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Real wage productivity elasticity across advanced economies, 1963–1996

Abstract: *The question of a constant wage share (Bowley's Law) has long been both an empirical and theoretical point of contention between rival theories of macroeconomic (functional) distribution. This paper explores some of these theoretical debates and issues related to Bowley's Law in contextualizing a simple empirical test of the real wage productivity elasticity of a cross section of 15 advanced economies across the 34-year period from 1963 to 1996. The evidence supports the hypothesis of a structural break in functional distribution on or around 1979 when real wages exhibit productivity inelasticity and the share of wages in national income starts a downward trajectory almost across the board. This is especially striking given the wide variety of labor market institutions and conditions across the 15 advanced economies. The paper concludes by posing the question that in light of the evidence presented perhaps a possible rethinking is in order (especially vis-à-vis possible national union strategies) regarding Marx's predictions on the fate of the working class as capitalism progresses.*

Key words: Bowley's Law, functional income distribution, labor market institutions and conditions, wage share.

On August 28, 2006, the *New York Times*' Steve Greenhouse and David Leonhardt in a front-page article declared that, for the U.S. economy, "real wages fail to match a rise in productivity" and that "workers' share of the economy hits record low, as corporate profits skyrocket" (pp. A1, A13). Greenhouse and Leonhardt report long-run data on the U.S. wage share from 1947 to the first quarter of 2006 using data compiled from the U.S. Department of Commerce (wage share out of gross domestic

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product [GDP]), the National Bureau of Economic Research (recessions), the Economic Policy Institute (hourly wages), and the Bureau of Labor Statistics (productivity) and conclude that in 2006, “wages are at their lowest share on record” at 45.3 percent (*ibid.*, p. A13). Yet according to Reynolds et al., economists today do not “focus . . . much attention on changes in labor’s share of income” (1998, p. 157). Fortunately for us, the economics reporters for the *New York Times* do, and deem such drastic erosion of the wage share as front-page news, which we concur in fact it is. In this paper, we consider the evidence in changes in the wage share for 15 advanced capitalist economies. What the data show is quite striking: despite the vast differences across countries vis-à-vis labor market institutions, almost across the board the share of wages in national income fell significantly.

Data

Recent developments in terms of data allow us to consider empirical patterns of international macroeconomic primary distribution of income by functional type.¹ In this paper, we analyze the empirical patterns of

¹ The great classical economists of the nineteenth century placed a great deal of emphasis on the functional distribution of income, although they did not call it by that name. The earliest systematic treatment of the role of distributed revenues is given by the physiocrats and especially Quesnay’s *Tableau Economique* (1954). Smith, in the *Wealth of Nations* (1976), also puts great emphasis on the distribution of the net product (value added) and in fact muddled two separate theoretical approaches to it when he compared the “early and rude state” to the “adding-up” theory in capitalist production proper. Indeed, it was this confusion in Smith that caught the interest and respectful ire of Ricardo, who went as far as to argue in the preface of his *Principles of Political Economy* that functional distribution was “the principal problem in political economy” (1951, p. 5). Post-Ricardians, those both socialistically inclined and those not (most notably John Stuart Mill), also placed great emphasis on income distribution. Marx, in his critique of extant political economy, also placed great emphasis on income distribution and, in fact, one could argue that volume I of *Capital* was less about the concept of *value* and more about the *distribution* of the (net) value as expressed through the rate of exploitation. It is along these lines that—much to the chagrin of some Marxists—Robinson, in the preface of the second edition of *An Essay on Marxian Economics* (1966, p. vii) strongly identified Marx’s rate of exploitation with Ricardo’s theory of distribution. Sraffa’s inquiries and contributions can easily be dovetailed here, as Robinson in numerous places does emphatically. It should also be mentioned the significance of functional distribution as regards Cambridge growth theories around the Cambridge Equation, an equation that relates the profit rate (distribution) with the growth rate of capital stock (growth). The literature around this growth–distribution nexus is vast; the seminal article is found in Pasinetti (1962); on this, see Harcourt (1972) as well. Early neoclassicals were also very interested in functional income distribution. This is especially evident in the “residual claimant” theory of profits of Stanley Jevons. Wesley Mitchell in his *Lecture Notes on Types*

such distribution for a group of 15 advanced economies over a span of 34 years (1963–96).² The database employed in this study is taken from the Extended Penn World Tables (EPWT2.1). This database is a derivative (“extension”) of the Penn World Tables (PWT, version 6.1) developed by Summers et al. (2002; the extensions were originally made by Adalmir Marquetti).³ As is well known, the original PWT data consist of macroeconomic categories and quantities measured in terms of commensurate real units of account based in international purchasing power parity.⁴

With the development of the PWT, researchers have been able to exploit an accessible and relatively thorough empirical account of economic behavior at a very abstract international macroeconomic level. The original PWT database has been used extensively in numerous studies

of *Economic Theory* (1967) has a fascinating discussion on the Jevonian residual claimant theory and argues (correctly, in our view) that this influenced the marginal productivity theory of distribution developed by J.B. Clark. Clark’s theory—augmented with developments by J.R. Hicks (1932; 1939)—has remained at the essential core of neoclassical treatments of functional distribution, although, as we argue below, functional distribution fell into conceptual disrepute among the neoclassicals as the human capital theory began its rise to dominance. From a history of thought perspective, it is very interesting that in his later incarnation as John, Hicks criticizes J.R.’s mechanical emphasis on the Clarkian parable, especially as regards the elasticity of substitution between capital and labor. On this, see the second edition of *The Theory of Wages* (Hicks, 1963, section III); also see Pasinetti and Mariutti (2004). It is interesting to note that Ferguson, in his 1969 book on production and distribution, refers readers to the 1932 edition of *The Theory of Wages*, thus, in our opinion, minimizing the changes in thinking that Hicks had undergone by the time of the second edition of that book.

² The 15 countries include Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Denmark (DNK), Finland (FIN), France (FRA), Ireland (IRL), Italy (ITA), Japan (JPN), Luxembourg (LUX), the Netherlands (NLD), Spain (ESP), the United Kingdom (GBR), and the United States (USA).

³ The PWT version 6.1 was released in October 2002 (Summers et al., 2002). In August 2002, Marquetti (2002) updated the EPWT. Version 6.1 of the PWT uses the 1996 international dollar as does EPWT version 2.0. EPWT 2.0 was originally an extension of PWT 6.0, and EPWT 2.1 extends data in PWT 6.1. In the empirical portion, we use data from EPWT 2.1. The data set can be accessed at <http://cepa.newschool.edu>. Foley and Michl (1999) make extensive use of this data set.

⁴ The PWT initially developed out of the United Nations’ System of National Accounts, which were extended to incorporate “interspatial comparisons” as well as “intertemporal comparisons” within and across countries (Summers and Heston, 1991, p. 327). The underpinning benchmark year data for the PWT come from the United Nations’ International Comparison Program, a massive project that estimated price parities in participating countries “for hundreds of identically specified goods and services.” These price parities in turn were “used to convert the countries’ national currency expenditures to a common currency unit, thus making real quantity comparisons across countries possible” (ibid., p. 329).

on economic growth, particularly those related to recent neoclassical developments in endogenous growth theory as well as empirical studies on the convergence phenomenon.⁵ One of the major “extensions” of the EPWT is the inclusion of wage share data for a large number of the countries. Marquetti notes that the wage share measure in the EPWT is constructed as “the share of employee compensation in the Gross Domestic Product . . . calculated in current prices of the local currency” (Marquetti, 1997, p. 3).⁶ This ratio was then applied to the PWT database to obtain corresponding data on real wages and gross profits. This represents an important contribution to the data and accordingly affords us the opportunity to consider questions regarding international primary distribution at the level of abstraction already used in recent empirical work on “long-run” theories of growth. This is especially of interest given that much of the empirics in this recent work locate the distribution problem exclusively in terms of return rates to human capital, which of course is an application of personal or size distribution of earnings to the international arena. By focusing on patterns in the primary distribution, the present study is intended to round out and expand the empirical research regarding international income distribution.⁷

⁵ See Alesina and Rodrik (1994), Baumol (1994), Blomström et al. (1994), Fagerberg (1994), and Mankiw et al. (1992).

⁶ It should be noted that the measure of employee compensation used does not include self-employment revenues. Self-employment in general has always caused problems with respect to national income accounting, which has translated into measurement problems with respect to the wage share. Indeed, many studies differentiate between different forms of the wage share. One hard and fast distinction is provided in Hein and Krämer (1998) where they distinguish between the wage share (net self-employment) and the labor share (inclusive of self-employment). In our study, we only focus on the former (net self-employment) measure. Self-employment is a necessary category for studies on distribution of aggregate wealth, and so on, but no such task is endeavored in the present study. Our concern here is strictly with the capitalistically-generated portion of worker compensation (as approximated by the real wage) and the relationship this has to total labor productivity. It is also noted that self-employment has greater significance in developing countries as compared to developed (one important exception is that of Japan). This is one reason we focus primarily on the performance on the 15 high-income countries in this essay.

⁷ There is a very interesting history in the development of the theory of functional distribution. Beginning in the 1960s, neoclassical economists became more and more critical of functional distribution of income as a concept and turned their attention toward personal or size distribution of earnings. The development of human capital theory greatly enhanced this endeavor, as noted by Nell: “The ‘human capital’ approach is precisely an application of neoclassical thinking to personal distribution” (Ferguson and Nell, 1973, p. 445). We are of the opinion that the debates regarding

Some empirical evidence

Let us initially explore the empirical patterns in functional distribution through “stylized visualization” of the broad movements among 15 high-income (HI) countries over the years 1963 (t_0) to 1996 (t_n) using data from EPWT 2.1. Consider first the relationship between the averaged filtered⁸ wage share (ω_{HP_15}), profit rate (v_{HP_15}), and output–capital ratio (ρ_{HP_15}). Figure 1 shows the relationship between the wage share measured on the horizontal axis and the profit rate measured on the vertical axis.

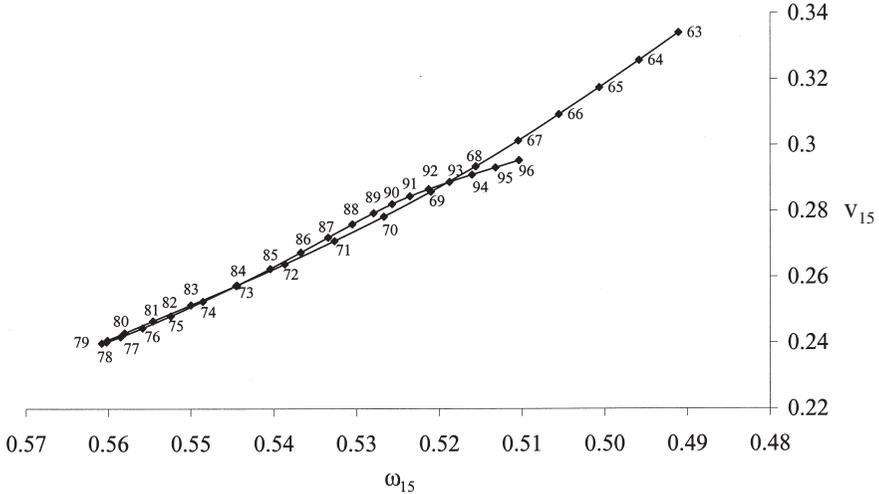
Figure 1 shows remarkable inverse linearity between the wage share and the rate of profit. From 1963 until 1979, the 15 high-income countries experienced a general rise in the share of wages and a general fall in the rate of profit. After 1979, the trend reverses as the share of wages falls and the rate of profit rises. Here we can already discern that 1979 represents some breakpoint year (t_*) in the data. These movements in international functional distribution data can also be expressed in terms of the wage–profit frontier, or distribution schedule,⁹ constructed by plotting

constancy/stability of the aggregate shares (see below) played no small role in the subsequent neoclassical turn toward focus on earnings size. In the early phases of the neoclassical transition of emphasis from function to size, many authors completely dismissed functional type as providing any relevance whatsoever to distribution theory proper. On this, see especially Lebergott (1964); also note that Ferguson’s (posthumously published) review of Bronfenbrenner (1971) and Pen (1971) makes mention of the relative decreased importance given to functional distribution in both books (Ferguson and Nell, 1973, p. 440). Fortunately, this extreme approach has tapered off somewhat and functional macroeconomic distribution is once again becoming a respectable realm of inquiry. It should be noted, however, that Sattinger, editor of a comprehensive three-volume set of readings on income distribution, seems compelled in the introduction to have to make the case for functional distribution as a conceptual category *as such* (see Sattinger, 2001, pp. xlvii–xlviii). Interestingly, one of the last exchanges on the nature of functional distribution at the level of theory appeared in the pages of early issues of the *Journal of Post Keynesian Economics (JPKE)*. Sydney Weintraub forwarded an “eclectic” theory of distributive shares in 1981 that much of the discussion in the ensuing years in *JPKE* on the wage share made reference. The tribute to Weintraub that appears in 1985, volume 7, is a good starting point for references to this debate; see there especially the article by Rothschild (Rothschild, 1985).

⁸ The “averaged filtered” visualizations in this section involve averaging economic variables for the 15 countries and then filtering these averages with the Hodrick–Prescott filter. In doing so, we are able to discern some interesting empirical patterns in these variables. See Cleveland (1993) for a discussion of empirical analysis involving data visualizations.

⁹ Foley and Michl (1999) extensively develop the growth-distribution schedule with a focus on empirical applicability in a cross-country context.

Figure 1 Cross section of wage share and profit rates for 15 high-income countries (HP filter)

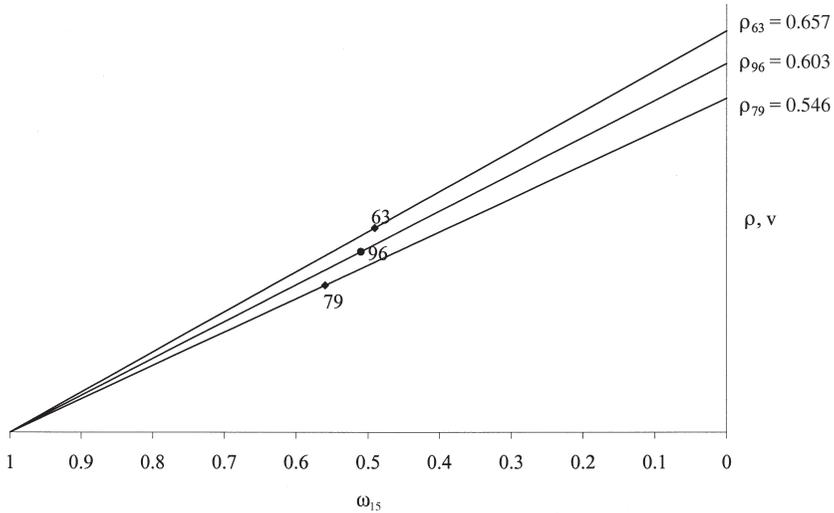


the various (potential) values of the wage share against the corresponding profit rate, the maximum value of which is set equal to the output capital ratio (ρ). Figure 2 shows the distribution schedules for the initial year 1963 (t_0), the breakpoint year 1979 (t_*), and the final year 1996 (t_n). As with Figure 1, the horizontal axis measures values of the wage share, in this case with the intercept occurring at a wage share of unity. The vertical axis represents values of the output–capita ratio, with decreases (increases) shown as downward (upward) rotations. These rotating shifts reflect changes in “capital productivity.” The movements in the profit rate as per Figure 1 are shown on each distribution schedule and can be seen as weaving through the rotating shifts of the schedules.

In Figure 2, we see that the averaged wage–profit relations for 15 high-income countries in the latter portion of the sample revert back toward those levels achieved in the mid-1960s. In 1979, there seems to begin a transformation of real wage–productivity relations as the wage share falls. Again, 1979 stands out as the breakpoint year in macroeconomic distribution.¹⁰

¹⁰ Slaughter and Lawrence also take 1979 as the watershed year as regards changes in functional income distribution, although their study is limited to the case of the United States: “We focus on the period since 1979, because 1979 is when slow average wage growth and rising relative wage dispersion—the two phenomena we are interested in—became apparent” (1993, p. 167).

Figure 2 Distribution schedules for 15 high-income countries (HP filter)



Consider now only movements in the wage share. A simple elasticity measure can be used to capture the real wage–productivity relation across countries and over time. Considered here is the percent change in wage growth with respect to the percent change in labor productivity growth or simply the *productivity elasticity of real wages* (η_{ω}) given by the ratio of the percent change in (log) real wages to the percent change in (log) labor productivity. The wage share and productivity elasticity in country i at time t are defined as follows:

$$\omega_{it} = \frac{(w_{it})}{(x_{it})} = \text{wage share ("omega")} \quad (1)$$

$$\eta_{\omega_{it}} = \frac{\partial \ln(w_{it})}{\partial \ln(x_{it})} = \text{productivity elasticity ("eta")}, \quad (2)$$

where real wages per worker = $w = W/N = \text{wage bill} \div \text{number of workers}$ and productivity per worker = $x = X/N = \text{total GDP} \div \text{number of workers}$. Real wages are either productivity elastic, productivity inelastic, or unit productivity elastic. With productivity elastic real wages, changes in real wages are greater than those of productivity and vice versa for productivity inelastic real wages. Given positive rates of growth in both real wages and productivity, the following values of eta hold:

$\eta_{it} < 1$ = productivity inelastic real wages

$\eta_{it} > 1$ = productivity elastic real wages

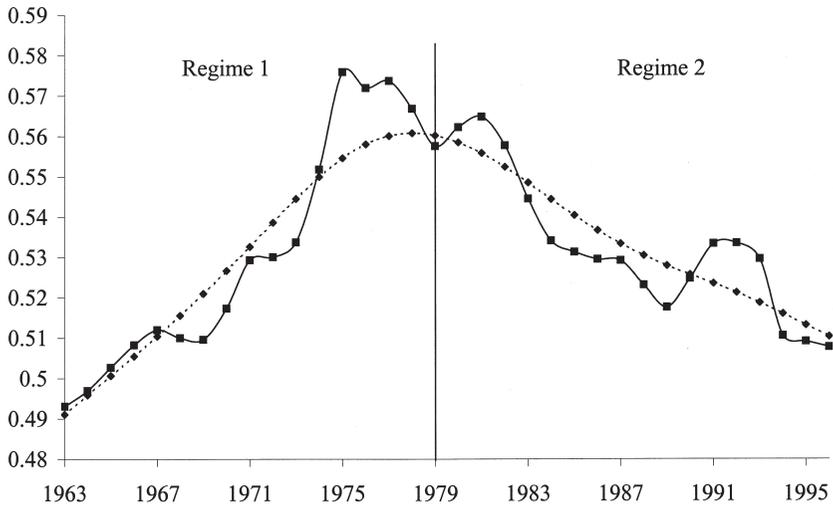
$\eta_{it} = 1$ = unitary productivity elastic real wages = Bowley's Law.

Note that strict constancy of the wage share (Bowley's Law)¹¹ requires unitary elastic productivity in the real wage. Productivity elastic real wages are associated with a rise in the wage share, and productivity in-

¹¹ Macroeconomic distribution as a conceptual category has long been a major area of contention between rival theories. Perhaps the most well-known debate along these lines had to do with the alleged "constancy" of distributive shares both within and across countries. As early as 1927, Bowley and Stamps threw into the fray the empirical "evidence" of a (strict) constancy in the wage share. For this reason, the notion of a constant wage share has often been referred to as "Bowley's Law." In truth, theirs was a comparative static analysis of British national income in two years separated by wide upheaval and socioeconomic turmoil—1911 and 1924. What they found remarkable was that after all those years of upheaval, the share of wages in national income remained almost constant (43 percent in 1911 compared to 44 percent in 1924; Bowley and Stamps, 1927, p. 50). Subsequent studies published in the 1930s "showed this stability as maintained through the ensuing years, not in the UK only but also in the USA" (Phelps-Brown, 1968, p. 2). From this starting point until the early 1970s, a vast literature rose that heavily and often hotly debated this question. The key point of contention behind this debate was not whether the wage share exhibited relative inertia—each side admitted this to be empirically what the evidence often showed (actually, there was, early on, vast disagreement within the neoclassical camp on the stability question, with Reder, 1959, Salter, 1960, and Solow, 1958, accepting stability, and Kravis, 1959, and Kuznets, 1959, vehemently rejecting it. Ferguson and Phouts, 1962, attempt to reconcile this difference from the perspective of neoclassical theory). The contentious point, especially between the neoclassicals and the neo-Keynesians, regarded the *importance* of this "fact" vis-à-vis the development of macroeconomic theory. The neo-Keynesians argued that the evidence of a constant wage share required a special theory of distribution. This is especially evident in Kaldor:

In fact no hypothesis as regards the forces determining distributive shares could be intellectually satisfying unless it succeeded in accounting for the relative stability of these shares in the advanced capitalist economies over the last 100 years or so, despite the phenomenal changes in the techniques of production, in accumulation of capital relative to labour and in real income per head. (Kaldor, 1955–56, pp. 83–84, quoted in Targetti and Thirwall, 1989, p. 202; see also Kaldor and Mirrlees, 1962)

Solow provides one of the earliest effective critiques of this neo-Keynesian contention. He argues that this "powerful macroeconomic fact" was in many ways an "optical illusion"—that macroeconomic constancy of the wage share is a direct result of "unruly microeconomic markets" (1958). The basic thrust of Solow's critique was simply that relative inertia of the wage share may in fact be evidenced empirically but that no "special" theory need be constructed that had "constancy" as one of its logical conclusions. This critique, initially advanced by Solow, became the mainstay perspective for subsequent neoclassical assaults on neo-Keynesian distribution theory. The concept of the elasticity of substitution played a fundamental role in these debates. Kaldor, in a paper presented at the 1958 Corfu Conference on Capital Theory (proceedings published in Lutz and Hague, 1961), argues that for neoclassical theory, a

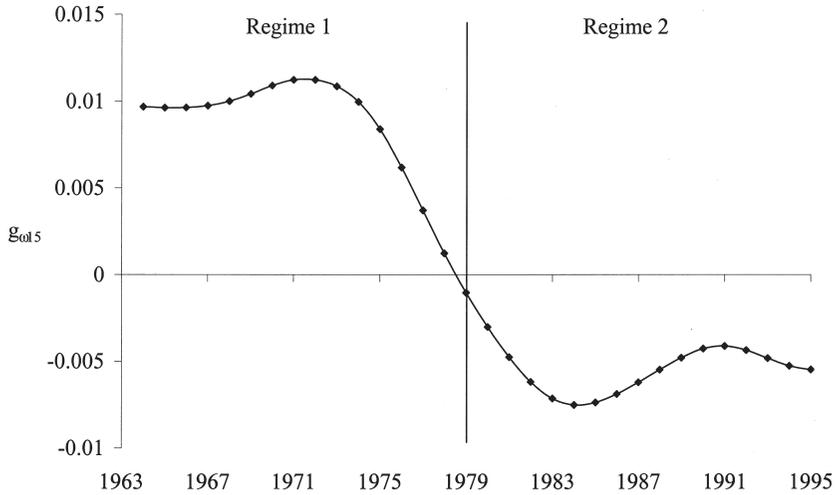
Figure 3 Raw and HP-filtered wage share for 15 high-income countries

elastic real wages are associated with a fall. Figure 3 shows the trajectory of the averaged filtered wage share for 15 high-income countries.

The 1979 breakpoint year clearly shows the wage share declining thereafter.¹² Following the work of Phelps-Brown (1957), we explore whether this may suggest, in the late 1970s and early 1980s, a regime change occurred in international primary distribution, one associated with a decrease in the wage share in the latter part of the sample period as wage earners in many countries experienced erosion in their command of output produced. Let us call the earlier part of the sample (1963–79) regime 1 (R1) and the latter part (1979–95) regime 2 (R2) and next consider the growth path for the averaged wage share, shown in Figure 4.

constant wage share is possible only if the elasticity of substitution is equal to unity. Given the empirical evidence that the elasticity of substitution was not unity coupled with the evidence that the wage share was constant, the neoclassical account of the latter (argues Kaldor) is logically flawed. Using the basic premise advanced by Solow, Bronfenbrenner (1960) demonstrates that a constant wage share is possible for changes in the elasticity of substitution within a “plausible range.” Thus, argues Bronfenbrenner corroborating Solow, there is no need for a “special” theory of income distribution. Ferguson (1969, p. 239) makes a great deal out of this; also see Davidson (1959) for an early account of the nature of these debates and issues.

¹² It is interesting to note that the trend in the wage share shows the longer-run movements and is not tied to the business cycle. The movement of the wage share in relation to the business cycle is not, however, explored in the present paper.

Figure 4 Growth rate in wage share for 15 high-income countries (HP filter)

Such a change in character requires that we look further into the behavior of its component parts. Table 1 shows the growth rates of labor productivity and real wages and the resulting productivity elasticity across selected periods.

Table 1 further shows that the character of functional income distribution undergoes a transformation in the latter regime where the growth rate in real wages systematically lags behind that of labor productivity. This is shown in Figure 5.

Figure 5 shows the trajectory of changes in real wages and labor productivity through filtered data. Clearly, in regime 2, the growth of labor productivity is greater than that of real wages. This relationship can be seen when the above growth rates are expressed as a scatterplot graph as in Figure 6.

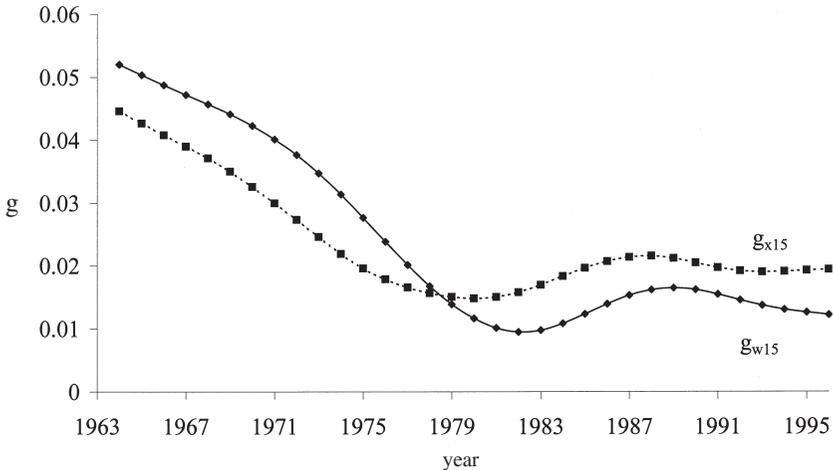
In Figures 5 and 6 we clearly discern a change in the character of functional distribution.¹³ In the early regime, real wages rose faster than productivity, and this represents somewhat of a golden age for labor, at least in terms of primary distribution. All of this begins to erode once

¹³ The cyclical character of the scatterplot in the latter period is very interesting, especially in light of the relatively secular character of the earlier period. This, however, is not explored in this paper in that our task is the much more simple one of identifying broad patterns.

Table 1
Average growth rates in labor productivity and real wages and the corresponding productivity elasticity

	Regime 1 (1963–1979)			Regime 2 (1980–1996)		
	1963– 1967	1968– 1972	1973– 1979	1980– 1984	1985– 1989	1990– 1996
Raw data						
$g_{(x)AVE}$ (percent)	3.722	3.567	1.374	1.094	3.301	1.453
$g_{(w)AVE}$ (percent)	4.637	4.357	2.074	-0.194	2.632	0.937
η_w	1.246	1.222	1.510	-0.177	0.797	0.645

Figure 5 Growth rates in labor productivity (x) and real wages (w) for 15 high-income countries (HP filter)

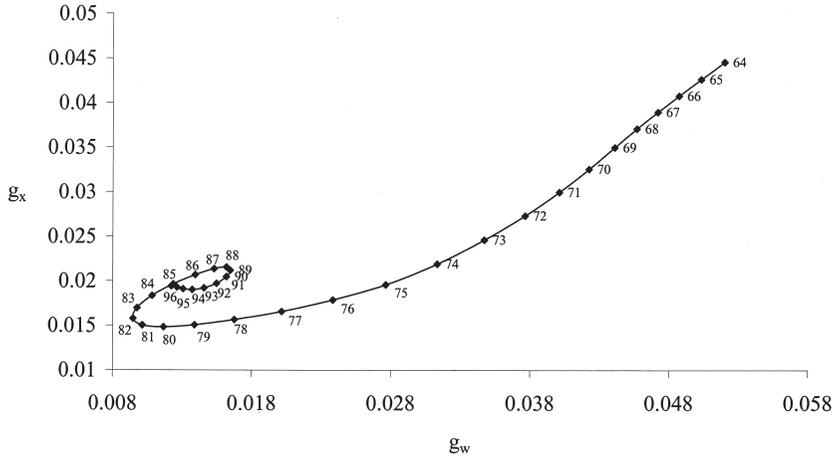


we cross into the second distributive regime. Here real wages rise more slowly than labor productivity, and in some cases absolute decline is experienced. The relative position of wage earners in the new economy is certainly more precarious in terms of distributional relations.

A simple test for structural break

We estimate the productivity elasticity using the following simple regression model:

$$\ln(w_{it}) = \beta_0 + \beta_1 \ln(x_{it}) + \beta_2 (trend_t) + \varepsilon_{it} \tag{3}$$

Figure 6 Scatter of growth rates in labor productivity and real wages for 15 high-income countries (HP filter)

Our estimated Equation (3) is expressed in constant elasticity form, hence the parameter β_1 is the estimate for productivity elasticity of real wages.¹⁴ The coefficients from the separate regressions are given in Table 2.

With the exception of Italy and Luxembourg, the elasticity coefficients are significant and positive. Using a Wald test, Table 3 reports the statistical significance of Bowley's Law such that the null hypothesis is a productivity elasticity of unity ($H_0: \beta_1 = 1$). Also reported is the null hypothesis of no relation between real wages and labor productivity ($H_0: \beta_1 = 0$).

From Table 3, we reject the null hypothesis of unitary productivity elasticity for the pooled data and eight of the 15 high-income countries. We cannot reject the null hypothesis of unitary productivity elasticity (Bowley's Law) for seven of the 15 high-income countries. The null hypothesis of no relation between real wages and labor productivity is rejected in all pooled data and all but two of the countries. We conclude that Bowley's Law remains an important stylized fact in macroeconomic distribution theories, one that has empirical foundation for almost half of

¹⁴ Note that the data exhibit a high degree of serial correlation, something that is to be expected especially given the two variables chosen. It is further noted that the above empirical test is a simple linear regression model in only two variables, whereas the data evidence significant nonlinearities. Nonlinear regression techniques would accordingly be more appropriate in fitting this data. The results reported above are accordingly the best linear estimators for the simple regressions used to fit the data.

Table 2
Coefficient values (t-statistics under coefficient values)

Country	β_0	β_1 (x61)	β_2 (trend)	AR(1) = ρ	R^2	Durbin-Watson
Pool15HI	3.638044	0.667645	-0.014759	-0.01476	0.993766	1.729068
	6.742514	16.47036	-2.506922	-2.50692		
Australia	4.629728	0.501214	-0.000488	0.768151	0.934959	1.977691
	1.876216	2.09327	-0.123449	8.48126		
Austria	5.483107	0.416217	0.005521	0.913722	0.997079	1.748143
	3.515457	2.723129	0.675602	20.92108		
Belgium	3.325435	0.673355	-0.010042	0.942472	0.993081	1.644214
	1.683868	3.499491	-0.487742	17.23698		
Canada	3.900126	0.593764	-0.004748	0.92496	0.988826	1.467707
	3.730055	5.739848	-0.390718	11.66127		
Denmark	3.343281	0.619826	0.002764	0.793565	0.986907	2.061814
	2.882585	5.446838	1.071732	10.49756		
Finland	0.988273	0.855486	-0.003439	0.885023	0.98761	1.230997
	0.56514	4.77926	-0.31214	8.803975		
France	1.082825	0.875137	-0.008565	0.951543	0.99618	1.723082
	0.557689	4.982958	-0.476383	17.15692		
Ireland	3.337622	0.632634	-0.004275	0.924574	0.991583	1.593024
	1.763521	2.926857	-0.193099	12.03356		
Italy	5.550327	0.441252	-0.008335	0.929991	0.98552	1.651808

(continues)

Table 2
(Continued)

Country	β_0	β_1 (x61)	β_2 (trend)	AR(1) = ρ	R^2	Durbin– Watson
Japan	2.017208 7.91375 1.469617	1.775644 0.365248 2.672858	-0.4409 -0.022714 -0.32026	16.58801 0.969592 25.19383	0.998646	1.398447
Luxembourg	7.680977 3.675134	0.199932 0.98069	0.020606 2.756103	0.812541 7.432116	0.973951	1.671714
Netherlands	-0.512245 -0.416678	1.003281 8.283081	-0.005988 -1.75616	0.81006 8.875272	0.993669	1.876477
Spain	-0.933412 -0.671559	1.046703 7.788478	-0.011232 -1.619694	0.904996 13.03414	0.991324	1.600975
United Kingdom	3.65338 2.151169	0.593591 3.492377	0.00083 0.205978	0.834335 8.26789	0.980952	1.263728
United States	1.729183 1.241375	0.789632 5.91644	0.001185 0.431538	0.762274 6.540339	0.988447	2.382634

Table 3
Statistical significance of restrictions on productivity elasticity coefficient

	$H_0 : \beta_1 = 1$ (<i>F</i> -statistic)	Probability	$H_0 : \beta_1 = 0$ (<i>F</i> -statistic)	Probability
Pool15HI	67.22307	0.000000	271.2727	0.000000
Australia	4.339442	0.046164	4.381781	0.045183
Austria	14.5881	0.000652	7.41543	0.010833
Belgium	2.881864*	0.10029	12.24644	0.001526
Canada	15.42168	0.000488	32.94585	0.000003
Denmark	11.16125	0.00231	29.66804	0.000007
Finland	0.6518*	0.426043	22.84132	0.000047
France	0.505467*	0.482787	24.82987	0.000027
Ireland	2.888651*	0.099909	8.566491	0.006595
Italy	5.055563	0.032316	3.152913*	0.086288
Japan	21.57659	0.000068	7.144169	0.012216
Luxembourg	15.40106	0.000491	0.961753*	0.334857
Netherlands	0.000734*	0.978577	68.60942	0.000000
Spain	0.120767*	0.730714	60.66039	0.000000
United Kingdom	5.717357	0.023508	12.1967	0.001555
United States	2.48445*	0.125824	35.00426	0.000002

* Indicates that the estimate is not statistically significant.

the high-income countries in our study. However, this empirical foundation should not be taken as a literal truism, valid at all points in time, as often is the case with the story behind the neoclassical Cobb–Douglas aggregate production function.

Our concern in developing Equation (3) is to consider whether we can locate structural breaks in primary distribution. Shifts in distributive regimes will be evidenced by qualitative changes in the character of η across time. In Table 2, the only country that yields a significant time trend is Luxembourg. This is an indication that supports the thesis of a structural break in the series of all but one country. Our method of further determining structural breaks in distribution involved simple Chow tests on the estimated equations for individual countries. The results of the Chow test are reported below.

From Table 4, we see that the structural breaks are statistically significant. Note that of the 15 high-income countries, only one (Finland) exhibits two structural breaks, while the remaining 14 exhibit only one. High-income countries experience structural change from 1973 through 1981, which is around the time of the productivity slowdown. The mean value shift year is 1979.

Table 4
Results of test for structural change

Estimated equation: $\ln(w_{it}) = \beta_1 + \beta_2 \ln(x_{it}) + \beta_3 \text{Trend}_t + \varepsilon_{it}$

$k = 4; N + M = 34$	$(N + M) - 2k = 26$	F4.26 = 2.76 (5 percent significance)	
		Chow test (years) Breakpoint year 1	Chow test (years) Breakpoint year 2
High income			F-statistic
Australia	1978		3.757373
Austria	1978		5.049398
Belgium	1976		2.832972
Canada	1985		3.660683
Denmark	1975		3.779985
Finland	1978	1991	3.83382
France	1980		4.979505
Ireland	1981		5.019256
Italy	1979		13.99178
Japan	1976		7.872962
Luxembourg	1978		5.102247
Netherlands	1984		4.56298
Spain	1980		5.580671
United Kingdom	1976		3.742873
United States	1979		4.356479

Empirical evidence on labor market conditions and institutions

In this section, we consider measures of labor market institutions and conditions. For the former, we construct union strength data for a group of high-income countries. The 15 high-income countries we are looking at exclude Luxembourg and include Sweden.¹⁵ In some series, we exclude Spain, and accordingly, we denote that group as 14HI. As of this writing, we have unemployment data for eight of the high-income countries (Australia, Canada, France, Italy, Japan, Netherlands, United Kingdom, and United States), which we denote 8HI.

We begin with the criteria of worker strength. The determination of what constitutes “worker strength” is a matter of debate within the industrial relations and labor economics literatures. The uncertainty of what it means to have “strength” is perhaps related to the uneasy nature of the compilation of comparative data on union density and other variables.

¹⁵ The 15 high-income countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Ireland, Italy, Japan, the Netherlands, Spain, Sweden, the United Kingdom, and the United States.

Rigby et al. (2004) identify four indicators of worker strength—union density, role of representative bodies, bargaining influence, and industrial conflict. Out of these four indicators, we present data for only union density (UD).

Union density data

We have two measures of union density, Organization for Economic Cooperation and Development (OECD) data and a compilation of data from the International Labour Organization (ILO), European Industrial Relations Observatory (EIRO), and Goddard (2004).¹⁶ The OECD density measure (UD_{OECD}) is more complete and is constructed from the *OECD Employment Outlook 2003*. It is derived as union membership (UM_{OECD}) divided by total employment (N_{OECD}):

$$UD_{OECD} = \frac{UM_{OECD}}{N_{OECD}}.$$

This is not a full panel, but we have a relatively good sense of density for the years 1963 through 2002. Table 5 shows this data.

Union density as an international phenomenon declined rapidly after 1980. We associate this decline in union density with the distributional regime change of 1979 and the resulting volatility in international income distribution associated therein. This is seen when we consider the coefficient of variation (standard deviation divided by mean) of union density for the cross section over the years as in Figure 7 and the scatter of the growth rate in union density against some initial level as in Figures 8 and 9.

Even though the average trend in union density was decreasing for the group of countries in the post-1979 era, the actual patterns per country were becoming increasingly dissimilar, a sign we take as an indication of the chaotic retrenchment of capital over labor in this latter period.

Unemployment data

We now consider the role of labor market conditions over the time period. A more classical model of distributive shares is one that allows for sociological forces to play an important role in determination of the

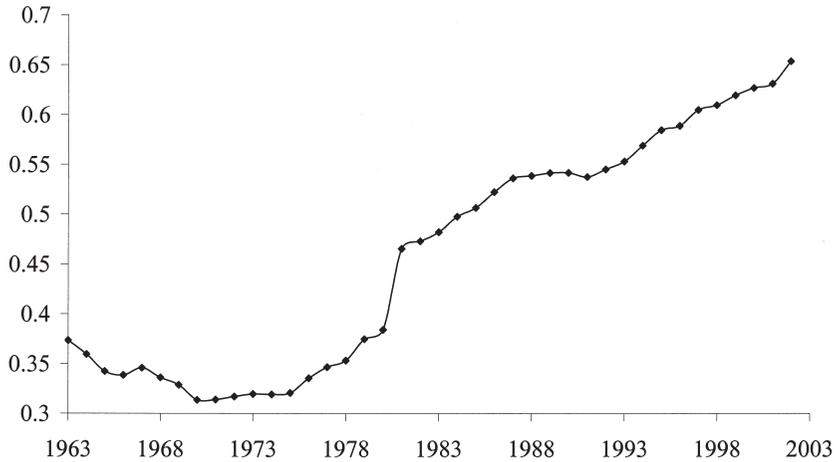
¹⁶ The latter compilation has only benchmark years.

Table 5
Union density for selected years

	1963	1971	1975	1980	1985	1990	1995	2000	2002
Australia	n/a	0.454	0.501	0.499	0.500	0.465	0.353	0.246	0.229
Austria	n/a	0.619	0.590	0.567	0.516	0.469	0.411	0.365	n/a
Belgium	0.390	0.434	0.518	0.541	0.524	0.539	0.557	0.556	n/a
Canada	0.276	0.330	0.363	0.349	0.354	0.344	0.338	0.309	0.300
Denmark	n/a	0.603	0.652	0.771	0.793	0.756	0.775	0.763	0.738
Finland	0.375	0.562	0.653	0.694	0.691	0.723	0.792	0.762	n/a
France	0.201	0.216	0.222	0.183	0.136	0.101	0.098	0.097	n/a
Ireland	n/a	0.532	0.553	0.572	0.541	0.511	0.471	0.378	n/a
Italy	0.261	0.397	0.480	0.496	0.425	0.388	0.381	0.349	0.340
Japan	0.350	0.346	0.345	0.311	0.288	0.254	0.240	0.215	0.203
Netherlands	n/a	0.362	0.378	0.353	0.287	0.255	0.257	0.232	0.221
Spain	n/a	n/a	n/a	n/a	0.089	0.110	0.163	0.139	n/a
Sweden	0.661	0.701	0.745	0.780	0.813	0.815	0.866	0.803	0.780
United Kingdom	0.403	0.453	0.483	0.507	0.462	0.393	0.329	0.312	0.304
United States	0.285	0.269	0.253	0.221	0.174	0.153	0.142	0.129	0.125
AVE_15	0.356	0.448	0.481	0.489	0.440	0.418	0.412	0.377	0.360

Source: *OECD Employment Outlook 2003*.

Note: n/a = not applicable.

Figure 7 Sigma convergence in union density for 15 high-income countries (OECD)

long-run character of functional distribution. Shaikh (2003) argued that one simple way to represent sociological forces in a theory of functional distribution is to make both changes in the wage share as well as technical change sensitive to relative tightness in the labor market. This argument is based on the story in Marx where “capital . . . adapt[s] itself to whatever supplies of labour are available” (Rowthorn, 1984, p. 204, as quoted in Shaikh, 2003, 22). In this framework, a fall in the wage share can come about through a persistent rise in the rate of unemployment. The rising rate of unemployment here is seen as a proxy for decreased worker strength, and this decrease in worker strength ultimately translates in a decreased wage share. In terms of the above analysis, this results in productivity inelastic real wages in the latter distributive regime.

To consider this possibility, unemployment rate data from the U.S. Department of Labor, Bureau of Labor Statistics, for seven of the 15 high-income countries were obtained (Table 6; Figure 10).¹⁷ These unemployment rates are consistent and accordingly applicable for cross-country comparison.

As seen through the filtered data, the unemployment rates of the United States and the United Kingdom experience reductions in the latter part

¹⁷ The seven high-income countries are Australia, Canada, France, Italy, Japan, the United Kingdom, and the United States (see Table 6) (www.bls.gov).

Figure 8 Beta convergence in union density for 14 high-income countries (excluding Spain) in the early 1960s

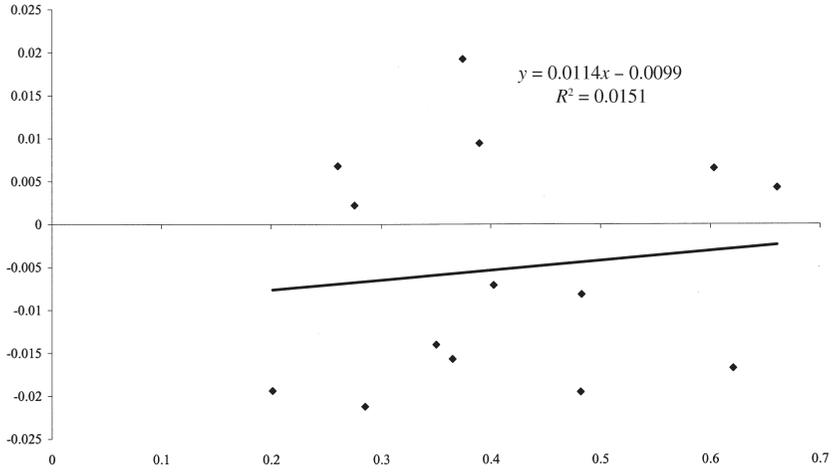


Figure 9 Beta convergence in union density for 14 high-income countries (excluding Spain) from 1981

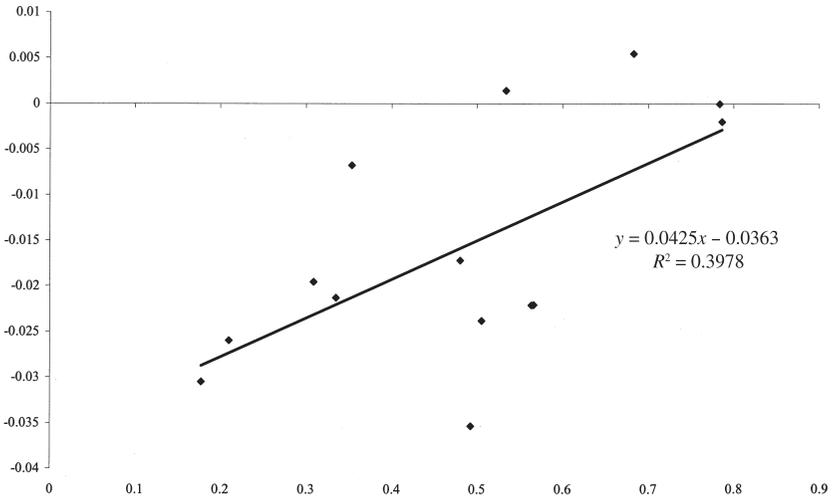
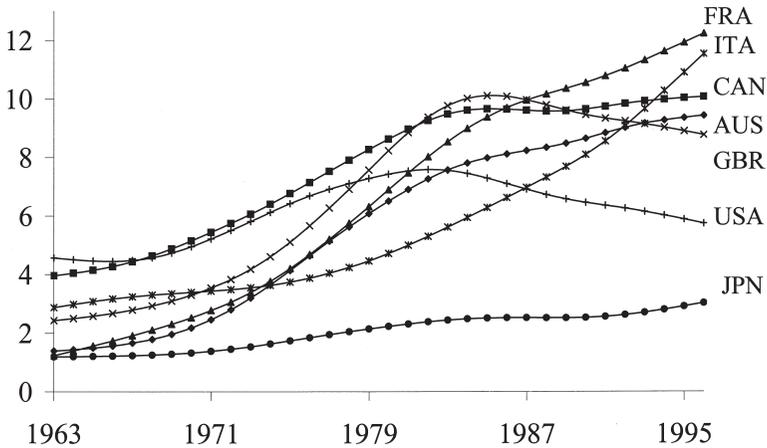


Table 6
Unemployment data for seven high-income countries

	Australia	Canada	France	Italy	Japan	United Kingdom	United States	Average
1963	2.3	5.2	1.6	2.4	1.3	3.3	5.7	3.11
1971	1.9	6.2	2.8	3.3	1.3	3.9	5.9	3.61
1975	4.9	6.9	4.2	3.4	1.9	4.6	8.5	4.91
1979	6.3	7.5	6.1	4.4	2.1	5.4	5.8	5.37
1984	9	11.3	10	5.9	2.8	11.7	7.5	8.31
1988	7.2	7.8	10.3	7.9	2.5	8.6	5.5	7.11
1992	10.8	11.2	10.4	7.3	2.2	10.1	7.5	8.50
1996	8.6	9.6	12.5	11.7	3.4	8.2	5.4	8.49
1999	7.2	7.6	11.1	11.5	4.7	6.1	4.2	7.49
Average 1963 to 1979	3.01	5.64	3.09	3.51	1.51	3.88	5.42	3.72
Average 1980 to 1996	8.24	9.46	10.28	8.26	2.79	9.16	6.51	7.81

Source: U.S. Department of Labor, Bureau of Labor Statistics.

Figure 10 Unemployment rates for seven high-income countries (HP filter)

Notes: FRA = France; ITA = Italy; CAN = Canada; AUS = Australia; GBR = United Kingdom; USA = United States; JPN = Japan.

of the sample, thus bucking the rising trend. Yet, as seen in the average, the latter trend is indeed at a much higher level.

Econometric specification

In order to further explore these questions, we run the following regression model:

$$\omega_{it} = \beta_0 + \beta_1 (U_{it}) + \beta_2 (UD_{it}) + \beta_3 (k_{it}) + u_{it}, \quad (4)$$

where ω_{it} = wage share of country i at time t , U_{it} = unemployment rate (U.S. definition) of country i at time t , UD_{it} = union density as percent of employment in country i at time t , k_{it} = capital-labor ratio of country i at time t .

In our model, we would expect the sign on the rate of unemployment to be negative, indicating that unemployment has a disciplinary effect on the wage share, and the sign on union density to be positive, indicating that increased worker strength has a positive effect on the wage share. One may hypothesize the sign on the capital-labor ratio to be either positive or negative depending on the impact of technical change on distributive shares.

Table 7 shows the results of the various pooled regressions with fixed country and time effects (p -values appear below coefficients). When we compare the regression results, we find that across all specifications, the sign on the unemployment rate is both of the “correct” negative sign and statistically significant, although significance is lost with both country and time effects specified together. Union density, however, is not significant in the unrestricted specification and the country-time effects specification and is only marginally so when country and time effects are separated. Interesting here is the inversion of the sign. When country effects alone are specified, the sign of union density is positive, and when time effects alone are specified, this sign is negative.

The variable of union density, and hence our proxy of worker strength, performs poorly in our regression specifications. We take this as an indication that the measure of worker strength has little impact on determining patterns of income distribution. Not so with the unemployment rate. In each specification, the rate of unemployment is significant and of the “correct” negative sign.

Conclusion

It is not clear whether increased union strength could have staved off the fall in the wage share. What the data show almost across the board is increased levels of unemployment, stagnate absolute real wages, and falling relative wages as expressed through the wage share. Certainly it is possible that a national union strategy could be adopted and formulated that centers not on the real wage but rather on the wage share. This discussion brings back the interesting question that Marx raised concerning the relative immiseration of the working class. Is that immiseration now beginning to manifest? The data presented in this paper point to a relatively bleak prospective for labor if the current trends in functional distribution continue. This resurrects the “law of the tendential fall of relative wages” that, as Rosdolsky (1977, p. 294) noted, Rosa Luxemburg drew out of Marx’s theory of wages, where the “relative wage” is synonymous with the wage share. Luxemburg deemed it vitally important, from the perspective of revolutionary working-class organization, that prime focus must be laid on the relative and not the real wage vis-à-vis the development of strategies and tactics involved in working-class organization. The focus on the wage share was, according to Luxemburg, a much more revolutionary way to understand movements in wages in the development of capitalism:

Table 7
Wage share equations with country and time effects

Specification	β_0	β_1	β_2	β_3	R^2	Standard error of regression
No effects	0.705165 (0.0000)	-0.004352 (0.0000)	-9.11E-05 (0.5862)	-1.94E-06 (0.0000)	0.329588	0.040821
Country effects (p -value for all = 0.0000)	Australia: 0.475335 Canada: 0.525876 France: 0.510936 Italy: 0.437847 Japan: 0.508343 United Kingdom: 0.552836 United States: 0.587731	-0.004216 (0.0000)	0.000801 (0.0275)	4.56E-07 (0.1215)	0.768157	0.024435
Time effects (p -value for all = 0.0000)	1969: 0.710995 1970: 0.729851 1971: 0.737836 1972: 0.744279 1973: 0.748083 1974: 0.769159 1975: 0.791988 1976: 0.793414 1977: 0.799940 1978: 0.796838 1979: 0.778750 1980: 0.779595 1981: 0.786392 1982: 0.791743	-0.006680 (0.0000)	-0.000314 (0.0574)	-2.72E-06 (0.0000)	0.481925	0.038458

Country and time effects	Australia: -0.041188 Canada: 0.004566 France: -0.042574 Italy: -0.089447 Japan: -0.007859 United Kingdom: 0.062769 United States: 0.062528	-0.002172 (0.0362)	3.79E-05 (0.9026)	1.93E-06 (0.0000)	0.884587	0.018526
	1969: 0.452789 1970: 0.461433 1971: 0.461193 1972: 0.460215 1973: 0.456381 1974: 0.469631 1975: 0.483407 1976: 0.479598 1977: 0.481920 1978: 0.474950 1979: 0.451950 1980: 0.454727 1981: 0.455287 1982: 0.455937	-0.002172 (0.0362)	3.79E-05 (0.9026)	1.93E-06 (0.0000)	0.884587	0.018526
	1983: 0.447698 1984: 0.438472 1985: 0.434239 1986: 0.430444 1987: 0.424650 1988: 0.417069 1989: 0.414992 1990: 0.421437 1991: 0.425170 1992: 0.425759 1993: 0.421516 1994: 0.397283 1995: 0.390893					

Thus the struggle against the fall in relative wages also implies a struggle against the commodity-character of labour-power, i.e. against capitalist production as a whole. Thus this struggle against the fall in relative wages is no longer a struggle on the basis of the commodity economy, but a revolutionary, subversive attack on the existence of this economy; it is the socialist movement of the proletariat. (Luxemburg as quoted in Rosdolsky, 1977, p. 295)

This brings us to the interesting prospect that perhaps dismissals of Marx's predictions regarding the fate of the working class as capitalism progresses are in fact a bit premature. Certainly in the century and a half since Marx penned his tome, the working class as a whole in the advanced countries has been able to enjoy relatively high standards of living. But to suggest that somehow this immediately translates into harmony among the classes is a bit naive and, given the evidence in this paper, can perhaps be seen as outright wrong.

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