher fertility and lower child mortality rates. To the extent that this historical correlation is strong, then there must have been two off-setting forces at work after 1830. First, ceteris paribus, immigration and high native born population growth in the New World lowered high wages there by glutting labor markets, while emigration and

lower native born population growth in the Old World raised low wages there by making labor relatively scarce. The interesting question, of course, is how much of the observed real wage convergence between 1856 or 1870 and 1913 can be explained by those postulated migrations and native born population growth rate differentials. Second, these postulated demographic forces would have redistributed population and labor from Old World poor regions to New World rich regions, thus creating greater divergence to the extent that wage rates are weighted. Indeed, at some point, a New World country like the USA would become big enough to dominate any weighted coefficient of variation.

Figure 9 reports the simple correlation between population growth (the difference in  $\log N(t)$  on the vertical axis) and initial real wages in 1870 ( $\log$  real wage on the horizontal axis) for the century 1870-1988. The correlation is significant and positive (the slope coefficient is 0.898, and the t-statistic 2.463). The four New World countries are clustered to the right (Argentina, Australia, Canada, and the USA), the poorest Old World countries are clustered to the left (Italy, Sweden, Spain, Norway, the Netherlands, and Denmark), while the remaining richer Old World countries are clustered in the middle (France, Ireland, Belgium, Germany and the UK). In the long run, labor scarcity produced the predictable labor supply response among these converging fifteen countries. However, as Figures 10, 11 and 12 show, the correlation is much the strongest during the convergence regime of free international migration 1870-1913 (slope coefficient 0.483, t-statistic 2.754), while it becomes weak in the interwar period of rising state intervention and quotas (slope coefficient 0.199, t-statistic 1.477) and then disappears altogether in the post World War II period (slope coefficient 0.041, t-statistic 0.279).

We do not yet know how much of the dramatic convergence during the forty-five years after 1856 can be explained by such forces, but it certainly did serve to drive a wedge between the weighted and unweighted coefficient of variation. The weighted C in Appendix Figure A4.2 undergoes roughly the same collapse between 1856 and the late 1870s, but, and in contrast with the unweighted C in Figure 3, the convergence stops thereafter. These labor supply responses appear to have mattered a great deal during the regime when real wage convergence was most dramatic. Furthermore, their impact was greatest in distinguishing responses in the Old World and the New.

#### Convergence Ceases: 1914-1945

The World Wars and the interwar decades offer nothing but contrasts to the long run convergence experience initiated in 1856. As Figure 4 confirms, the convergence ceases from 1914 to 1934 since C is the same in both years (see also Appendix Table A3.1). 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, C continues the long run decline initiated in 1870 (and Abramovitz, 1986, Table 1, p. 391, found the same). 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 ceases between 1914 and 1934. Furthermore, after World War I it is the variance in real wages within the Old World ( $D_0$ ) that dominates, not the average real wage gap between

New World and Old that was so true of the classic period of convergence between 1856 and 1913. 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 and two. A large share of that divergence was driven by the spectacular surge in real wages in the USA (Figures 15 and 19: see also Abramovitz, 1986, p. 395 and Wolff, 1991, p. 569).

The result of all this was that the level of wage dispersion of the late 1870s had been regained by 1945: the Great Depression and World War II lost everything that had been gained over the three decades or so prior to 1913. Indeed, the weighted coefficient of variation plotted in Appendix Figure A4.3 suggests that even more had been lost, returning the weighted C to 1870 levels. Since our real wage rates do not take account of unemployment, and since unemployment rates in the USA in 1934 were higher than 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 interesting question, of course, is how much of this experience can be explained by the breakdown of international commodity and factor markets. It seems like a research avenue at least equal in promise compared with that which appeals to the cessation of international technological transfer, although the latter has been argued by many to have been carried by the former.

#### 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 period 1856-1913 deserves that prize. Second, there were three distinct episodes within the period, not just one.

Figure 5 displays C over the full postwar period, and the country details can be seen in Figure 16. 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 completely 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 post-1856 long run convergence does not resume until the mid 1960s. Post World II real wage convergence, therefore, is a relatively recent story that started unfolding only twenty-five years ago. The story has two parts: the first is well known -- the European Old World's final catch up on the New World, especially the leader, the USA; and the second is less well known -- the spectacular rise in Old World Latin real wages in Italy, Spain and even France relative to everyone else (Figure 8). 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 1856 onwards. In 1870, Italy, Spain and France had real wages that were, respectively, 34, 42 and 72 percent of the UK, for an average of 49; in 1913, they were 50, 44 and 60, for an average of 51; in 1937,

they were 49, 58 and 83, for an average of 63; in 1946, they were 41, 82 and 53, for an average of 59; and in 1980, they were 124, 121 and 99, for an average of 115. Over the 76 years between 1870 and 1946, these three countries were able to erase only 10 percent of the 50 percent wage gap between themselves and the UK, while over the 34 years between 1946 and 1980, they were able to erase all of it and more.

#### V. Some New Facts and 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 certainly be welcome. But the new real wage data base also serves to reject some of that conventional wisdom, adds some new facts, and, I hope, 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 fifteen 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 four -- Argentina, Australia, Canada and the USA. 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 1850s, 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 1850s 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 1850s and 1913 has two phases, a very steep descent through the 1880s, and stability thereafter, which is again different from the evidence of average labor productivity for which convergence was stronger from 1890-1913 than from 1870-1890..
- \* Between the mid 1850s 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 1890 was driven by a cessation in the erosion of the average wage gap between the Old World and the New. The cessation of convergence within Europe was driven by a rising wage gap between the Latin South and the non-Latin North.
- \* Longrun wage-convergence ceases between 1913 and the mid 1930s, and sharp divergence takes place thereafter until 1945. While this latter episode is one of surging wages in the USA, divergence took place everywhere: within the Old World, within the New World, and between the two. 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? How much can be attributed to capital accumulation responses, and international capital flows in particular? How much can be attributed to world commodity market integration and disintegration? Have the forces of international technological transfer played a more important role in the late 20th century than they did prior to 1913?

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Appendix Table A1.1 and Appendices 3-6 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, Massachusetts 02138 (617-495-2438). This is a revised version of HIER Discussion Paper No. 1571 with the same title.

Please do not use the data reported here without the author's permission. Some are being revised and augmented.

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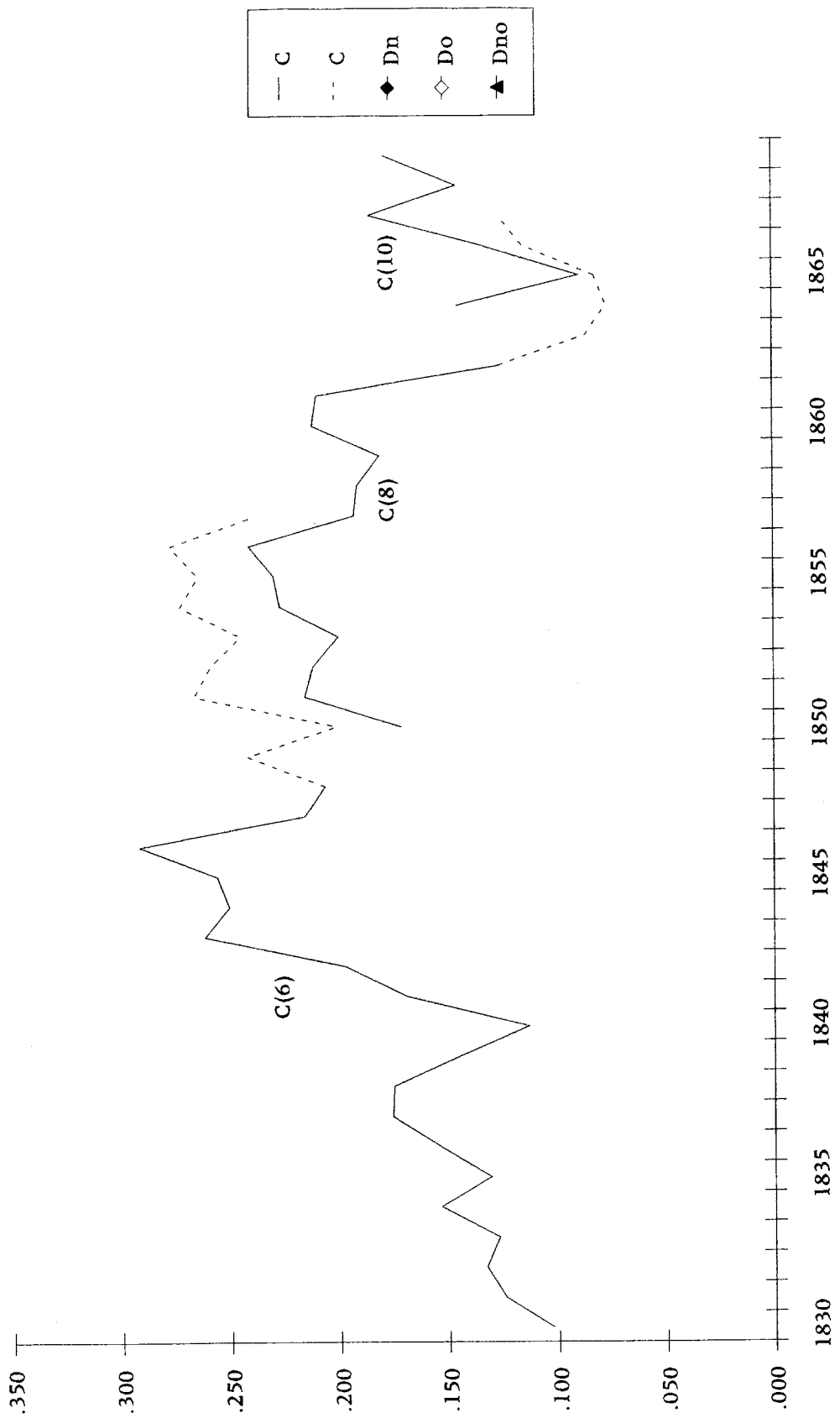
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Figure 1. International Real Wage Dispersion, 1830-1869



Source: Appendix Table A3.1.

Figure 2. Real Wage Convergence, 1870-1988

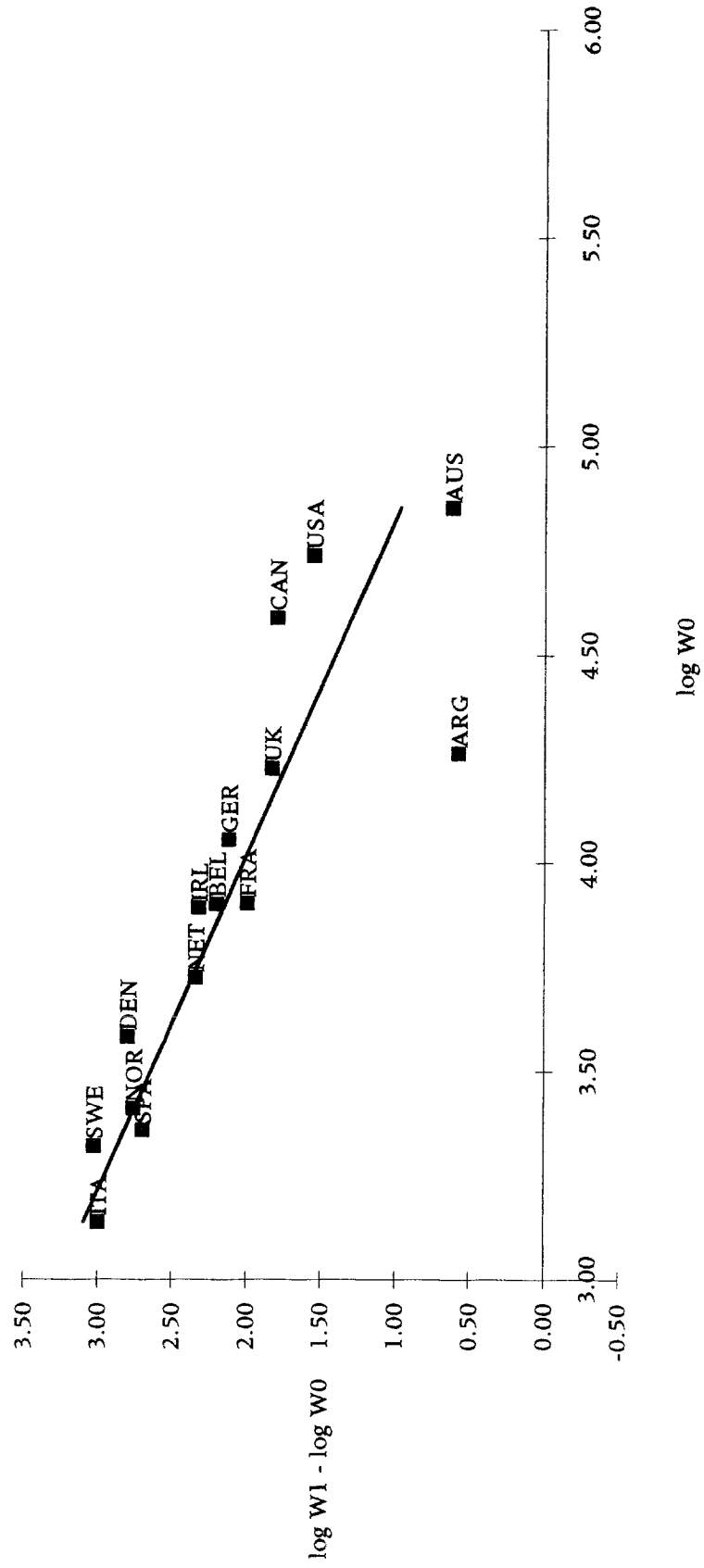
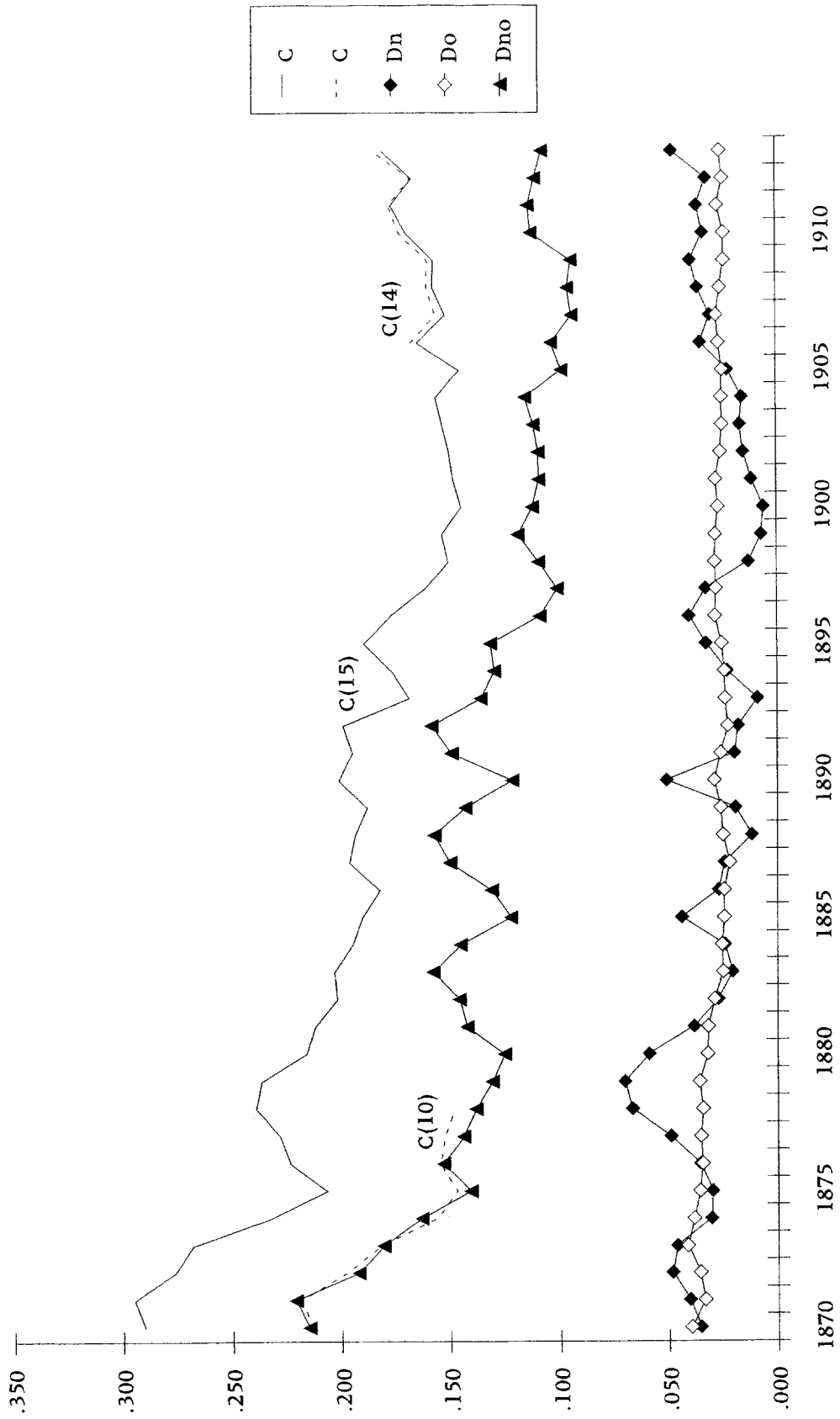
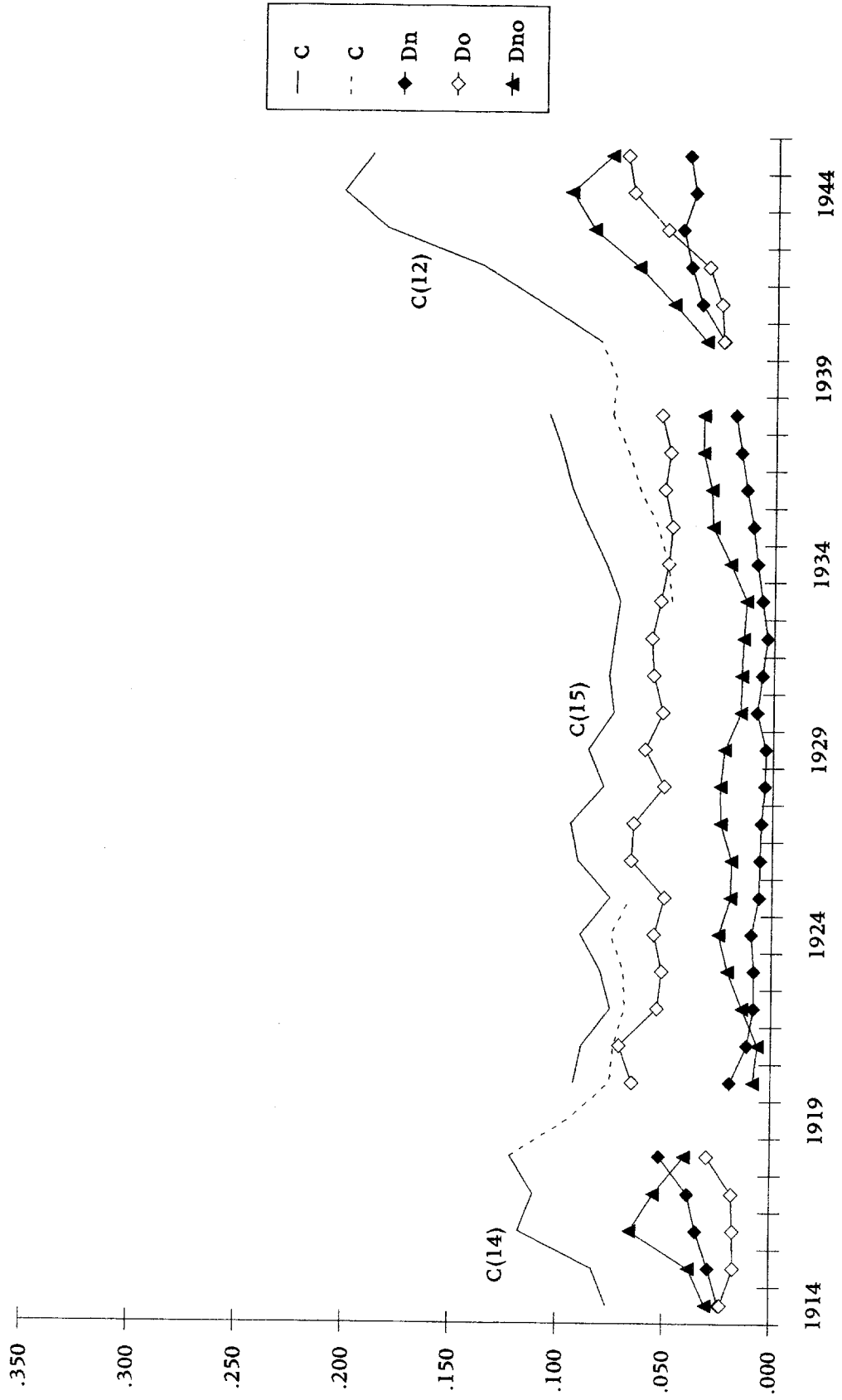


Figure 3. International Real Wage Dispersion, 1870–1913



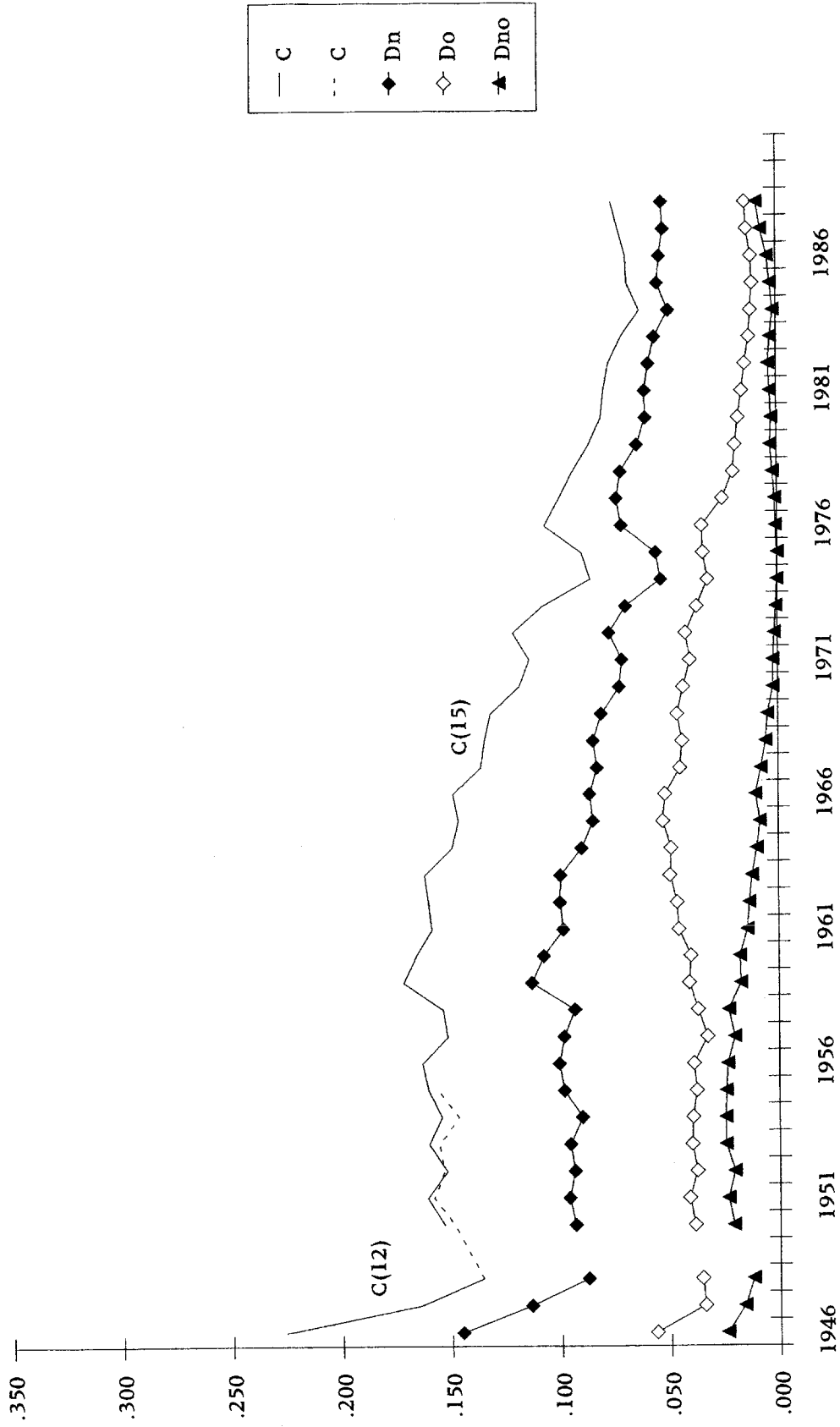
Source: Appendix Table A3.1.

Figure 4. International Real Wage Dispersion, 1914-1945



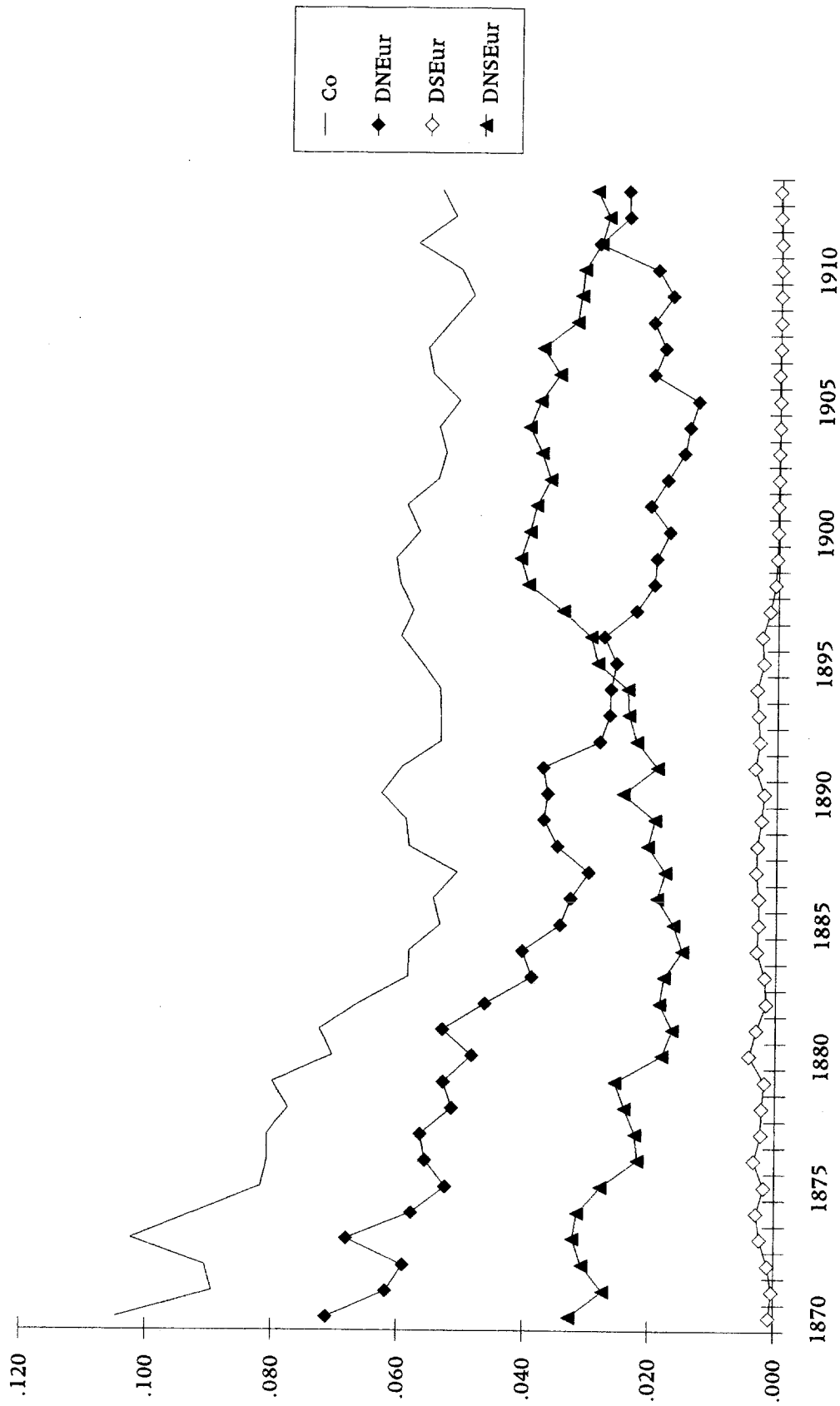
Source: Appendix Table A3.1.

Figure 5. International Real Wage Dispersion, 1946-1988



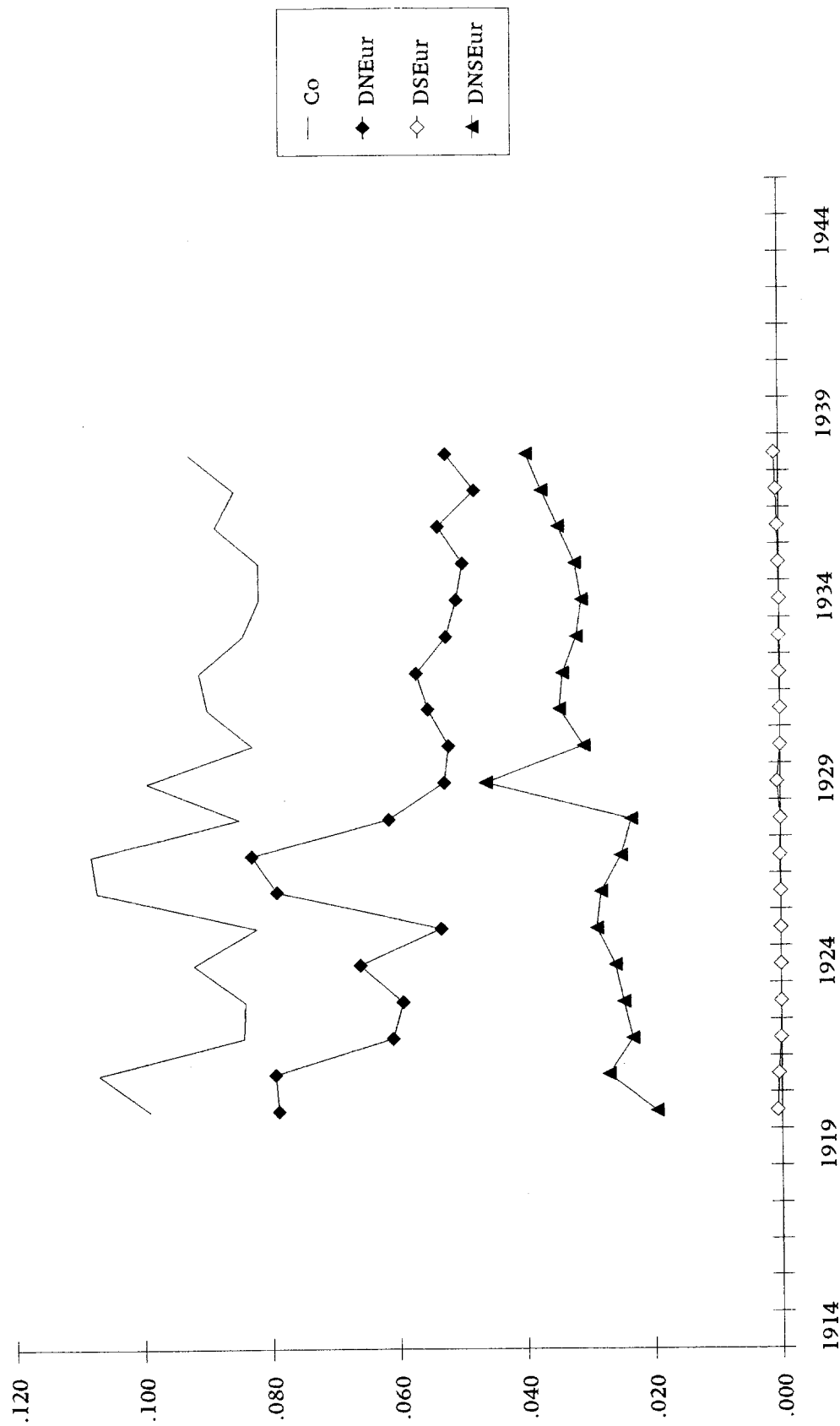
Source: Appendix Table A3.1.

Figure 6. International Real Wage Dispersion, Europe, 1870–1913



Source: Appendix Table A3.1.

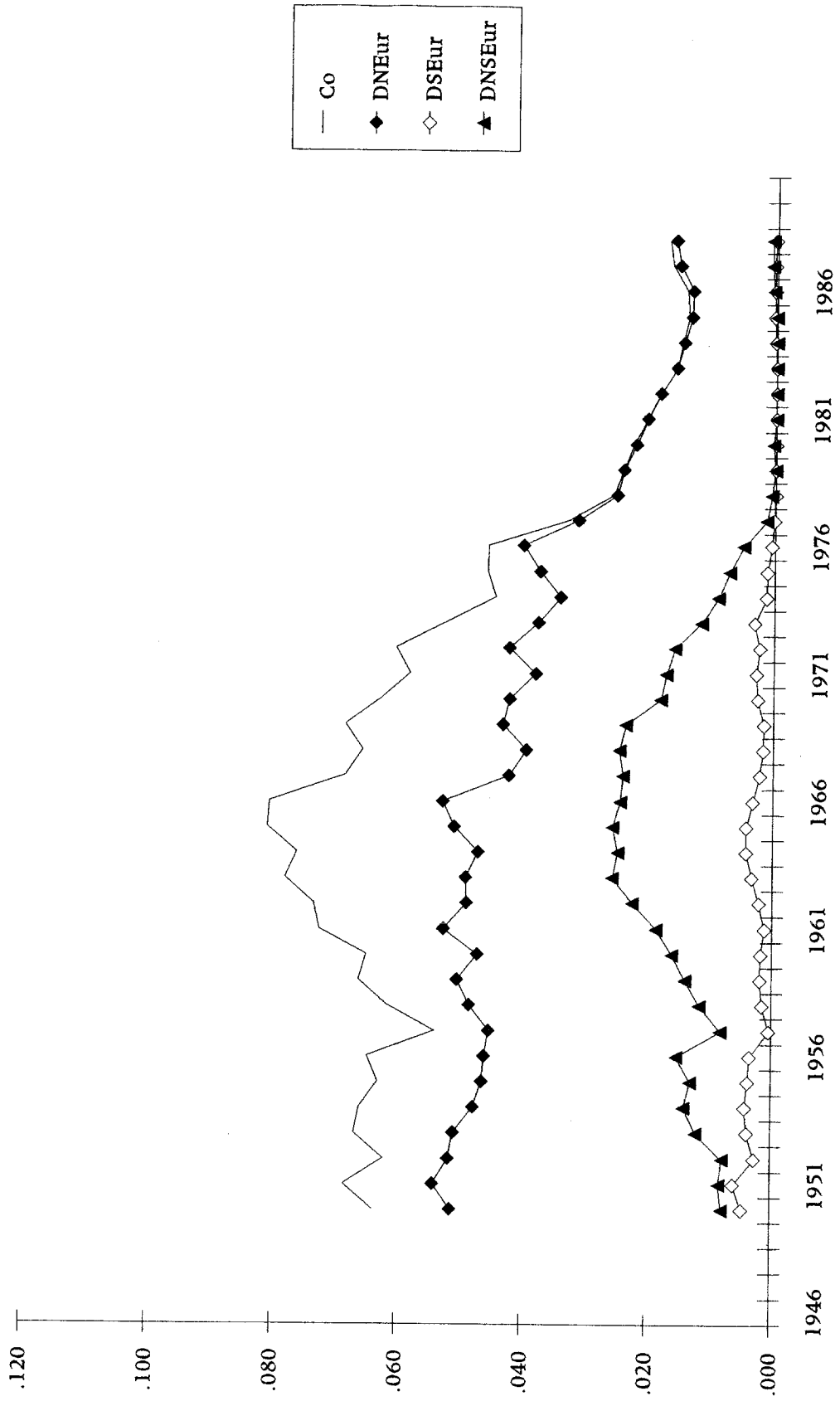
Figure 7. International Real Wage Dispersion, Europe, 1914-1945



Source: Appendix Table A3.1.



Figure 8. International Real Wage Dispersion, Europe, 1946-1988



Source: Appendix Table A3.1.

Figure 9. Real Wages and Population Growth, 1870–1988

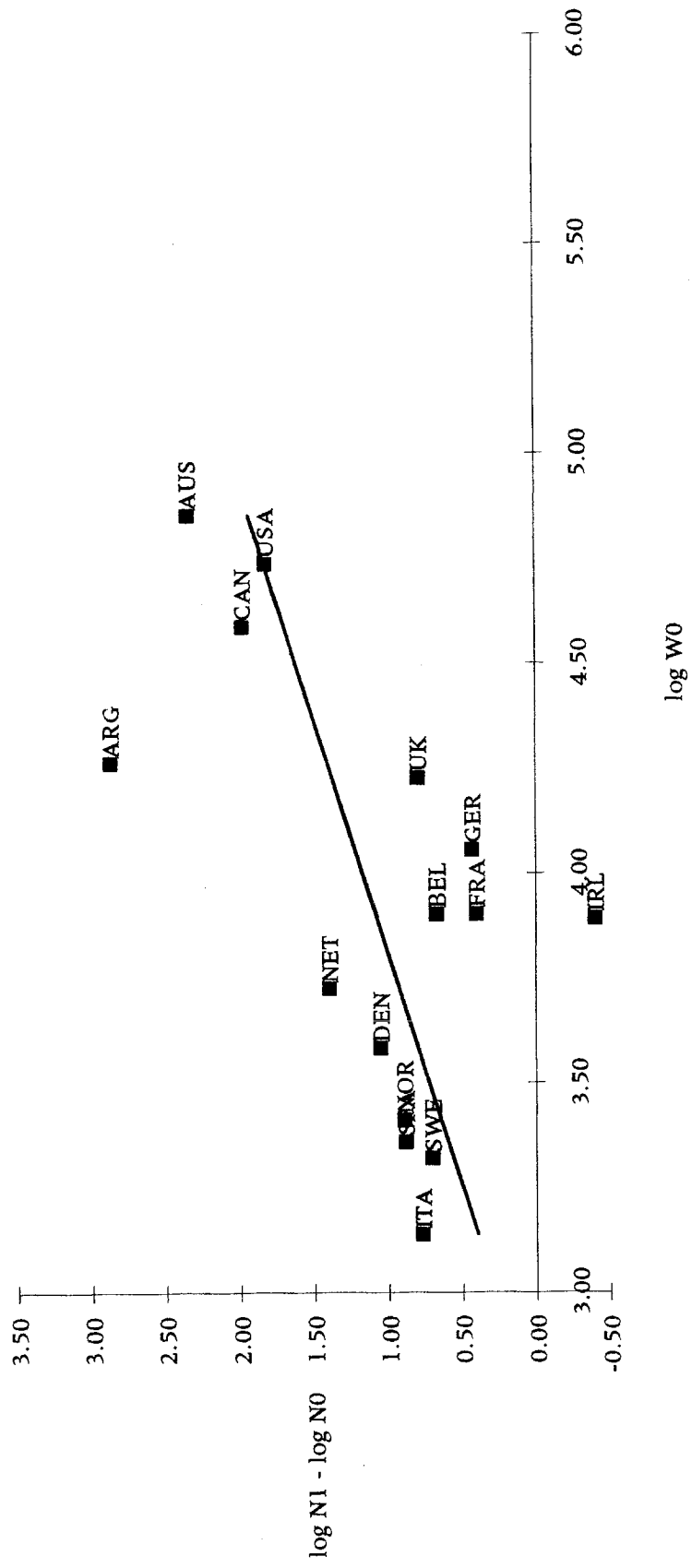


Figure 10. Real Wages and Population Growth, 1870–1913

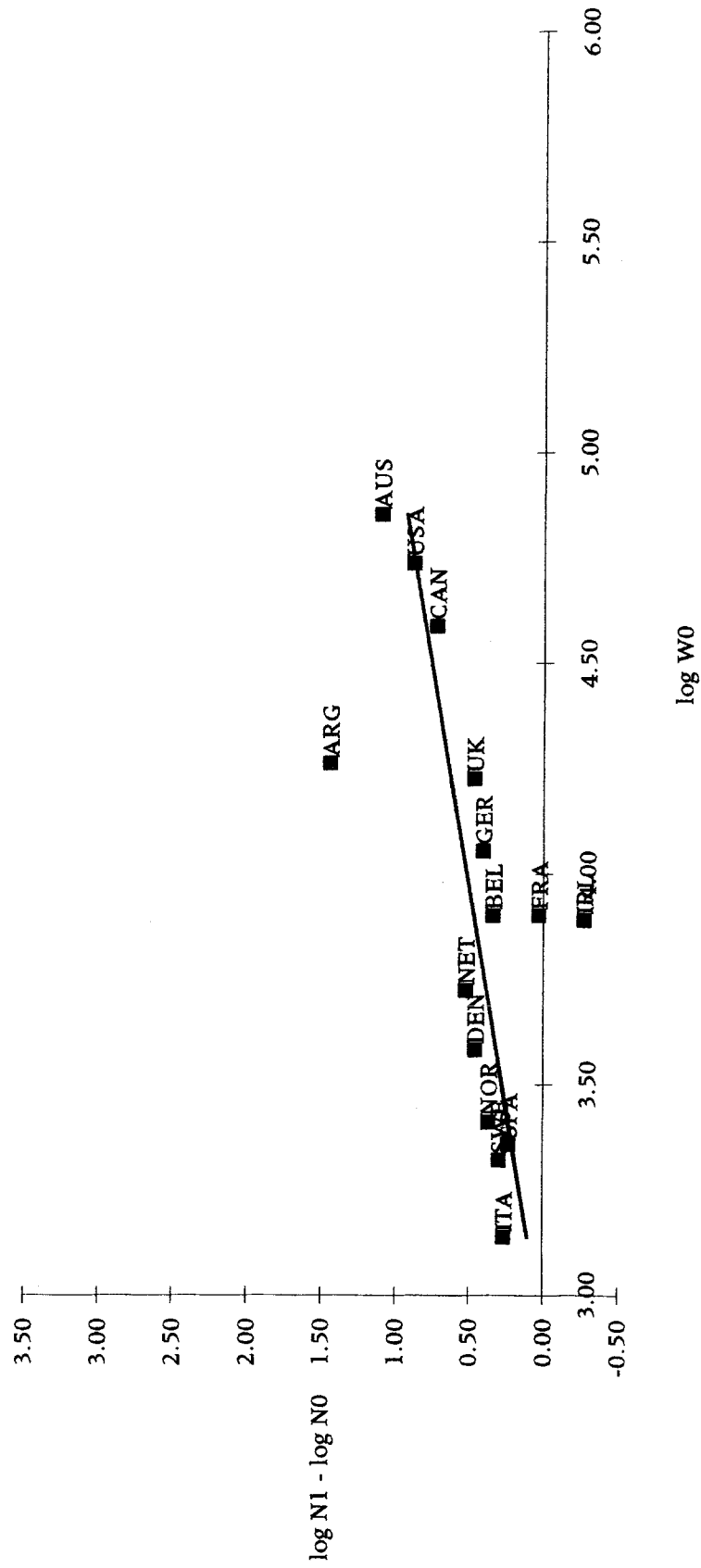


Figure 1.1. Real Wages and Population Growth, 1913-1938

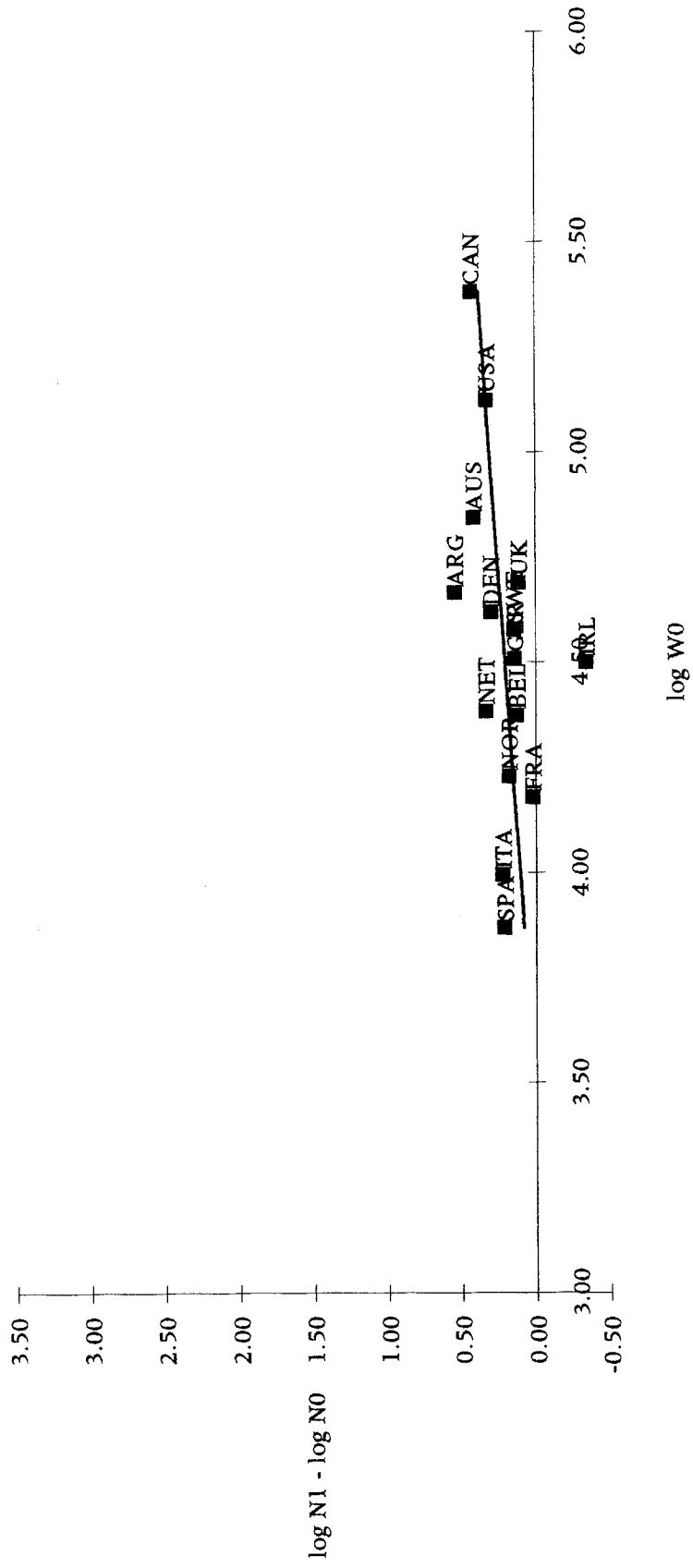


Figure 12. Real Wages and Population Growth, 1950-1988

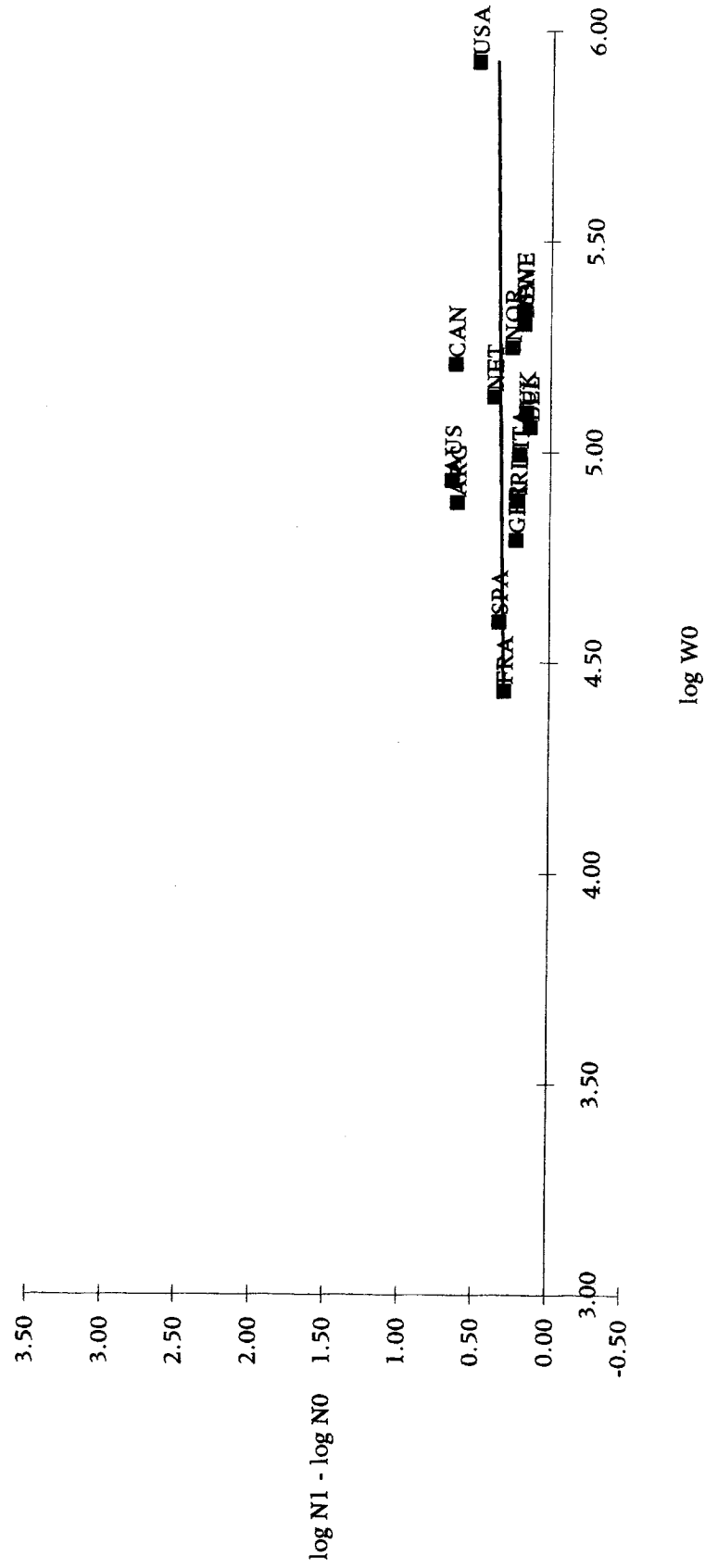
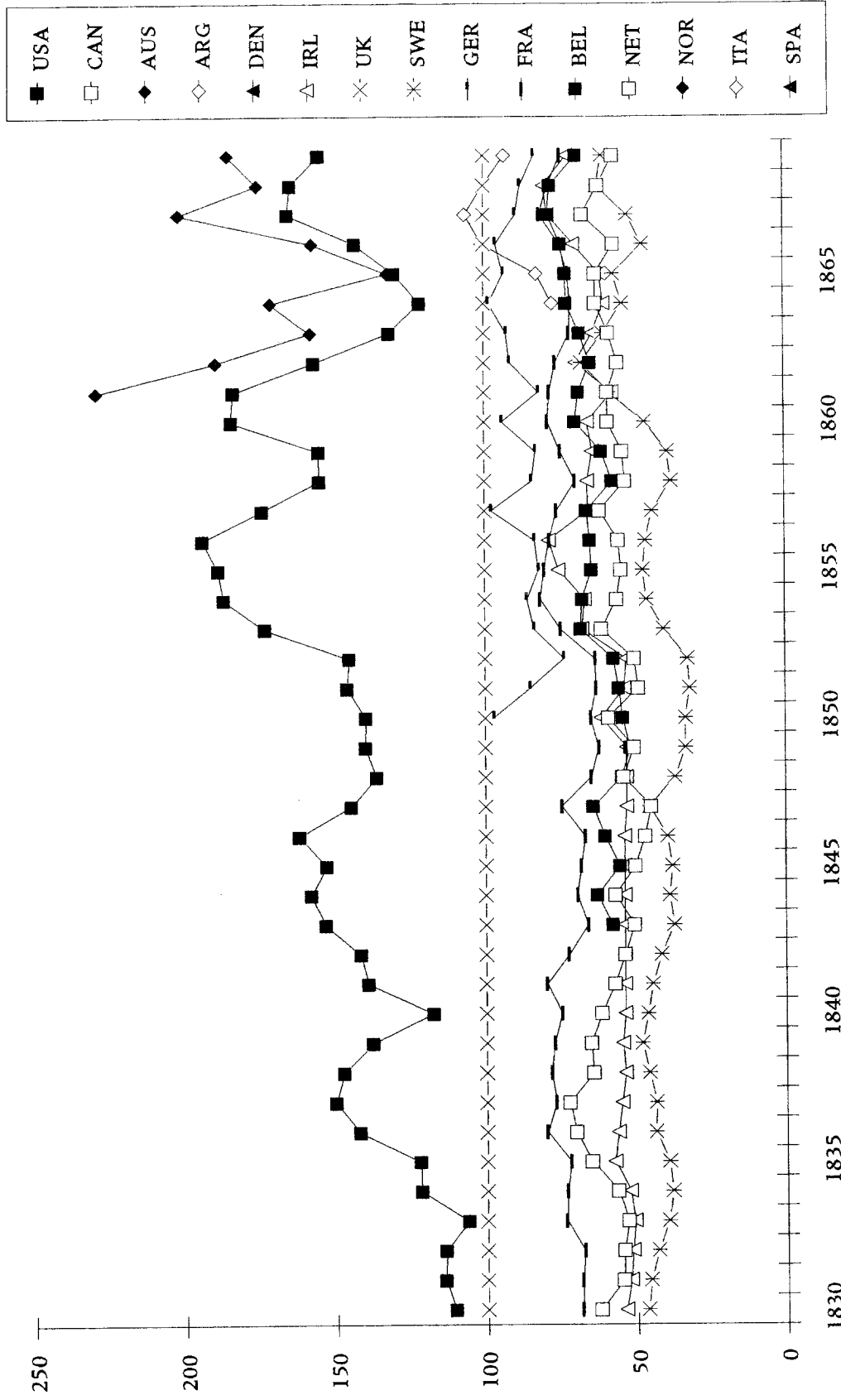
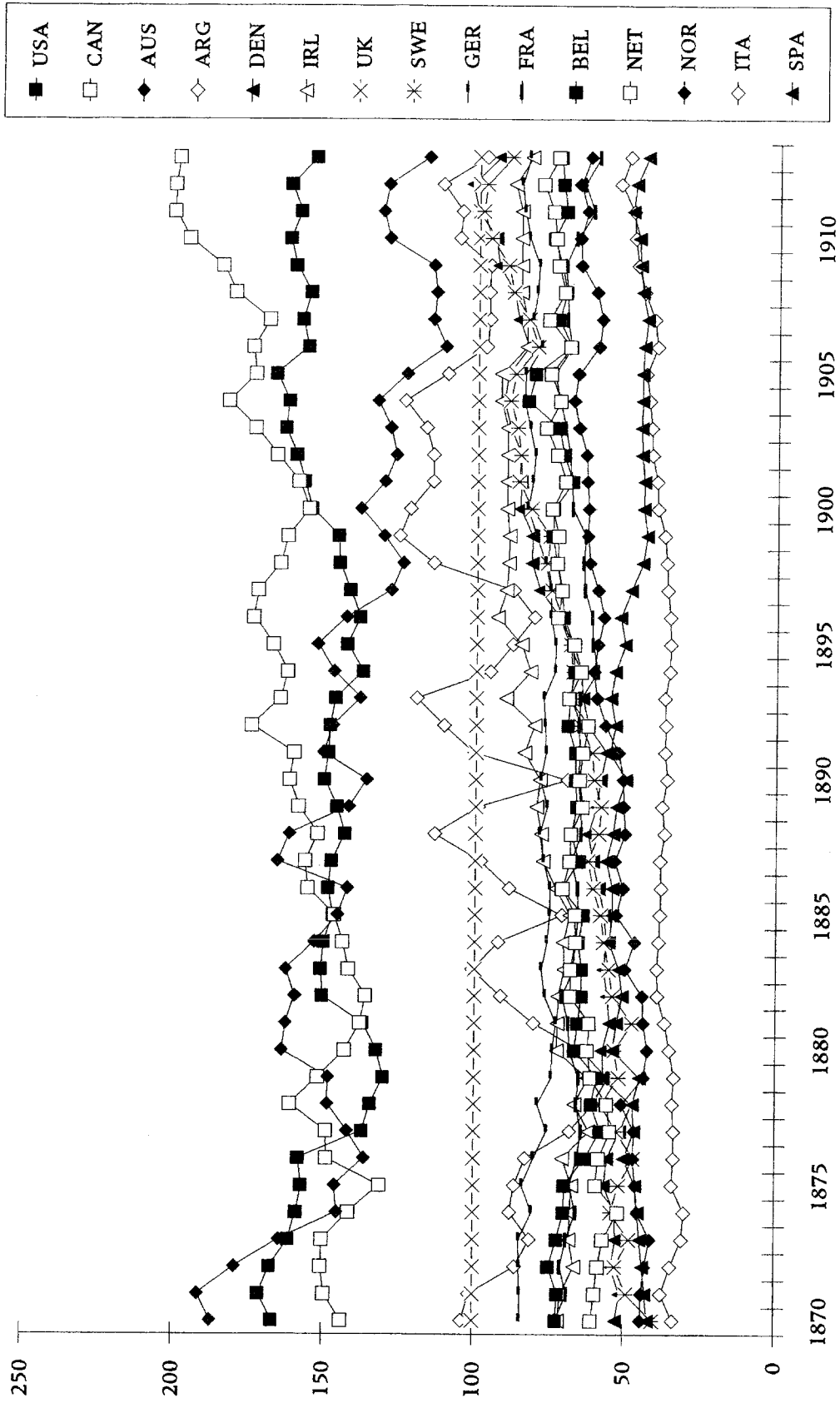


Figure 13. International Real Wage Indices (UK=100), 1830-1869



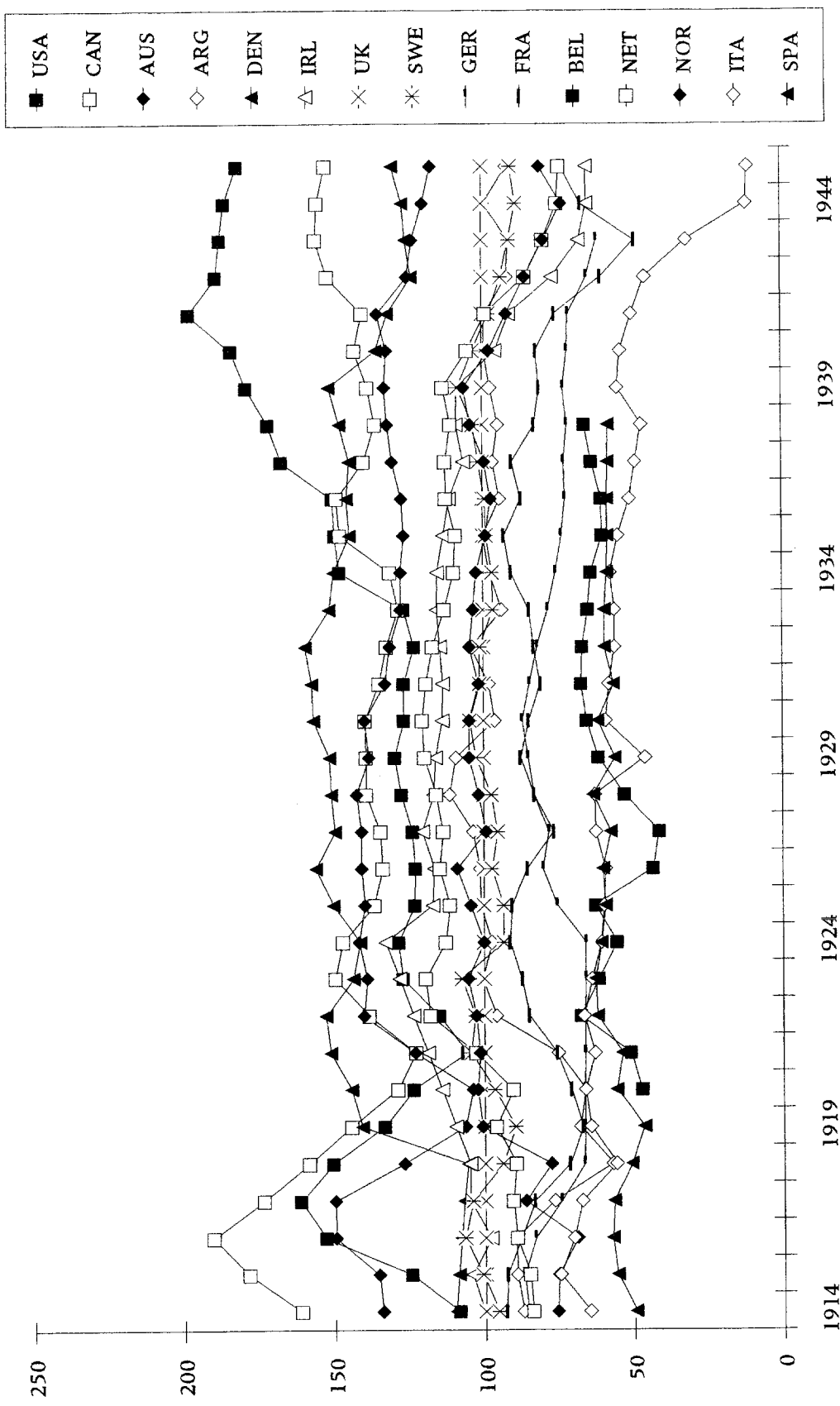
Source: Appendix Table A2.1.

Figure 14. International Real Wage Indices (UK=100), 1870-1913



Source: Appendix Table A2.1.

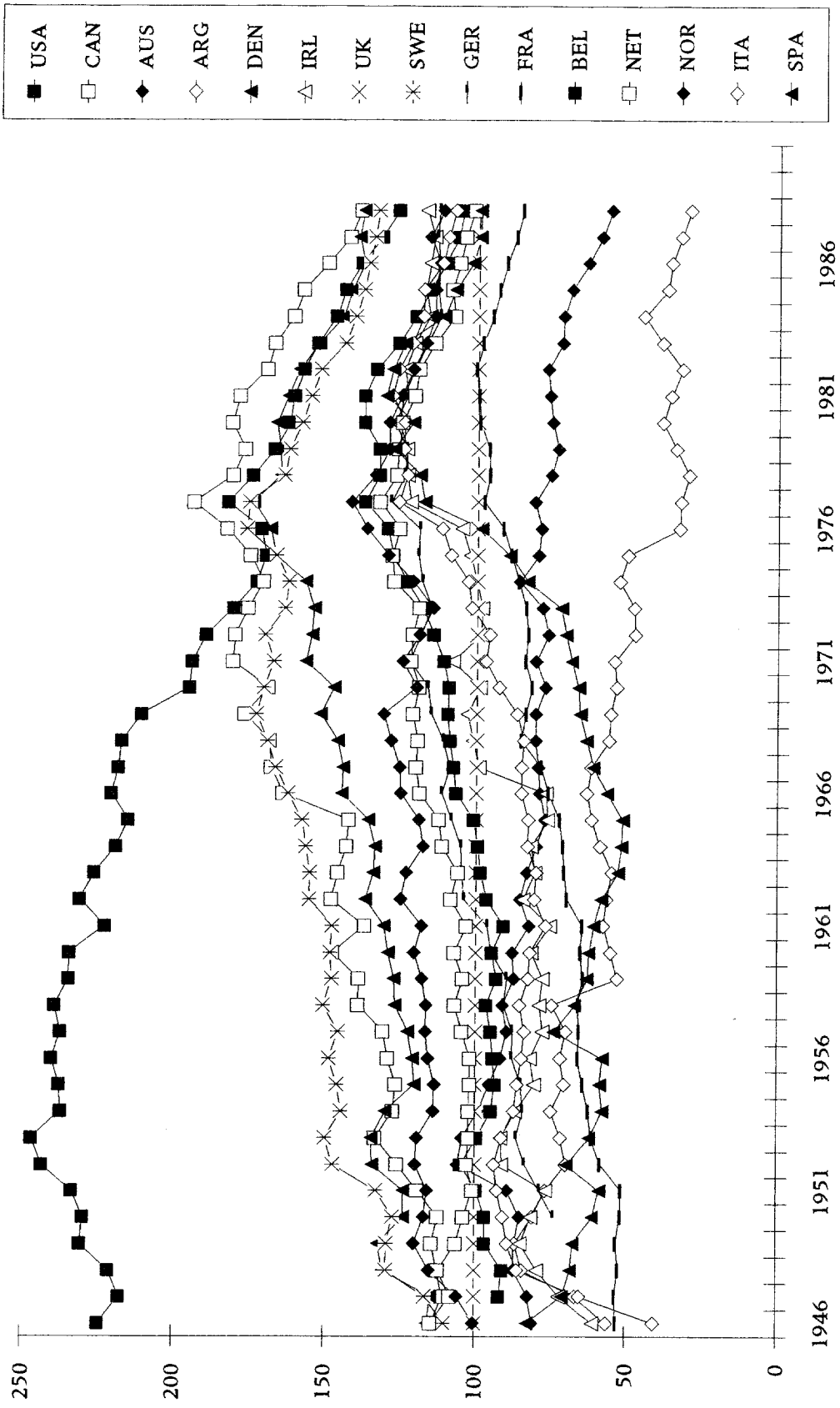
Figure 15. International Real Wage Indices (UK=100), 1914-1945



Source: Appendix Table A2.1.

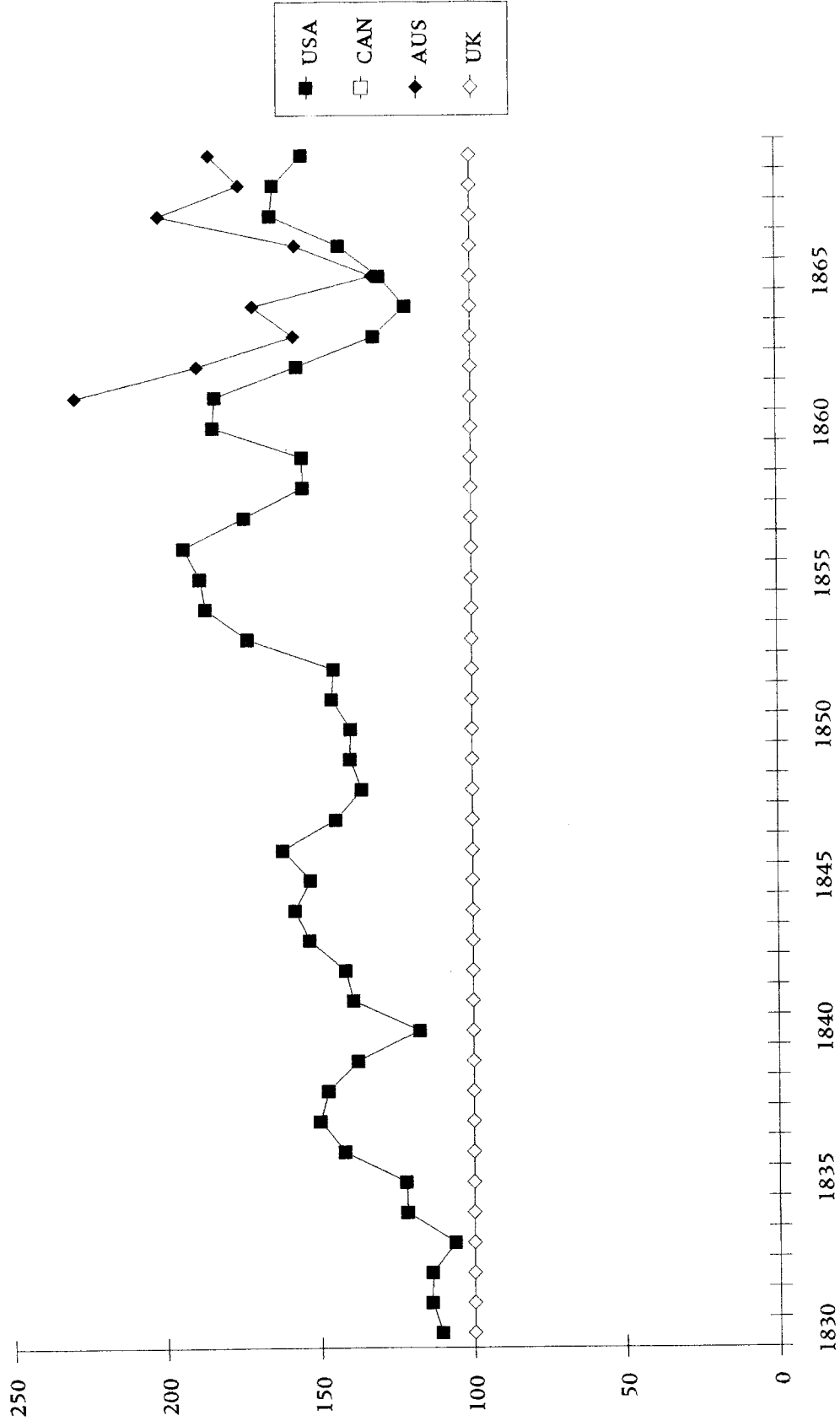


Figure 1.6. International Real Wage Indices (UK=100), 1946-1988



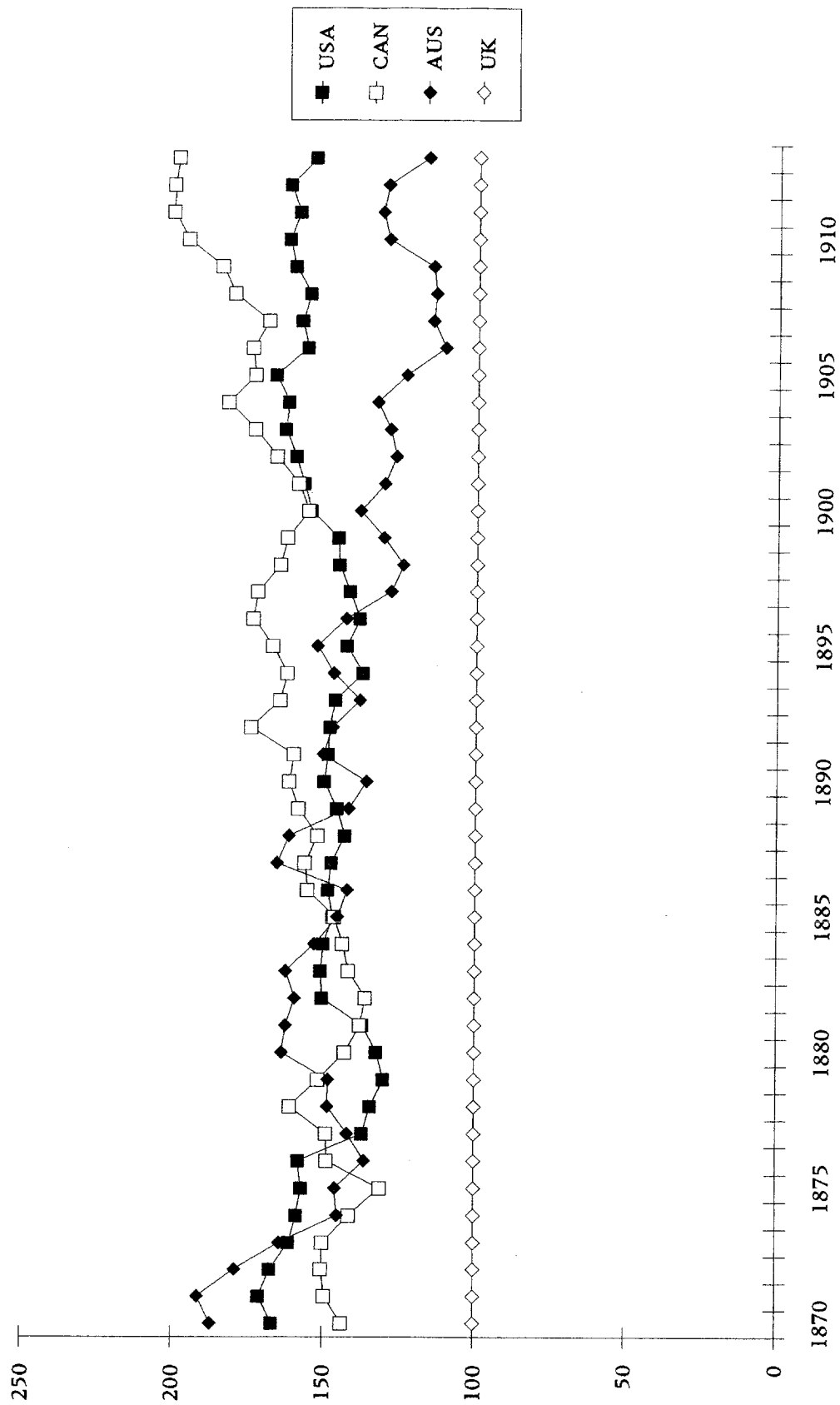
Source: Appendix Table A2.1.

Figure 17. International Real Wage Indices (UK=100), Group A, 1830-1869



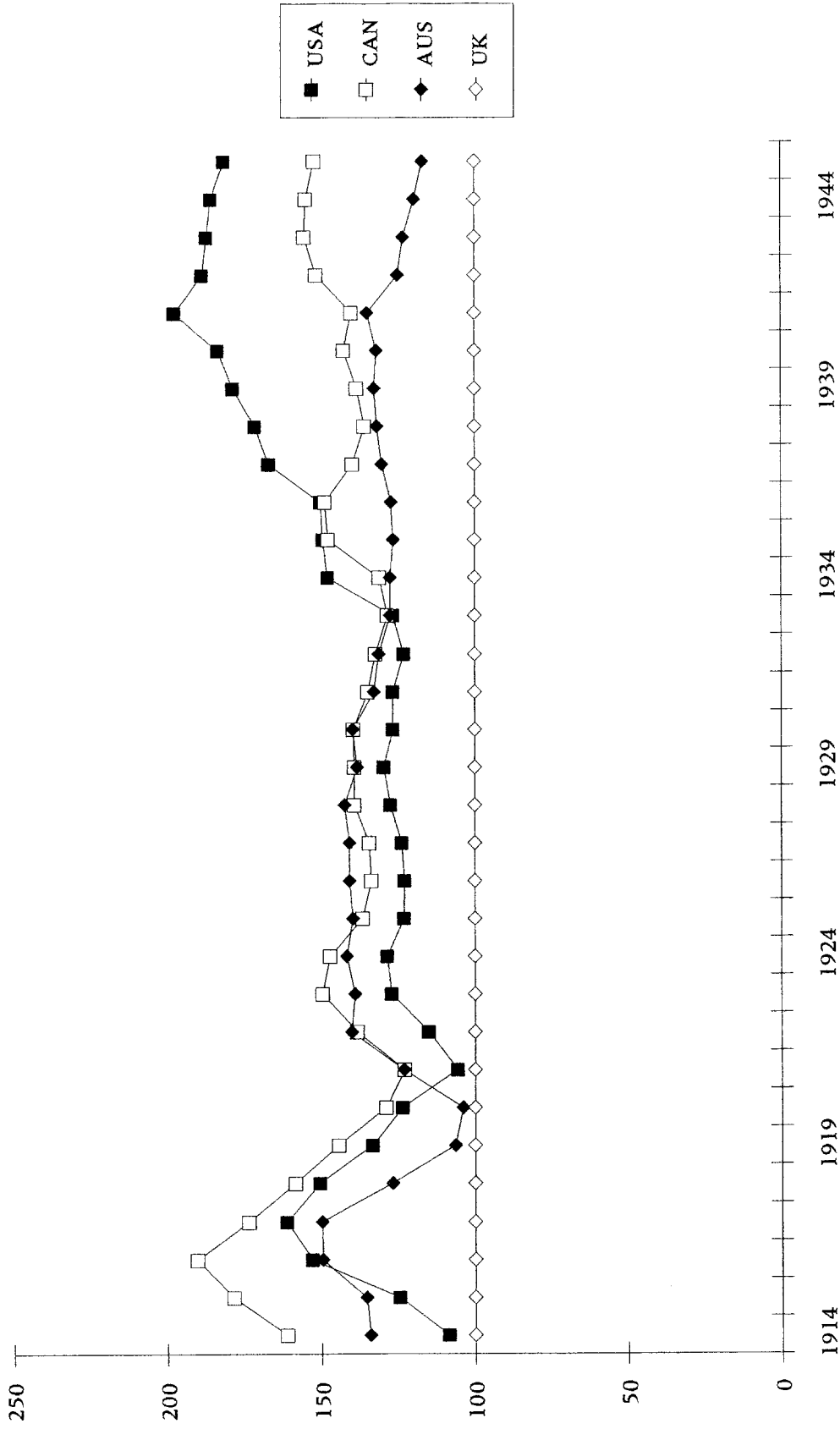
Source: Appendix Table A2.1.

Figure 18. International Real Wage Indices (UK=100), Group A, 1870–1913



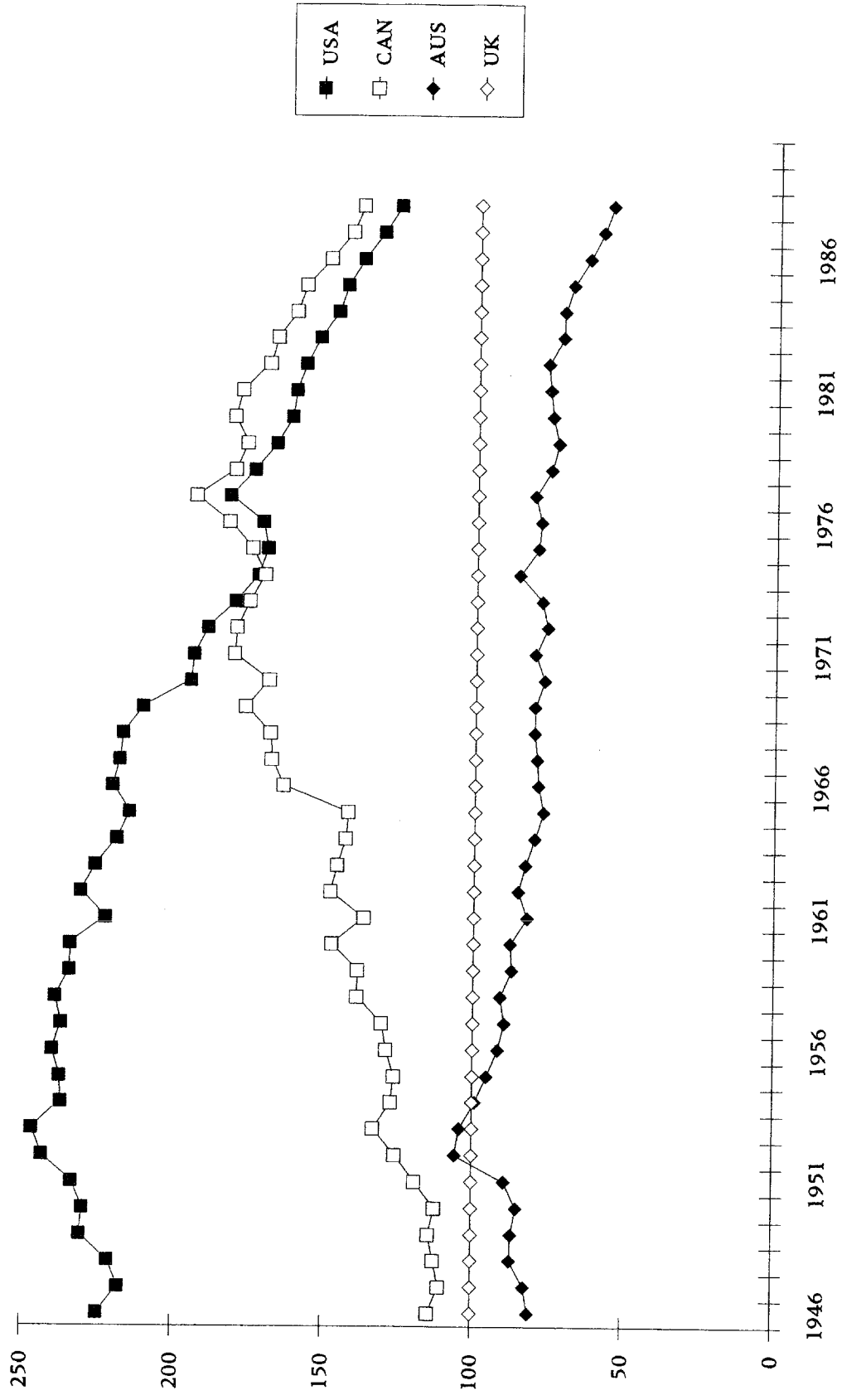
Source: Appendix Table A2.1.

Figure 19. International Real Wage Indices (UK=100), Group A, 1914-1945



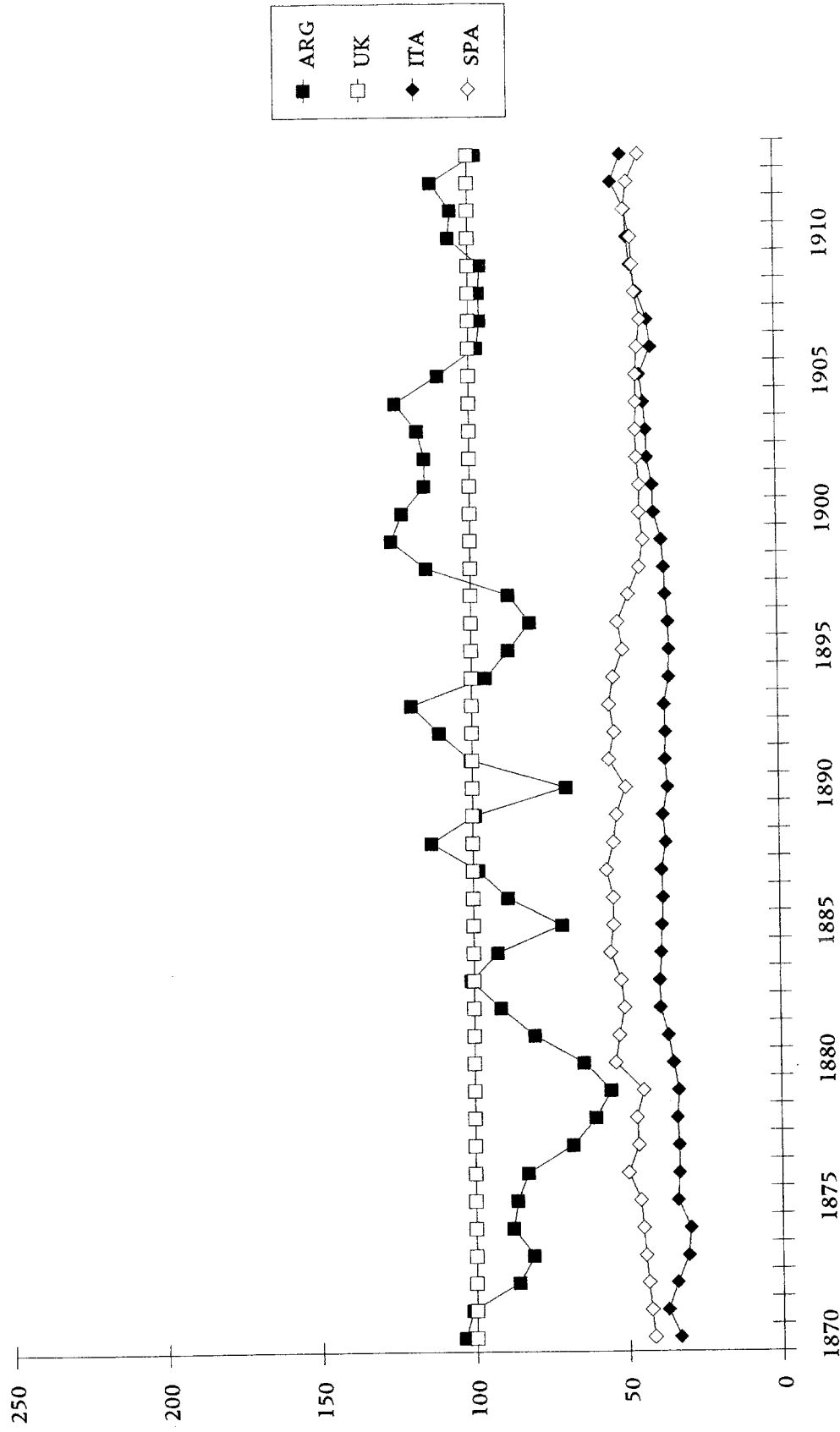
Source: Appendix Table A2.1.

Figure 20. International Real Wage Indices (UK=100), Group A, 1946-1988



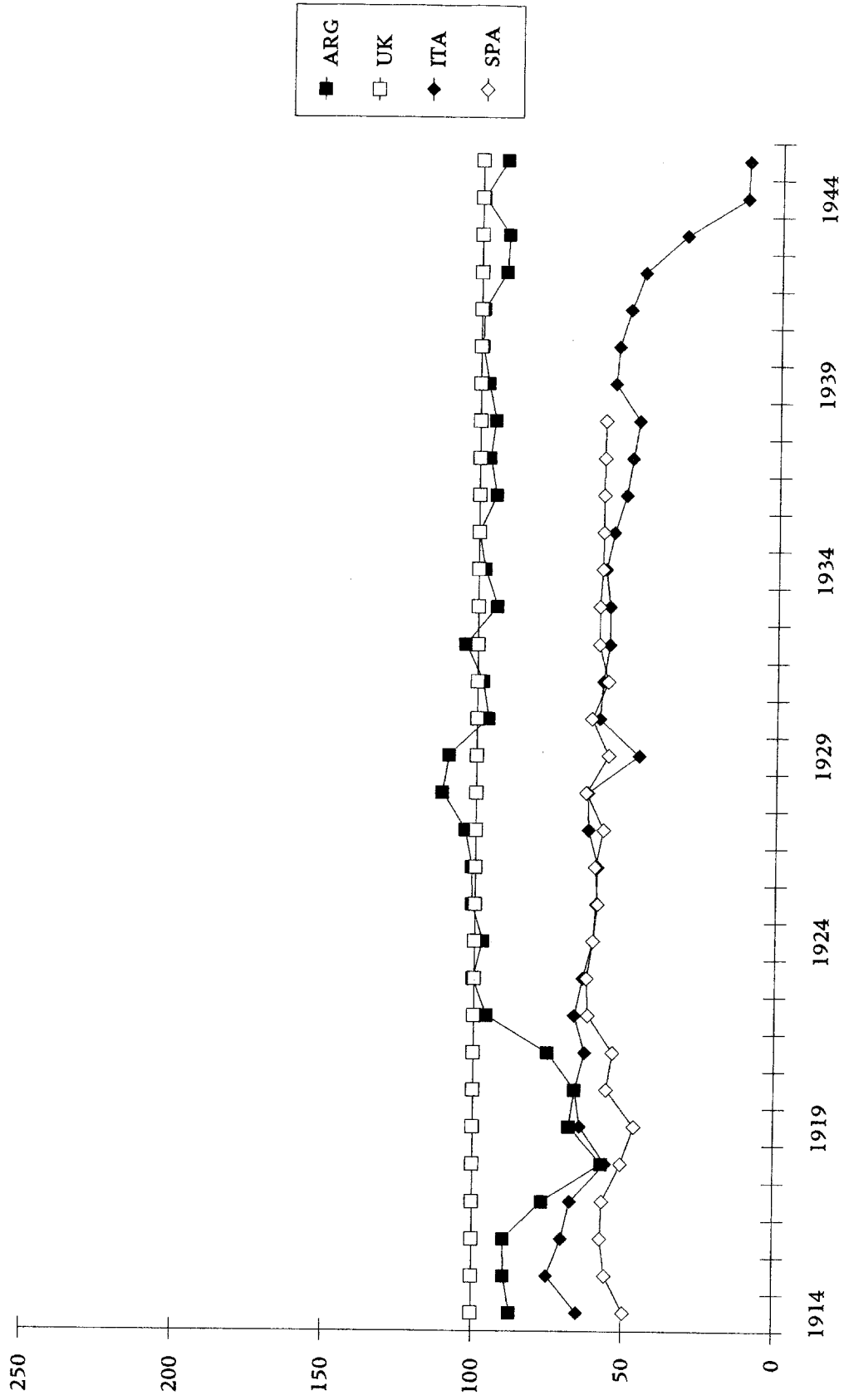
Source: Appendix Table A2.1.

Figure 21. International Real Wage Indices (UK=100), Group B, 1870-1913



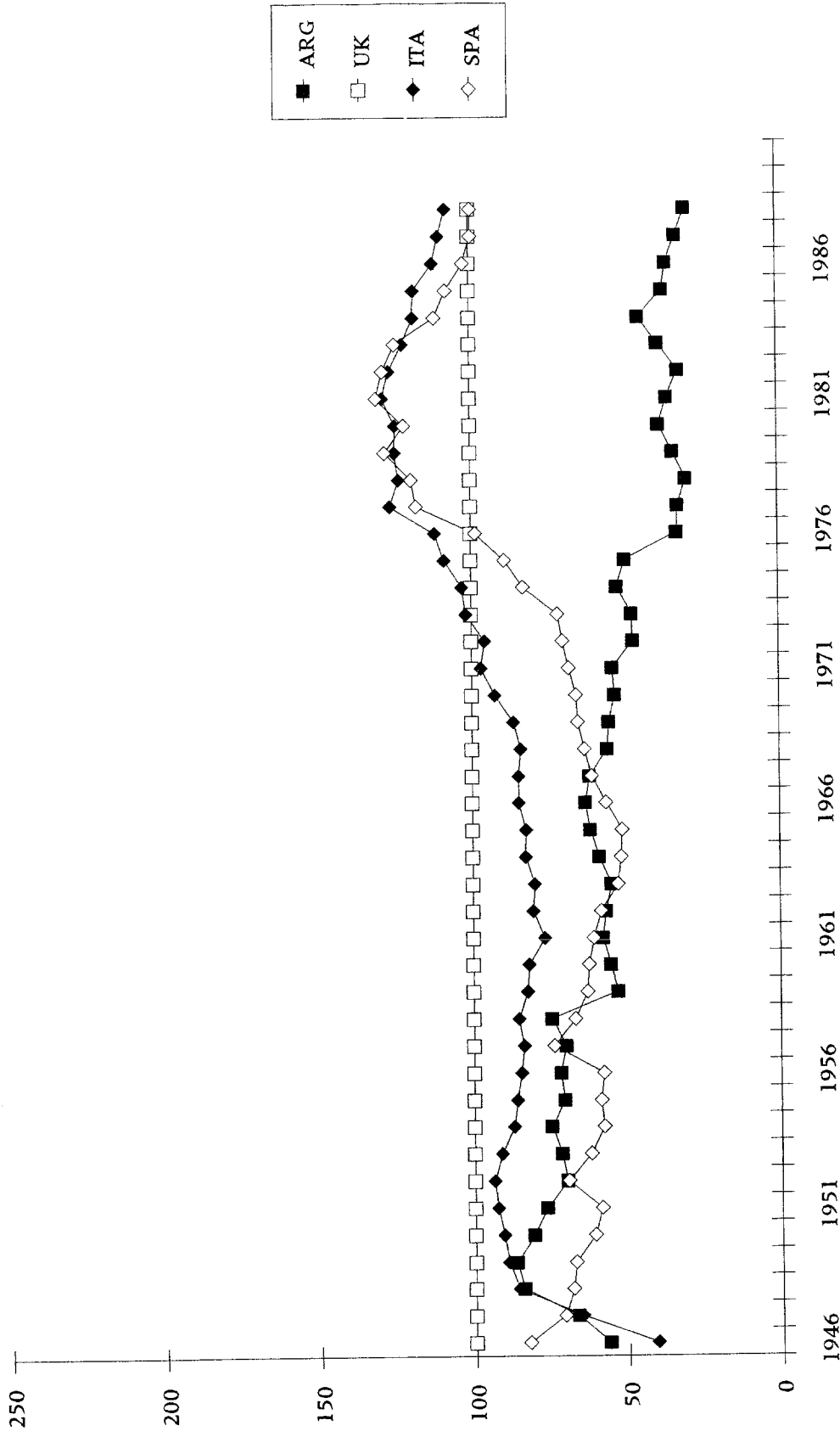
Source: Appendix Table A2.1.

Figure 22. International Real Wage Indices (UK=100), Group B, 1914-1945



Source: Appendix Table A2.1.

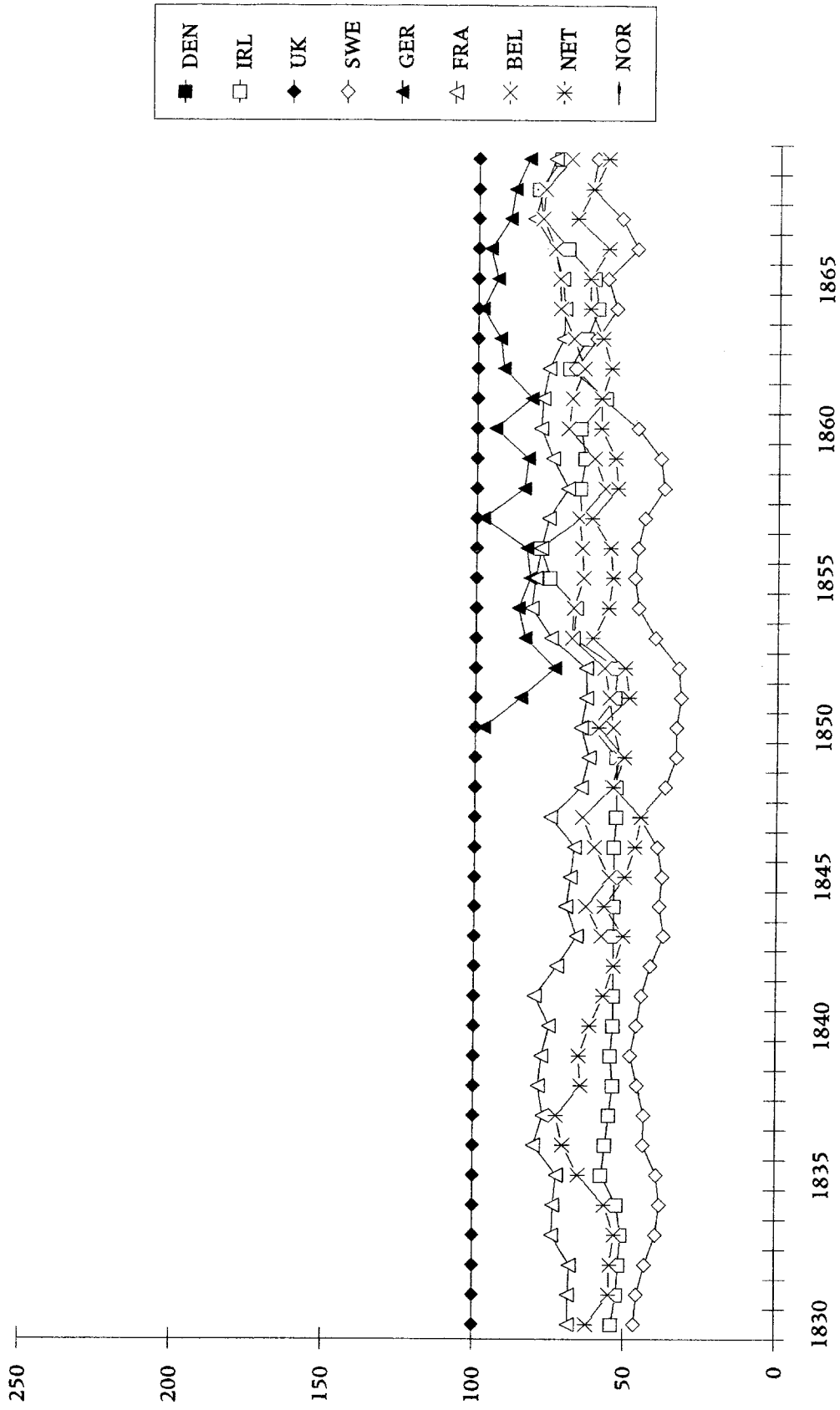
Figure 23. International Real Wage Indices (UK=100), Group B, 1946-1988



Source: Appendix Table A2.1.

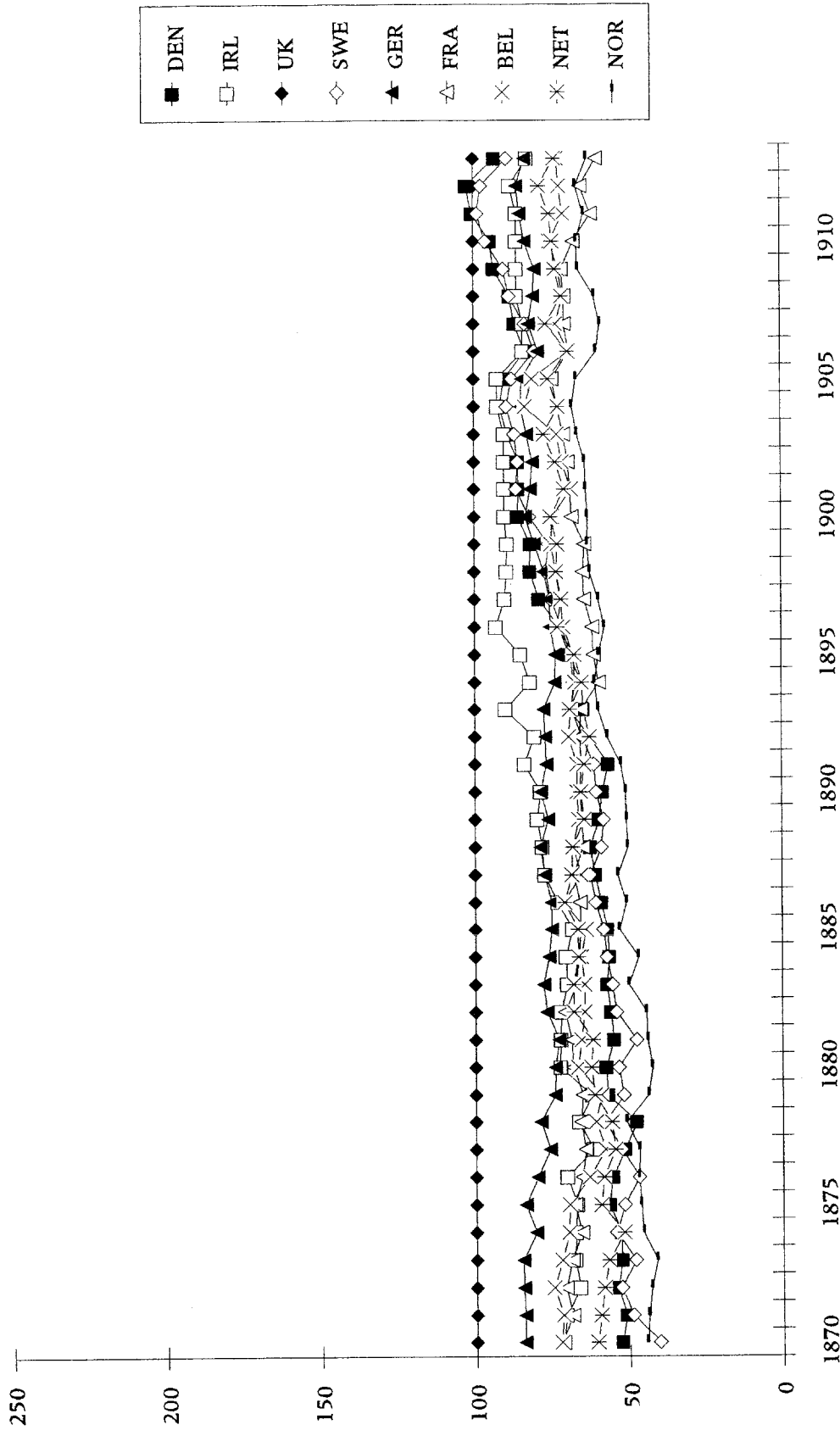


Figure 24. International Real Wage Indices (UK=100), Group C, 1830–1869



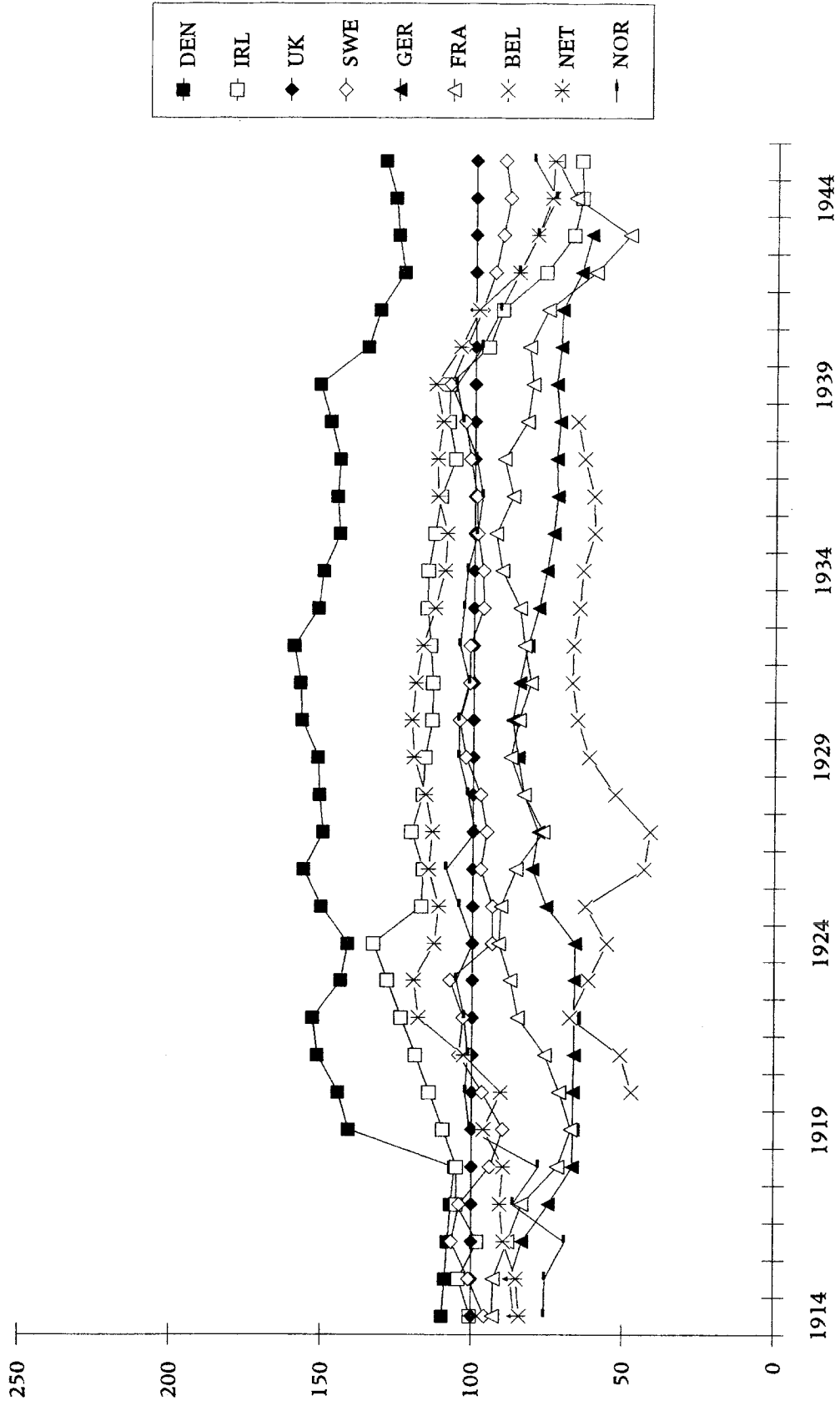
Source: Appendix Table A2.1.

Figure 25. International Real Wage Indices (UK=100), Group C, 1870-1913



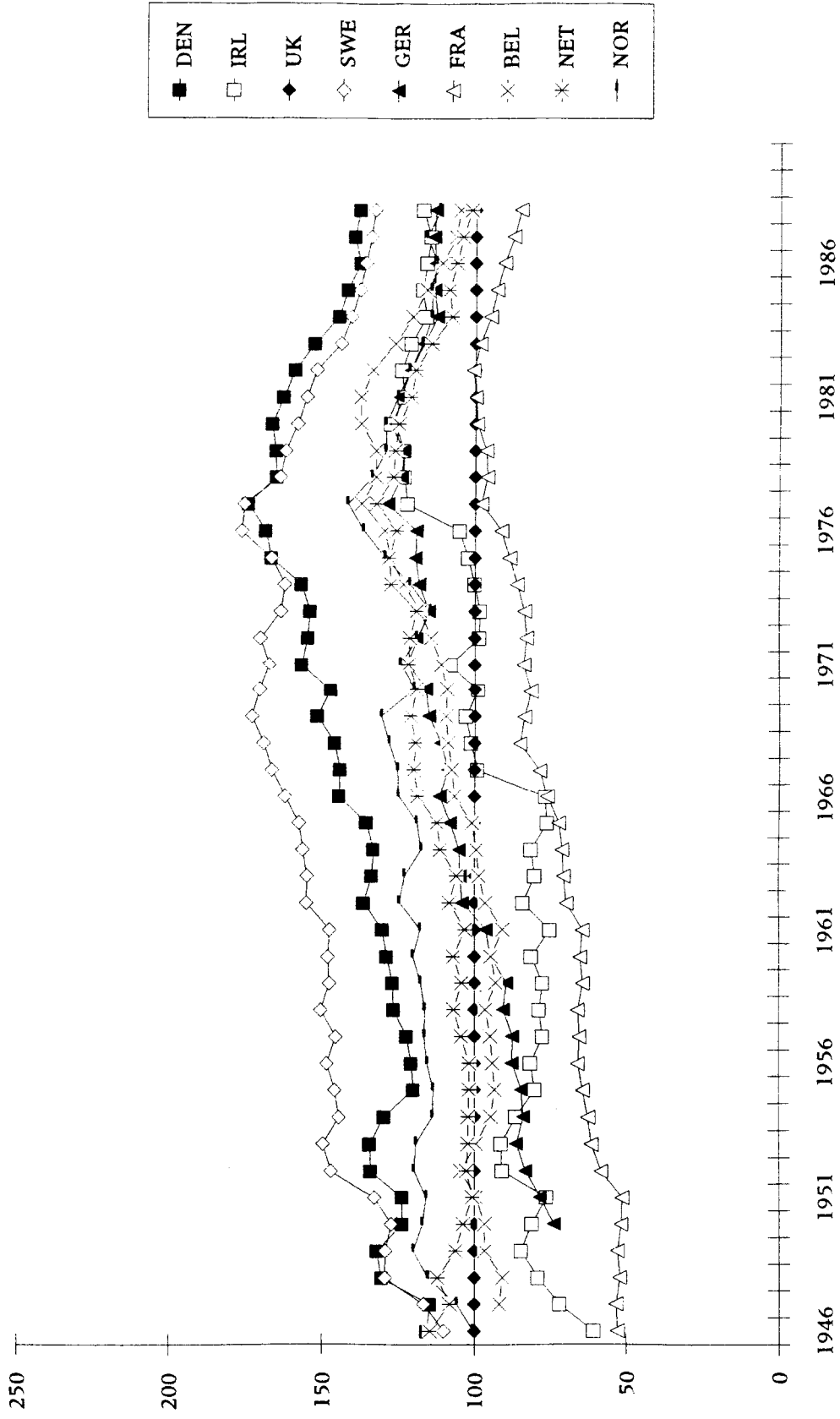
Source: Appendix Table A2.1.

Figure 26. International Real Wage Indices (UK=100), Group C, 1914-1945



Source: Appendix Table A2.1.

Figure 27. International Real Wage Indices (UK=100), Group C, 1946-1988



Source: Appendix Table A2.1.

## *Appendix 1*

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

1. Derived national real wage series are shown in the accompanying tables and figures; *these series are not internationally commensurate.*
2. Wages are specified as being hourly, daily, weekly, etc., unless this information is omitted in the sources.
3. Unless otherwise stated, the national real wage series are derived by deflating the nominal wage series by the cost of living series, and then splicing as necessary. *The choice of base year is arbitrary, and we set 1900 = 100 in all cases.*
4. Occasionally, due to incomplete coverage, there are breaks in the derived national real wage series. In the tables, such breaks are denoted by a horizontal line (—). *In these cases different base years apply either side of the break.*
5. The sample period is 1830–1988. This is divided into four sub-periods as follows:

Period 1:	1830–1869
Period 2:	1870–1913
Period 3:	1914–1945
Period 4:	1946–1988

6. The sample consists of fifteen countries. Abbreviations used are as follows:

USA United States of America	GER Germany/West Germany
CAN Canada	FRA France
AUS Australia	BEL Belgium
ARG Argentina	NET Netherlands
DEN Denmark	NOR Norway
IRL Ireland	ITA Italy
UK Gt. Britain/United Kingdom	SPA Spain
SWE Sweden	

## **Argentina**

### *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, 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 Argentina. Un Diagnóstico de Largo Plazo 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, Apr. 1985. From the FIEL (Fundación de Investigaciones Económicas Latinoamericanas) database.

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

## **Australia**

### *Nominal Wage*

1861–1900: Wage of laborers, geometrical mean of each colony for New South Wales, Victoria, Queensland and South Australia, weighted by workforce in each colony; Glenn Withers, unpublished database, n. d.

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*

1861–1900: Retail price index, geometrical mean of each colony for New South Wales, Victoria, Queensland and South Australia, weighted by workforce in each colony; Glenn Withers, unpublished database, n. d. (derived from N. G. Butlin, *Australian Domestic Product, Investment and Foreign Borrowing, 1861–1938/39*, Cambridge University Press, 1962, Table 78, p. 158).

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

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

### *Real Wage*

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

## **Belgium**

### *Nominal Wage*

1843–1913: Average wages in five industries; B.R. Mitchell, *European Historical Statistics 1750–1975*, (hereafter *EHS*), Columbia University Press, New York, 1978, pp. 71–73.

1913–1920: Data not available.

1920–1929: Wages of laborers in the building trades (or in mechanical engineering, 1920–22); International Labour Organisation, *International Labour Review*, Geneva, various issues:

1920: vol. VII, no. 4, April 1923, p. 591 (July 1920 observation).

1921: *ibid.* (January 1921 observation);

1922: *ibid.* (January 1922 observation);

1924: vol. XVII, no. 5, May 1928, p. 882 (December 1923 observation);  
1925: vol. XI, no. 4, April 1925, p. 570 (January 1925 observation);  
1926: vol. XIV, no. 1, Jul. 1926, p. 114 (April 1926 observation);  
1927: vol. XV, no. 4, April 1927, p. 610 (January 1927 observation);  
1928: vol. XVII, no. 4, April 1928, p. 559 (January 1928 observation);  
1929: vol. XIX, no. 4, April 1929, p. 569 (January 1929 observation);

1929–1938: Wages of males in industry & transport; Mitchell, *EHS*, pp. 71–73.  
1938–1947: Data not available.  
1947–1969: Daily wages of males in manufacturing; Mitchell, *EHS*, p. 75.  
1969–1988: Hourly wage in manufacturing; OECD, *MEI*, p. 240.

#### *Cost of Living*

1843–1913: 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 and E. Waxweiler, “Le Mouvement des prix de six article de consommation courante à Bruxelles de 1881 à 1910”, *Bulletin de l’Institut International de Statistique*, 1912, vol. 19; reprinted in J. Singer-Kerel, *Le coût de la vie à Paris de 1840 à 1954*, A. Colin, Paris, 1961, pp. 108–109.

1920–1939: Price index reported in C. Schroeven and P. Solar, “The Construction of Historical Price Indices with an Illustration from Interwar Belgium”, in P. Scholliers (ed.), *Real Wages in 19th and 20th Century Europe: Historical and Comparative Perspectives*, Berg, New York, 1989, p. 175.

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

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

## **Canada**

#### *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, 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–248–267.

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**

### *Nominal Wage*

1870–1980: Hourly wage of unskilled males in crafts and industry; Hans 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**

### *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 University Press, Cambridge, 1990, Table A–IV.

1840–1939: All France, non-farm 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**

### *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 University 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.

## **Italy**

### *Nominal Wage*

1861–1890: 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 and Results”, in P. Scholliers (ed.), *Real Wages in 19th and 20th Century Europe*, p. 134.

1913–1922: Daily wage for industrial operatives; V. Zamagni, “La alterazione nella distribuzione del reddito in Italia nell’immediato de poguerra 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*

1861–1890: 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.

## **Ireland**

### *Nominal Wage*

1830–1918: Daily wages of unskilled laborers in the building trades, Dublin; F.A. D’Arcy, “Wages of Labourers in the Dublin Building Industry, 1667–1918”, *Saothar*, 14, pp. 17–32.

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*

1830–1880: K.H. O'Rourke, *Agricultural Change and Rural Depopulation in Ireland 1845–1876*, Harvard University Ph.D.Thesis, 1989, pp. 129, 212–226.  
1880–1914: Cost of living in United Kingdom (see UK sources).  
1914–1969: ILO, *Yearbook*, several issues.  
1969–1988: Consumer price index; OECD, *MEI*, p. 443.

### **Netherlands**

#### *Real Wage*

1830–1880: Real wage of craftsmen in Amsterdam; H. Nusteling, *Welvaart en Werkgelegenheid in Amsterdam 1540–1860*, De Bataafsche Leeuw, Amsterdam, 1985, Table 6.3, p. 265.

#### *Nominal Wage*

1880–1939: 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*

1880–1939: 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**

#### *Nominal Wage*

1870–1910: Average daily wage unskilled laborers; *Norges Officielle Statistik*, Kristiania, 1910, vol. 212, Table 5, p. 28.  
1910–1938: Hourly wages in engineering; Mitchell, *EHS*, p. 196.  
1938–1969: Hourly wages in industry, adult males; Mitchell, *EHS*, p. 198.  
1969–1988: Hourly earnings in manufacturing, males; OECD, *MEI*, p. 548.

#### *Cost of Living*

1870–1910: Consumer price index; A. Maddison, *Phases of Capitalist Development*, Oxford University Press, Oxford, 1982, Table E2, p. 237.

1910–1913: Cost of living index (Oslo); Mitchell, *EHS*, p. 780.  
1913–1969: Cost of living index; Mitchell, *EHS*, p. 780–782.  
1969–1988: Consumer price index; OECD, *MEI*, p. 550.

## *Spain*

### *Nominal Wage*

1876–1896: Daily Wage of unskilled mine laborers (Vizcaya); A. Escudero, “Evolución de los salarios reales en las minas de Vizcaya (1876–1936)”, UAB Conference paper on Living Standards in Spain, Barcelona, December 18–19, 1990.  
1896–1925: 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 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.  
1934–1939: Data not available.  
1940–1963: 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*

1876–1913: Price index reported in F. Bustelo and G. Tortella, “Monetary Inflation in Spain, 1800–1970”, *The Journal of European Economic History*, 5, 1976, 1, Table II, pp. 141–150.  
1913–1933: Consumer price index (Barcelona); Maluquer de Motes, “Precios, Salarios y Beneficios”, Table 12.12, pp. 518–519.  
1934–1939: Data not available.  
1940–1983: 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***

### *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*, P.S. King, London, 1933, vol. II.

### *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.

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.

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*, 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.

## ***United Kingdom***

### *Nominal Wage*

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

1834–1900: Weekly wage of a common laborer in the building trades computed as a 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 University Press, Cambridge, 1900, p. 60; 1839–1900, A.L. Bowley, "The Statistics of Wages in the UK during the last 100

years", *Journal of the Royal Statistics Society*, LXIII, June 1900, pp. 300–311; 1834–1900, E.H. Phelps Brown and S.V. Hopkins, "Seven Centuries of Building Wages", *Economica*, August, 1955, pp. 203–206.

1900–1913: Daily wages, common laborer in the building trades, Southern England; E.H. Phelps Brown and S.V. Hopkins, "Seven Centuries", pp. 300–311. 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.

1851–1870: J.G. Williamson, *Did British Capitalism Breed Inequality?*, Allen & Unwin, London, 1985, Table A.8, p. 220.

1870–1914: 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 University 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.

### ***United States of America***

#### *Nominal Wage*

1830–1856: Wages of common laborers in the building trades, Northeast; R.A.Margo, "Wages and Prices during the Antebellum Period: A Survey and New Evidence", NBER conference paper on Antebellum Living Standards, Cambridge, July 20–22, 1990, Table 12, p. 68.

1856–1945: Wages of urban unskilled labor, in P.A. David and P. Solar, "A Bicentenary Contribution to the History of the Cost of Living in America", *Research in Economic History*, vol. 2, 1977, 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*

1830–1974: P.A. David and P. Solar, "A Bicentenary Contribution", pp. 16–17.

1974–1985: ILO, *Yearbook*, various issues.

1985–1988: Consumer price index; OECD, *MEI*, p. 79.

## *Appendix 2*

### *International Real Wage Series*

1. These series are derived by re-scaling the national real wage series (Appendix 1) to make them consistent with the real wage benchmarks derived using purchasing power parities (Appendix 5). The result is a cross-section of real wage series over all countries which are internationally commensurate.
2. The method chosen is to normalize the UK real wage to 100 in every year. The relative real wage in the other countries is then derived by a chain index method as follows.
3. Let  $w(t)$  denote the real wage in the home country (UK) and  $w^*(t)$  the real wage in the foreign country at time  $t$ , where these real wages are internationally commensurate. The relative real wage  $[w(t) / w^*(t)]$  is given by the identity:

$$[w(t) / w^*(t)] = \frac{[w(t) / w(r)]}{[w^*(t) / w^*(s)]} \cdot [w(r) / w^*(s)],$$

where:

- $[w(t) / w(r)]$  is an inter-temporal real wage at home, from Appendix 1;
- $[w^*(t) / w^*(s)]$  is an inter-temporal real wage abroad, from Appendix 1;
- $[w(r) / w^*(s)]$  is an international real wage benchmark, from Appendix 5.

This procedure is illustrated schematically in Figure A2. Note that natural breaks in the relative real wage series occur when there is a change of benchmark year: in the tables such breaks are denoted by a horizontal line (—).

4. The results are presented in Table A2.1. Figures 13–27 in the text are based on this table.
5. Occasionally, for the sake of completeness, linear interpolation has been used, denoted †, and extrapolation based on 5-year linear trend, denoted e.
6. Data omitted from the principal dispersion calculations for the sake of sample-size consistency are denoted \*. See Appendices 3 and 4.
7. For comparisons, the following sample partitions are used in certain figures:

Group A:

(English-speaking New World plus UK): USA, CAN, AUS, UK.

Group B:

(Latin New and Old World plus UK): ARG, ITA, SPA, UK.

Group C:

(Other Old World plus UK): DEN, IRL, SWE, GER, FRA, BEL, NET, NOR, UK.

Table A2.1. International Real Wage Indices, 1830-1988 (UK=100)

	USA	CAN	AUS	ARG	DEN	IRL	UK	SWE	GER	FRA	BEL	NET	NOR	ITA	SPA
1830	111					54	100	47		68					62
1831	114					52	100	46		68					55
1832	114					52	100	43		68					54
1833	106					51	100	39		74					53
1834	122					52	100	38		73					57
1835	122					58	100	39		72					65
1836	142					56	100	44		80					70
1837	150					55	100	44		77					72
1838	147					54	100	46		78					65
1839	138					55	100	48		77					65
1840	117					54	100	46		75					62
1841	139					54	100	45		80					57
1842	142					54	100	42		72					54
1843	153					54	100	37		66	58*				51
1844	158					54	100	39		70	63*				57
1845	153					54	100	38		68	55*				50
1846	162					54	100	39		67	60*				47
1847	145					53	100	45		75	64*				45
1848	136					53	100	37		65	55*				54
1849	140					53	100	33		62	52*				51
1850	140					61	100	33	97	65	54				59
1851	146					54	100	32	85	63	56				49
1852	145					53	100	33	74	63	57				51
1853	173					68	100	40	84	75	68				61
1854	187					67	100	46	86	82	68				56
1855	189					75	100	47	82	80	64				55
1856	194					79	100	47	83	79	65				56
1857	174					65	100	44	98	76	66				62
1858	155					66	100	38	84	70	58				53
1859	155					64	100	39	83	75	61				54
1860	184					66	100	47	94	79	70				59
1861	183		229*			57	100	59	82	78	68				59
1862	157		189*			69	100	68	91	76	65				56
1863	131		158*			64	100	60	93	71	68				59
1864	121		171	77		60	100	54	98	71	73				63
1865	130		132	82		61	100	57	93	72	73				63
1866	143		157	100		70	100	47	96	75	74				57
1867	165		202	106		79	100	52	89	81	79				67
1868	164		175	100		80	100	62	88	78	78				62
1869	155		185	93		72	100	61	83	74	69				57



**Table A2.1. International Real Wage Indices, 1830–1988 (UK=100)**

	USA	CAN	AUS	ARG	DEN	IRL	UK	SWE	GER	FRA	BEL	NET	NOR	ITA	SPA
1870	167	143	187	104	52	71	100	40	84	72	72	60	44	34e	42e
1871	171	149	191	101	51	71	100	49	84	69	72	59	44	37	43e
1872	167	150	179	86	54	66	100	53	85	71	75	58	43	34	44e
1873	161	150	164	81	52	68	100	48	85	69	72	57	41	31	44e
1874	159	141	145	88	53	68	100	54	80	66	70	52	45	30	45e
1875	157	131	146	86	57	67	100	52	84	68	70	59	46	34	46e
1876	158	149	136	83	55	70	100	47	80	65	63	58	47	34	50
1877	137	149	142	68	52	62	100	53	76	64	58	55	47	34	47
1878	134	161	149	61	48	66	100	58	79	66	61	56	51	34	47
1879	130	152	148	56	57	62	100	52	74	65	59	61	44	33	45
1880	132	143	164	64	57	72	100	53	74	68	67	62	42	35	54
1881	137	138	163	80	55	72	100	48	73	69	65	62	44	37	53
1882	150	136	160	91	56	72	100	54	77	71	64	68	44	39	51
1883	151	142	163	101	57	70	100	55	78	67	64	68	50	39	52
1884	150	144	153	92	56	70	100	57	76	66	66	66	47	39	55
1885	147	146	146	71	57	68	100	58	75	66	64	67	53	38	54
1886	149	155	142	89	59	73	100	61	75	66	71	71	51	38	54
1887	148	156	166	98	61	77	100	62	77	68	66	69	54	39	56
1888	143	152	162	113	62	78	100	59	79	65	68	68	50	37	54
1889	146	159	142	99	60	80	100	58	76	65	66	64	51	38	53
1890	150	162	136	69	59	79	100	61	79	66	67	65	51	36	50
1891	149	160	151	100	57	84	100	61	77	65	67	64	53	37	55
1892	148	174	148	111	63	81	100	65	77	66	69	63	57	37	54
1893	146	165	138	120	65	90	100	68	77	65	69	69	60	37	55
1894	138	162	147	95	65	82	100	68	74	60	67	65	61	36	54
1895	143	167	153	88	69	85	100	69	74	61	68	68	60	35	51
1896	139	174	143	81	72	93	100	72	75	62	71	73	58	36	52
1897	142	172	128	88	79	90	100	75	75	64	72	72	60	37	49
1898	146	165	124	114	82	89	100	77	77	65	73	73	62	37	45
1899	146	163	131	126	82	89	100	76	80	64	75	73	63	38	44
1900	155	156	139	122	86	90	100	82	83	68	75	75	63	40	45
1901	157	159	131	115	85	90	100	86	82	69	68	71	64	40	45
1902	160	166	127	115	85	90	100	86	81	69	71	73	64	42	46
1903	164	174	129	117	89	90	100	87	83	71	73	77	66	42	46
1904	163	183	133	124	91	92	100	89	85	73	83	73	68	43	45
1905	167	174	124	110	90	92	100	88	84	75	81	76	67	44	45
1906	156	175	111	97	83	84	100	80	79	69	69	69	60	40	45
1907	158	169	115	96	87	84	100	83	82	70	73	76	59	42	44
1908	156	181	114	97	88	86	100	88	81	70	71	71	61	45	46
1909	161	185	115	96	93	86	100	90	80	71	72	74	66	47	46
1910	163	196	130	106	94	86	100	96	83	67	75	74	66	48	47
1911	159	201	132	106	100	86	100	99	85	62	71	75	64	49	49
1912	162	201	130	112	102	88	100	97	86	65	72	79	67	53	48
1913	154	199	117	98	93	83	100	89	83	60	73	74	63	50	44

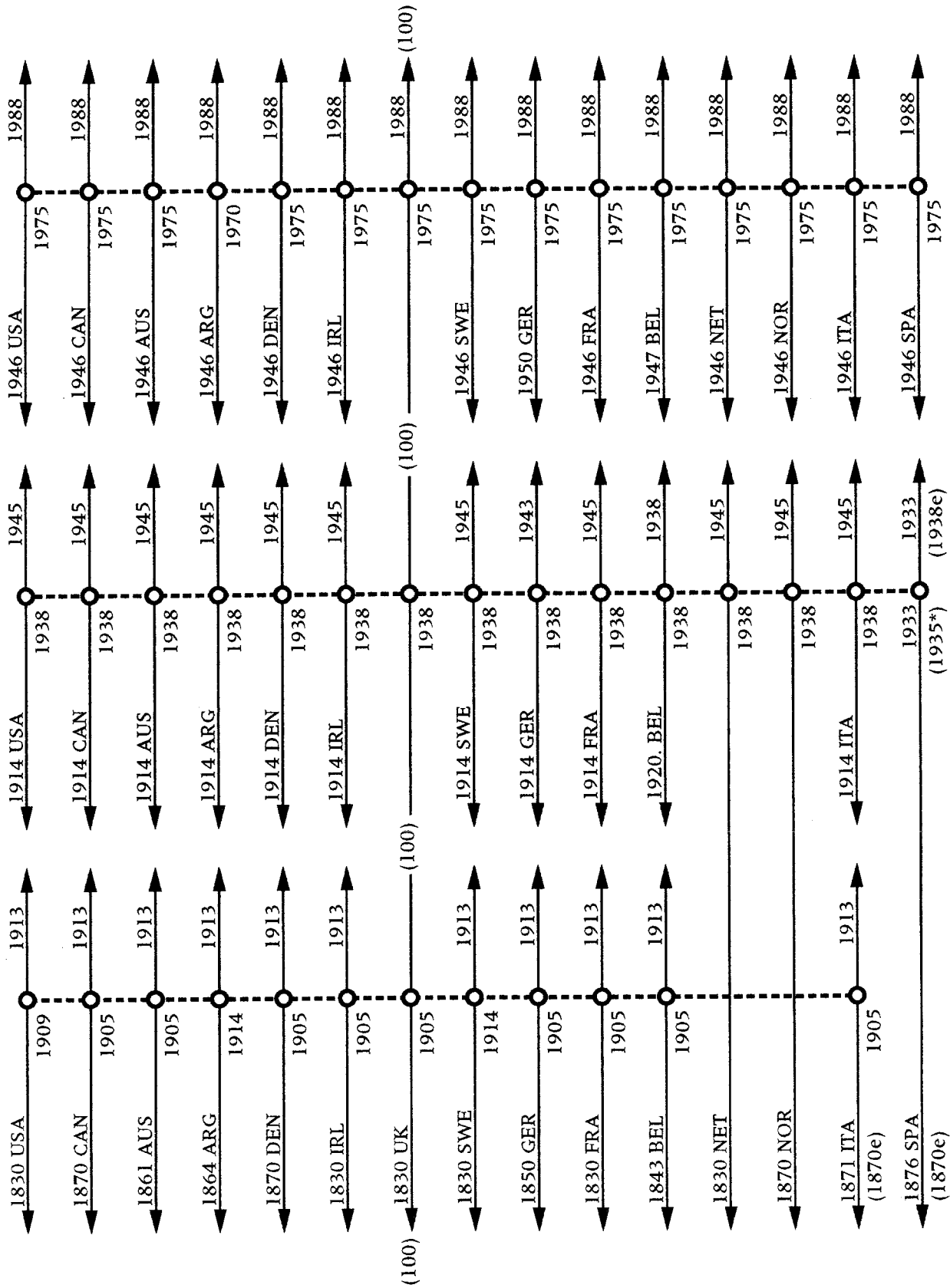
**Table A2.1. International Real Wage Indices, 1830–1988 (UK=100)**

	USA	CAN	AUS	ARG	DEN	IRL	UK	SWE	GER	FRA	BEL	NET	NOR	ITA	SPA
1914	108	161	134	87	110	100	100	95	86	93		84	76	65	50
1915	124	179	135	89	109†	104	100	101	87	93		85	75	75	56
1916	153	190	150	90	108†	98	100	107	83	88		89	69	70	57
1917	161	173	150	77	107	105	100	104	74	83		91	86	67	57
1918	150	158	127	57	106	105	100	94	67	72		89	78	56	51
1919	133	144	106	68	141	109†	100	90	66†	67		96	101	64	47
1920	124	129	104	66	144	114†	100	97	66†	71	47	90	102	66	56
1921	106	123	123	75	151	119†	100	104	66†	76	51	103	101	63	54
1922	115	138	140	96	153	123†	100	103	66†	85	68	118	103	67	62
1923	127	150	139	100	144	128†	100	107	66†	87	62†	120	105	64	63
1924	129	147	142	97	141	133	100	93	66	91	56	113	100	61	61
1925	123	137	140	101	150	117	100	93	75	91	63	111	104	60	59
1926	123	134	141	101	156	116	100	97	80	86	43	115	109	59	60
1927	124	134	141	104	150	120	100	95	78	77	41	113	99	63	58
1928	127	139	142	111	151	117	100	97	83	83	53	116	102	63	63
1929	129	139	138	109	151	116	100	102	85	87	62	120	105	46	56
1930	127	139	140	96	157	114	100	104	87	85	66	120	105	59	62
1931	126	135	133	98	157	113	100	101	85	81	67	119	101	58	56
1932	123	132	131	104	159	114	100	101	82	83	67	117	105	56	59
1933	127	128	127	94	151	115	100	97	79	85	65	113	103	56	59
1934	148	131	127	98	150	115	100	97	76	91	64	110	102	58	59e
1935	149	148	126	100	144	113	100	99	74	93	60	109	99	55	58e
1936	150	149	127	94	145	111	100	99	72	87	60	112	97	51	58e
1937	167	140	130	97	144	106	100	101	73	90	63	112	99	49	58e
1938	171	136	132	95	148	109	100	103	72	83	66	111	104	47	58e
1939	179	138	133	97	151	108	100	108	73*	81		113	106	55	
1940	184	143	132	99	135	96	100	103	71*	82		105	98	54	
1941	198	140	135	99	131	91	100	98	71*	76		99	92†	50	
1942	189	152	125	92	124	77	100	94	65*	60		86	86†	46	
1943	187	155	123	91	125	68	100	91	62*	49		80	79†	32	
1944	186	155	120	99	126	65	100	89		67		75	73	12	
1945	182	152	117	92	130	65	100	90		73		74	81	11	

Table A2.1. International Real Wage Indices, 1830–1988 (UK=100)

	USA	CAN	AUS	ARG	DEN	IRL	UK	SWE	GER	FRA	BEL	NET	NOR	ITA	SPA
1946	224	114	81	56	115	61	100	110		53		114	100	41	82*
1947	218	111	82	67	114	72	100	116		53	92*	108	106	65	71*
1948	221	112	87	84	130	79	100	129		52	91*	112	115	86	68*
1949	230	114	87	86	132	85	100	129		53	97*	106	120	89	67*
1950	230	112	85	81	123	81	100	127	74	52	97	104	117	90	61
1951	233	119	89	76	124	76	100	133	78	51	99	101	116	92	59
1952	243	126	106	70	134	91	100	147	83	58	105	103	120	94	69
1953	247	133	104	71	134	91	100	150	86	61	99	102	119	91	62
1954	237	127	99	75	130	86	100	144	84	62	95	102	114	87	58
1955	238	126	95	70	120	80	100	146	85	64	93	102	113	86	59
1956	240	129	92	72	121	82	100	148	88	66	94	102	116	84	58
1957	237	130	89	70	122	77	100	145	88	65	95	104	116	84	74
1958	239	139	91	75	127	79	100	150	90	66	96	107	116	85	67
1959	235	139	87	53	127	77	100	147	90	64	93	104	118	82	63
1960	234	147	88	55	129	81	100	148	95	65	95	107	120	82	62
1961	223	137	82	58	130	75	100	147	96	65	91	103	118	77	61
1962	231	148	85	57	137	84	100	155	104	70	96	108	125	80	58
1963	226	146	83	55	134	80	100	155	105	71	99	106	123	80	53
1964	219	143	80	59	133	81	100	156	105	71	99	111	118	83	52
1965	215	142	77	62	136	76	100	158	108	72	101	112	119	83	51
1966	221	164	79	63	145	77	100	162	112	76	107	119	125	85	56
1967	218	168	79	62	144	99	100	166	109	78	108	120	125	85	61
1968	217	168	80	56	146	101	100	169	111	85	109	120	128	84	63
1969	211	177	80	55	152	103	100	173	115	84	110	121	131	86	66
1970	195	169	77	53	147	99	100	170	116	81	109	119	120	92	66
1971	194	181	80	54	156	108	100	167	122	84	111	122	124	97	68
1972	189	180	76	47	154	98	100	170	119	83	114	121	119	96	70
1973	180	176	78	48	154	98	100	163	115	84	118	119	114	102	72
1974	173	171	86	52	157	100	100	162	118	86	123	127	121	103	83
1975	170	175	80	50	167	102	100	167	119	89	128	128	129	109	89
1976	171	183	79	33	168	105	100	176	119	91	129	126	136	112	98
1977	182	194	81	33	174	122	100	175	129	98	137	132	142	126	117
1978	174	181	75	30	165	123	100	164	124	96	132	127	134	123	119
1979	167	177	73	34	165	124	100	162	123	96	132	126	129	124	128
1980	162	181	75	38	166	128	100	158	126	99	137	125	129	124	121
1981	161	179	76	36	163	123	100	155	125	100	137	121	125	128	130
1982	158	170	77	32	159	124	100	152	121	101	133	119	121	126	128
1983	153	167	72	39	153	121	100	144	117	98	126	114	117	122	124
1984	147	161	72	45	145	116	100	141	113	95	120	108	114	118	111
1985	144	158	69	37	142	117	100	138	113	93	116	109	114	118	108
1986	139	150	63	36	138	116	100	136	113	90	111	106	113	112	102
1987	132	142	59	33	140	115	100	134	114	87	106	104	116	110	99
1988	126	139	56	30	138	117	100	133	113	85	105	101	112	108	99

Figure A2. International Real Wage Index Construction, Schematic



NOTES: e = by extrapolation. (100) = UK base level.  
 \* = 1935 proxies for 1933.