294-75

INSTITUTE FOR RESEARCH ON POVERTY DISCUSSION PAPERS

"STRATEGIC" WAGE GOODS, PRICES AND INEQUALITY

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September 1975

The research reported here was supported by funds granted to the Institute for Research on Poverty at the University of Wisconsin-Madison by the Department of Health, Education, and Welfare pursuant to the Economic Opportunity Act of 1964. The opinions expressed are those of the author.

ABSTRACT

This paper shows that twentieth-century relative price movements have, with only one exception, always reinforced nominal distribution trends. The "food and fuel crunch" since 1967 follows a long historical continuity in this regard. When the nominal income position of the poor in the size distribution has deteriorated, the deterioration has always been exacerbated by cost of living changes on the expenditure side. When the poor's nominal income position has improved, the improvement has normally been reinforced by relatively favorable price movements on the expenditure side. It is also shown that these price effects are quantitatively important and that policy analysts ignore them at their peril. While the "strategic wage good" has always been food, the paper describes changes in the role of different wage goods over time and compares American contemporary experience with that of England.

1. Distribution and American Inflations: Exploding a Myth

In the long sweep of American experience, what have been the key determinants of the relative prices of consumer goods? Which income classes have benefited most by their change? Do historical episodes of rapidly changing price structures correspond with episodes of dramatic shifts in the structure of wages, rents, and profits, and thus, more generally, with shifts in the distribution of income? Have these trends and cycles reinforced each other so that real distribution indicators exhibit even more dramatic variation than conventional nominal indicators?

Before we can present some speculative answers, a red herring needs disposal--inflation and the distribution of income. It may take a bit of doing, since the recent surge of interest in the distributional impact of contemporary inflations will doubtless produce an atavistic twitch in most economists. The present paper does not focus on the classic wage-lag thesis pursued by Hamilton, Mitchell, Friedman, and so many others. My own prejudice is that these scholars are asking the wrong questions. We need only reflect that the twentieth-century war-induced inflations have always coincided with revolutionary egalitarian shifts in distribution. Figure 1 should make this point clearer. It is based on my efforts in an earlier paper (Williamson, 1975) to document and explain American experience with nominal pay differentials by occupation as well as secular trends in distribution. The figures show just how dramatic this variation in nominal distribution experience has been. This is not the place to argue the merits

of the early twentieth-century indices as proxies for urban inequality prior to World War I. If the reader will grant me the license to refer to these as distribution trends, then the hypothesis of gross negative correlation between inflation and nominal inequality must surely be rejected. The wartime inflations of 1916-1920, 1940-1948, and more recently the Viet Nam decade, all coincided with a leveling in the pay structure and egalitarian distribution changes. The peacetime "stabilizations" and deflations, including the Nixon-Ford stabilization, were also episodes of trending inequality. It seems to me that little light will be shed on "wage-price" dynamics unless the underlying demand and supply forces that feed these inflations are better understood and the price structure is subjected to serious scrutiny.

Obviously, inflation itself cannot have different expenditure effects by socioeconomic class unless relative prices of consumption goods exhibit some variance. This condition is apparently unfulfilled for postwar America. Hollister and Palmer (1969) found that only medical care had changed significantly in relative price from 1947 to 1967. Prices of food, housing, clothing, transportation, personal care, and durables tended to conform closely to the overall consumer price index. In spite of a very wide range in budget shares from poor to rich, differential effects of postwar inflations have been relatively small on the expenditure side, at least prior to 1967. Hollister and Palmer concluded that relative prices of consumer goods had only a trivial influence on real distributions and that nominal distribution statistics were quite adequate social indicators. Before policymakers conclude that this finding is relevant to inflation in the seventies, it should be noted that American postwar growth has also been accompanied by remarkable stability in the

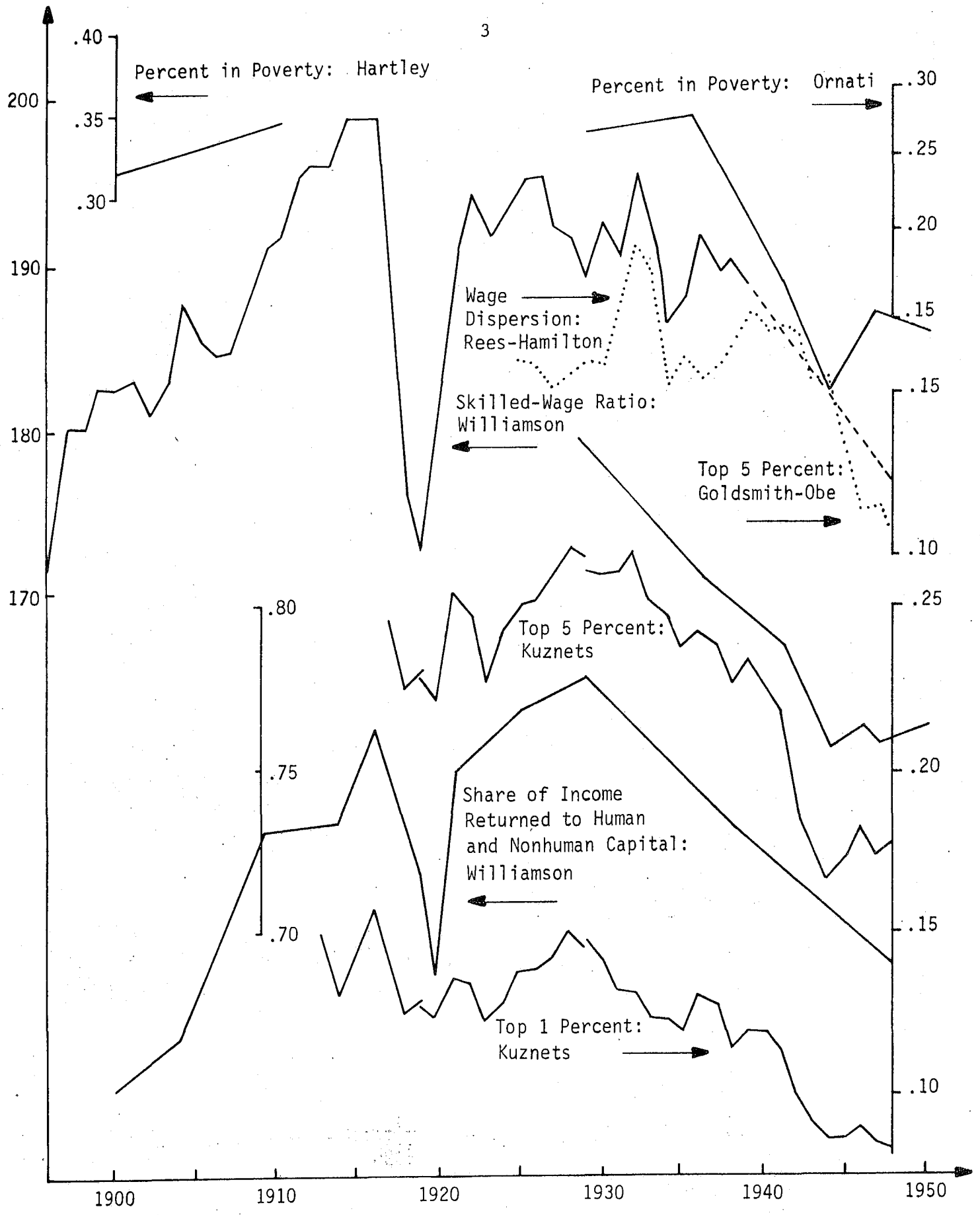

Figure 1A. Trends in Wage Structure and Income Distribution, 1896-1948

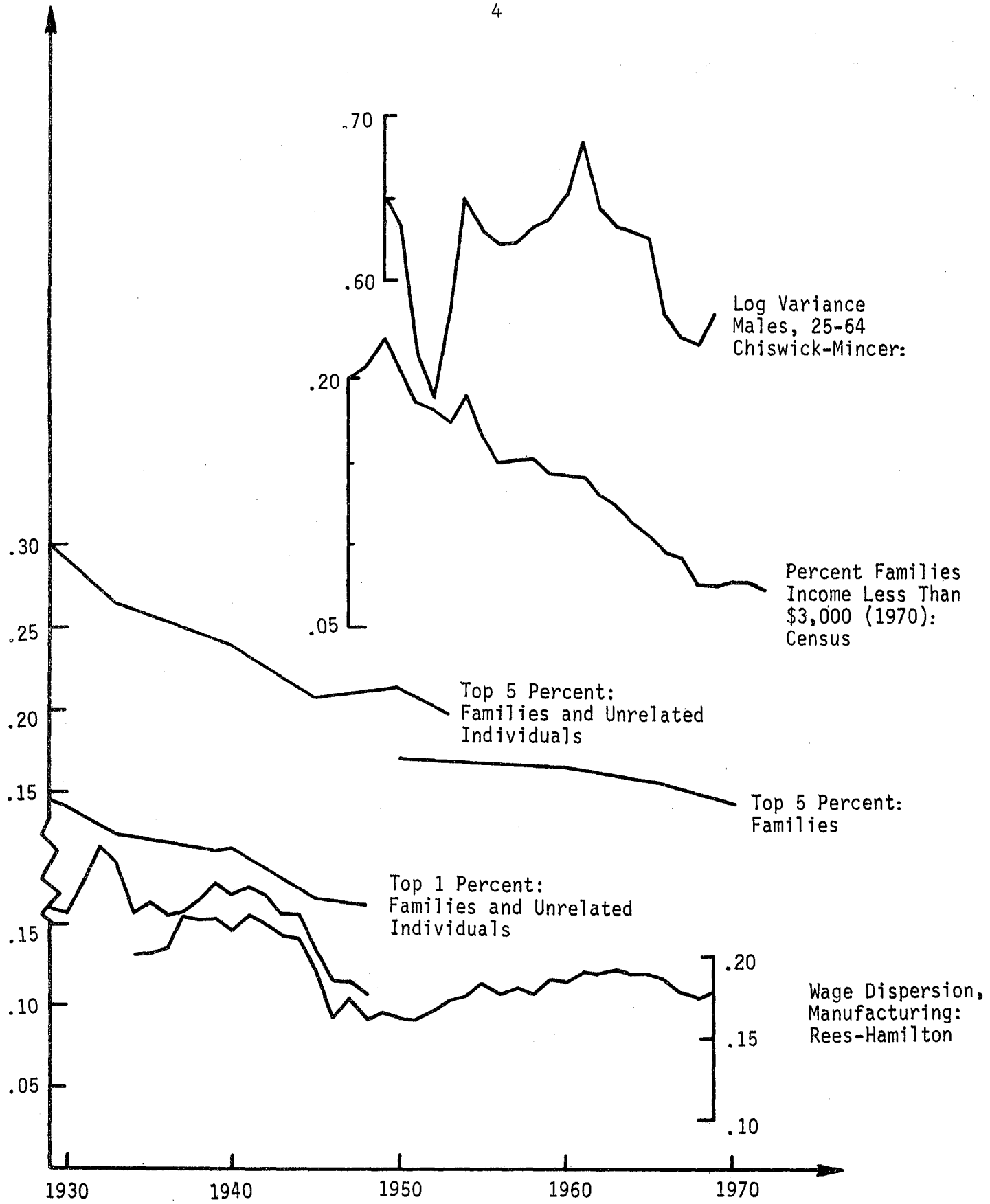

Figure 1B. Trends in Wage Structure and Income Distribution, 1929-1972

distribution of nominal income as well as the structure of demand and output. One wonders how this contemporary finding would apply prior to 1948 and after 1967.

What was the distributional impact of wartime inflation during the "revolutionary" income leveling following 1936 or 1939? While this question has been central to modern British histories (Seers, 1949; Lydall, 1959; Brittain, 1960), it has been ignored in America. Was the World War I inflation egalitarian? Who gained most from the changing relative prices during the subsequent stabilization of the Roaring Twenties? Since these periods generated pronounced variation in the nominal earnings distribution, it might be of some interest to see whether cost of living movements reinforced or offset these trends. Section 2 shows that twentieth-century relative price movements have, with only one exception, always reinforced nominal distribution changes. Section 4 takes this analysis one step further and evaluates the quantitative importance of these cost of living effects on American size distributions. But aggregate historical impact, composition of that impact, and potential future impact may be quite different, and policymakers are usually least interested in the first of these three. In Muellbauer's (1974) terms, what are the strategic commodities whose relative prices most influence real expenditure distributions? Were these the same commodities in the 1930s, during World War I, or at the turn of the century as they are now? If not, why have conditions changed? Do relative price changes have a more potent impact on real expenditure distributions when the nominal distributions themselves are very unequal? Can we therefore expect "inflation"--relative price

changes--to have far less potent distributional impact in contemporary America where incomes are less unequally distributed than in the past?

A lot of questions, indeed. Some answers appear in section 5, but only after a theoretical framework is presented in section 3.

2. The Relative Prices of "Wage Goods"

Have "wage goods" exhibited consistent relative price behavior over time? Wage goods are defined here to include all consumption goods and services for which the income elasticity of demand is less than unity--that is, necessities. Luxuries are those commodities whose income elasticities exceed unity. For the period 1914-1948, the urban price data are reported for three necessities (food, fuel and light, and rent) and three luxuries (clothing, house furnishings, and miscellaneous goods and services). The data prior to 1914 combine house furnishings with miscellaneous goods and services. The level of aggregation is kept high intentionally, both to help uncover any systematic price-distribution relationships should they be present, and to facilitate comparisons with studies of other economies (Muellbauer, 1973, 1974).

The evidence presented in Figure 1A shows that nominal inequality was on the rise from the mid-1890s to 1914. (See Williamson, 1975, for more detailed evidence.) The peacetime inflation rate following 1896 was 2.1 percent yearly, modest by modern double-digit standards but certainly significant. Table 1 shows unambiguously that prices of necessities rose at a more rapid clip than did prices of luxuries. Indeed, while food prices rose by some 2.4 percent per annum in American cities, the prices of luxuries actually fell--and this without any quality

Table 1. Urban Price Indices, 1890-1914 (1914=100)

	Necessities			Luxuries	
	Food	Fuel and Light	Rent	Clothing	House Furnishings and Misc.
1890	72	83	93	134	122
1891	72	86	93	135	119
1892	70	84	95	135	117
1893	72	84	95	128	114
1894	69	76	93	118	110
1895	68	78	90	113	103
1896	66	83	91	113	100
1897	68	80	88	110	96
1898	69	78	88	107	96
1899	70	79	87	106	95
1900	71	91	85	108	95
1901	74	92	87	103	93
1902	78	100	86	99	91
1903	77	112	91	98	93
1904	78	105	96	97	90
1905	78	101	97	96	87
1906	81	101	98	98	89
1907	85	101	102	102	96
1908	83	101	99	97	94
1909	84	100	97	95	95
1910	91	99	99	97	95
1911	93	95	97	96	96
1912	96	99	97	99	97
1913	97	102	100	101	98
1914	100	100	100	100	100

Source: All prices are taken from Rees, 1961, p. 74.

adjustment during an age of revolution in consumer durables! Yet it is not the positive correlation between inflation on the one hand and a rise in the relative price of necessities on the other that deserves stress. Rather, it is the fact that a period of surging nominal inequality coincided with a relative rise in the cost of necessities. The low-income poor were struck twice by inegalitarian trends, first on the income side and then on the expenditure side. This correlation can be found during the previous century of American economic experience, without exception (Williamson, 1974).

Turn now to the war years following 1914, for which both the nominal income distribution data and the urban price series are much improved. The rate of price inflation accelerates long before America enters the conflict, and the inflation continues to 1920: The annual rate was 14.6 percent over these six years. Yet, the urban price data in Table 2 show that luxuries rose in price far more dramatically than did necessities. (Price controls and rationing are not at issue here since experimentation with them during World War I was limited and furthermore they were all lifted by the beginning of 1920.) While there is no evidence of a positive correlation between inflation and the relative price of necessities, there certainly is evidence of such a correlation between nominal inequality and the relative price of necessities. Figure 1A reveals a dramatic decline from 1914 to 1920 in every nominal inequality indicator. It appears that relative price movements supported these nominal trends: In real terms, the egalitarian trend must have been considerably more dramatic.

Similar results emerge from an examination of the stabilization decade following 1920. The twenties were years of trending inequality, so much so, judging from Figure 1A, that most, if not all, of the

Table 2. Urban Price Indices, 1914-1929

	Necessities			Luxuries			
	Food	Fuel and Light	Rent	Clothing	House Furnishings	Miscellaneous	Adjusted House Furnishings
1914	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1915	100.0	100.0	101.5	103.7	106.3	104.3	104.0
1916	120.0	107.3	102.3	118.8	122.9	110.0	117.8
1917	149.5	122.9	100.1	147.6	144.8	136.4	136.1
1918	178.4	144.6	105.3	211.3	197.1	158.5	182.1
1919	190.9	151.6	119.0	283.5	247.9	180.0	224.9
1920	174.6	190.1	142.5	268.4	267.6	199.8	237.5
1920	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1921	86.0	95.5	108.9	74.3	75.6	98.8	73.3
1922	83.6	98.4	109.5	65.8	72.5	95.9	68.5
1923	86.0	97.5	113.9	67.4	77.5	96.9	71.7
1924	86.0	96.0	116.2	65.5	74.6	97.1	67.4
1925	96.0	102.1	115.8	64.9	73.7	97.9	65.0
1926	93.4	99.7	114.2	63.7	71.4	98.2	61.5
1927	90.4	97.4	111.9	62.2	70.1	99.0	58.9
1928	89.2	96.5	109.1	61.7	68.2	99.6	56.0
1929	91.4	95.9	106.6	61.1	67.7	100.2	54.3

Source: All prices are taken from BLS, Bulletin No. 616, p. 81, except for "adjusted house furnishings." The latter includes an estimated impact of the quality bias based on post-1935 evidence. See Table 3. Parenthetically, in 1918-1919, only 3 percent of "miscellaneous" expenditures by North Atlantic urban families sampled was devoted to consumer durables (autos, bicycles, and so forth). For American urban families with highest incomes (greater than $2500) the figure was still only 9.5 percent. The shares (though steeply rising over income) are far too small to warrant concern about "quality-adjusted miscellaneous" prices.

previous nominal egalitarian gains were lost. Table 2 shows once again that relative cost of living movements were supporting those nominal distribution trends. During this decade of stabilization, the price of luxuries declined far more precipitously than did that of necessities. Furthermore, the inequality bias in the changing price structure is even more striking when quality improvements in consumer durables are introduced for the 1920s. In short, the poor must have found their relative economic position eroding from both the income and the expenditure side.

The striking association between distribution trends and changes in the commodity price structure does not continue through the distribution "revolution" between 1929 and 1948. This is not to say that the relative price structure of consumer goods and services was stable after 1929; Table 3 documents just the opposite. What is missing over the Great Depression decade is a consistent fall in the prices of all necessities relative to the prices of luxuries, although the characterization does hold for all commodities save one. The exception is important, however. The relative price of food rose between 1929 and 1948, as well as during the shorter-term episode from 1936 to 1948. This represents a striking departure from a century of American experience. Whether it is sufficiently striking to reverse the historical mutual reinforcement of expenditure and income effects on the size distribution is a matter reserved for section 4.

The more recent postwar experience can now be better appreciated. The Hollister and Palmer (1969) finding of long-term stability in the structure of wage goods' prices (1947-1967) seems to conform quite well to our "empirical price law." When we discount war-induced cycles in

Table 3. Urban Price Indices, 1929-1948 (1936=100)

	Necessities			Luxuries				
	Food	Fuel and Light	Rent	Clothing	House Furnishings	Miscel-laneous	Adjusted House Furnishings	Adjusted Miscellaneous
1929	130.8	112.3	146.7	118.1	116.0	106.0	136.8	111.3
1930	124.4	111.2	142.6	115.5	113.1	106.5	130.5	111.1
1931	102.6	108.7	135.2	105.1	101.8	105.5	114.5	109.3
1932	85.4	103.2	121.3	93.0	88.7	103.0	97.1	105.9
1933	83.0	99.8	104.5	90.1	87.4	99.7	93.4	101.8
1934	92.5	101.2	97.9	98.5	96.4	99.2	100.8	100.6
1935	99.1	100.5	97.7	99.2	98.4	99.4	100.7	100.1
1936	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1937	103.9	100.0	104.7	105.3	108.3	102.3	106.0	101.6
1938	96.5	99.7	108.0	104.7	107.3	102.8	102.6	101.4
1939	94.0	98.8	108.2	103.0	105.2	102.0	98.2	99.9
1940	95.4	99.5	108.5	104.2	104.4	102.4	95.2	99.6
1941	104.1	102.0	110.2	108.9	111.4	105.4	99.5	101.8
1942	122.3	105.2	112.6	127.4	126.9	112.4	108.3	107.8
1943	136.2	107.5	112.0	132.9	130.4	117.3	108.9	111.8
1944	134.4	109.6	112.2	142.2	141.6	122.9	115.7	116.4
1945	137.3	110.1	112.3	149.5	151.4	125.7	121.1	118.3
1946	157.6	112.2	112.7	164.1	165.3	130.5	129.4	122.0
1947	191.3	120.9	115.4	190.4	191.5	141.7	146.9	131.6
1948	207.5	133.6	121.8	202.9	203.3	151.9	152.7	140.2

Source: All prices are taken from Statistical Abstract (1951), pp. 282-283. The "Adjusted House Furnishings" price index attempts to introduce a quality change estimate. The rate of quality improvement estimated for refrigerators (1935-1948) is assumed to apply to all house furnishings over the period (Gordon, 1971, Table 4, p. 144). The "Adjusted Miscellaneous" price index does the same for automobiles. The quality improvement rate is taken from Griliches (1939-1947, low-priced automobiles; see Gordon, 1971, Table 4, p. 144). In 1935/36, the "average" urban family spending $1750 annually devoted 23.9 percent of miscellaneous expenditures to automobile purchases. This fixed budget weight is utilized to get the "adjusted" price series reported in the table.

unemployment and thus in the size distribution (Metcalf, 1972; Schultz, 1969), what remains in Figure 1B is only the weakest nominal egalitarian trend (Schultz, 1971; Chiswick and Mincer, 1972). Stability in the price structure seems to correspond with stability in the size distribution of income. Or, if you like, stability in the output price structure coincides with stability in the input price structure--a very comforting result, but one that deserves far more attention and analysis than economists have given it.

And what about the performance since the mid-late 1960s? Rates of inflation have accelerated, of course, but Table 4 shows once again that, with the trivial exception of personal care and miscellaneous items, necessities have risen in price more dramatically than luxuries. The size distribution of income has also deteriorated: Danziger and Plotnick (1975) have documented significant increased inequality in family and individual pretransfer nominal income from 1965 to 1972. History seems to be repeating itself--trending nominal inequality is exacerbated by changing prices of wage goods, which penalize the poor still further.

Now then, how important have these relative price movements been quantitatively? Have they served to influence the distribution of real incomes or expenditures in any significant way?

3. Prices and Inequality: Theory

While the previous section establishes a historical correspondence between nominal and real distribution trends, the importance of the "price-distribution" nexus has yet to be established. How can we best evaluate this impact?

Table 4. Urban Price Indices, 1967-1975 (1967=100)

	Necessities					
	(1) Food	(2) Fuel and Light	(3) Housing	(4) Medical Care	(5) Personal Care	(6) Miscellaneous (including tobacco and alcohol)
1967	100.0	100.0	100.0	100.0	100.0	100.0
1968	103.6	110.4	104.8	106.1	104.2	104.6
1969	110.6	112.9	113.3	113.4	109.3	109.1
1970	114.9	107.6	123.6	120.6	113.2	116.0
1971	118.4	115.0	128.8	128.4	116.8	120.9
1972	123.5	120.1	134.5	132.5	119.8	125.5
1973	141.4	126.9	140.7	137.7	125.2	129.0
1974	161.7	150.2	154.3	150.5	137.3	137.2
1975 (March)	171.3	163.0	166.6	164.6	148.9	146.5

	Luxuries						
	(7) House Furnishings	(8) Clothing	(9) Auto	(10) Other Trans-portation	(11) Recreation and Education	(12) Adjusted House Furnishings	(13) Adjusted Automobiles
1967	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1968	104.4	105.4	103.0	104.6	104.7	102.6	105.4
1969	109.0	114.9	106.5	112.7	108.7	105.2	111.1
1970	113.4	116.1	112.7	128.5	113.4	107.4	119.3
1971	118.1	119.8	116.6	137.7	119.3	109.7	125.1
1972	121.0	122.3	117.5	143.4	122.8	110.4	128.2
1973	124.9	126.8	121.5	144.8	125.9	111.8	139.7
1974	140.5	136.2	136.6	148.0	133.8	122.5	154.5
1975 (March)	155.6	140.9	144.0	152.3	142.0	131.4	162.3

Source: All prices are taken from BLS, Monthly Labor Review, annual December issues and June 1975. The "Adjusted House Furnishings" price index attempts to introduce a quality change estimate, as does "Adjusted Automobiles." The former is an estimate based on 1954-1968 for refrigerators, and the latter is an estimate based on 1960-1966 for "low-priced" autos (Gordon, 1971, Table 4, p. 144).

Summary empirical measures of income distribution are essential to facilitate analysis and policy prescription. There is certainly no shortage of such measures, and many of them are exploited in Figure 1. The Lorenz Curve is a useful visual aid, but it lacks precision when two such curves intersect, since in that case a comparative judgment is impossible. Other common measures include the shares of selected income classes, the variance, the coefficient of variation, the relative mean deviation, the standard deviation of logarithms, and, of course, the Gini coefficient. Each of these measures is arbitrary, and all too frequently different statistics imply different conclusions regarding the behavior of inequality over time or in response to policy. This is so because each of these statistics implies some underlying social welfare function--a social welfare function that should be made explicit. A few years ago, Atkinson (1970) offered an ingenious device that confronts these issues with extraordinary economy. As Muellbauer (1973, 1974) has shown since, the Atkinson Index is especially useful for confronting the impact--potential and actual--of inflation on distribution from the expenditure side.

Departing only slightly from Atkinson's notation, define

y = mean income of a given income class

$\bar{y}$ = mean income, economy-wide, and

$f(y)$ = percent of individuals (families, heads of households, and so forth) in a given income class.

If the social welfare function is an additively separable and symmetric function of individual incomes, then generally

$$W = \int_{o}^{\tilde{y}} U(y)f(y)dy,$$

where incomes range from zero to some maximum $\tilde{y}$. Atkinson then poses the following question: "Under what conditions can we ... rank two distributions without specifying any further the form of the function U(y)?" (Atkinson, 1970, p. 245). In examining two distributions resulting from policy, under what conditions can we unambiguously conclude that (real or nominal) income has historically become more or less equally distributed over time?

A complete preference ranking of income distributions is impossible unless the form of the function U(y) is made more precise. What general properties would we like that function--and thus our inequality measure--to possess? Among the statistics listed earlier, those used most commonly are the coefficient of variation, the relative mean deviation, the Gini coefficient, and the standard deviation (or variance) of logarithms. Since each of these is defined relative to the mean, it follows that none of them is affected by equal percentage increases in all incomes: Equiproportional growth implies constant inequality over time. The most recent and influential empirical studies on American distribution experience, for example, have been those by Schultz (1971), by Chiswick and Mincer (1972), and by Chiswick (1974) and Mincer (1974) separately. Each researcher used log variance statistics. Although the use of log variance statistics may be an attractive and inevitable extension of the human capital model, it should be emphasized that they imply a special degree of "political aversion" to economic inequality. (The word "special" should not imply political irrelevance, judged by the fact that Chiswick's log variance statistic appears in the 1974 Economic Report of the President.) If the inequality statistic is to be invariant to "proportional" growth--as opposed to absolute income gaps--then U(y) must have the form (Atkinson, 1970, p. 251)

$$U(y) = A + B\left\{\frac{y^{(1-\varepsilon)}}{(1-\varepsilon)}\right\}, \quad \varepsilon \neq 1$$

and

$$U(y) = \log_e(y), \quad \varepsilon = 1.$$

The requirement that yields this result is called constant relative inequality aversion.

Very often the literature seems to assert a different requirement: that growth in a mature economy should reduce inequality. In other words, successful twentieth-century development should allow America the luxury of being more concerned about inequality. (Hirschman (1973) refers to such rising intolerance of inequality as the "tunnel effect.") Such a position implies that the social welfare function should exhibit increasing relative inequality aversion. Were this our view, we would expect the inequality index to rise even under proportional growth. This would seem to be a very radical stance, especially when compared with the "poverty" analyst's conservative position. If our concern were limited only to numbers in poverty, any income growth among the poorest families would constitute an egalitarian trend, regardless of what was happening elsewhere in the size distribution. (For a recent example, see Figure 1B, where the log variance statistic exhibits postwar trends that clash with the "numbers in poverty" index.)

In any case, most of the conventional statistics are invariant with respect to proportional growth by income class. Atkinson (1970, p. 257) proposes a more general index that has this property:

$$I = 1 - \left[\sum_j \left(\frac{y_j}{\bar{y}}\right)^{1-\varepsilon} f(y_j)\right]^{\frac{1}{1-\varepsilon}} \qquad (2)$$

where

$$0 \leq I \leq 1$$

y_j is mean income (expenditure) of the j^{th} class,

$\bar{y}$ is mean income (expenditure) economy-wide,

$f(y_j)$ is percent in the j^{th} class, and

$\varepsilon \geq 0$ is a parameter measuring the degree of inequality aversion.

This is a very attractive general statistic, since it allows us to examine inequality experience under alternative (and explicit) treatment regarding the relative importance of transfers at different income levels. As ε rises, transfers to lower-income groups are given heavier weight and transfers among top-income recipients are given lighter weight. Consider two extremes. If $\varepsilon = 0$, we are in effect describing a society in which only aggregate growth counts, and distribution is irrelevant (or, less harshly, policymakers rely completely on "trickling down"). In this case, $I(t) = 0$ for all t. As $\varepsilon \to \infty$, society tends to take greater account of transfers to the poverty group, and ignores the source of the transfers--the distribution of income among the "nonpoor" has no political relevance. The tax revolt by "middle Americans" would certainly seem to deny the contemporary significance of this extreme characterization.

The algebraic elegance of Atkinson's Index should not fool us into believing that ε is independent of the measured inequality. On the contrary, ε itself is an endogenous variable that should certainly have risen following 1929. Increasing equality, however measured, ensures greater political participation by lower-income groups. Increasing relative political participation of the poor implies less legislative tolerance for inequality

and a rising ε. Having made this confession of endogeneity, however, we fail, in this paper, to supply any useful resolution. We shall instead treat ε as an exogenously given parameter and explore the implications of its size.

It should be apparent that Atkinson's Index can be a very powerful tool in evaluating the impact of competing policies, which may have complex and uneven effects by income class. We need not commit ourselves to a specific degree of inequality aversion when pursuing policy analysis, but we need not be vague either. Does the distributional impact of competing policies vary according to ε, or are rank orderings invariant to the degree of inequality aversion assumed? If rank orderings do vary with ε, what are their critical ranges and do they seem to be politically relevant? Atkinson's Index also supplies a means by which changes in the distribution of income or expenditure can be interpreted. The index can be rewritten (Atkinson, 1970, p. 250) as

$$I = \frac{\bar{y} - y_E}{\bar{y}} .$$

To be consistent with the empirical work that follows in section 4, y shall denote consumption expenditures rather than income. Thus, y_E is the per capita consumption level which if given to everyone would generate the same aggregate welfare as the current consumption expenditure distribution. If, for example, $I = 0.20$ under some assumed value of ε, then the index tells us that the same level of aggregate welfare could be achieved by distributing equally only 80 percent of aggregate consumption--"essential consumption," in Paul Baran's (1957, ch. 22) words. Once again in Paul Baran's words, 20 percent of aggregate consumption would be "potential

economic surplus."[1] Alternatively, if a given policy raises I from .20 to .21, this is equivalent to a 1 percent loss in aggregate consumption, or an ad valorem expenditure tax of 1 percent on all families. The reader will also note the following: Two very different assumed values of ε, say 1.5 and 4.0, may imply two very different initial levels of inequality, say $I_{1.5} = 0.20$ and $I_{4.0} = 0.70$, while the proposed policy may raise them both by approximately 1 percent--a 1 percent loss in aggregate consumption in both cases. Thus, it seems to me that such calculations have far more intuitive appeal in judging what is "large" and what is "small" than do changes in the Gini coefficient, the log variance statistic, or even "numbers in poverty."

Now then, can we improve on our measures of the expenditure-side incidence of inflation? Let us define a new index, $\hat{I}$, which deals with prices from the expenditure side. Furthermore, let

y_j^* = mean real expenditure of the j^{th} income class,

p_j = cost of living of the j^{th} income class,

w_{ij} = fixed expenditure share on the i^{th} good in the j^{th} income class,

$$y_j^* = \frac{y_j}{p_j} = \frac{y_j}{\sum_i w_{ij} p_{ij}}, \text{ and}$$

$$\bar{y}^* = \sum_j \left\{ \frac{y_j}{\sum_i w_{ij} p_{ij}} \right\} f(y_j).$$

Thus, a real expenditure inequality index will be written as

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[1] The remainder of GNP going to defense regrettables (Nordhaus and Tobin, 1972), which Baran would also allocate to potential economic surplus, and for gross investment to insure that current welfare levels are sustainable.

$$\hat{I} = 1 - \left\{ \sum_j \left(\frac{y_j^*}{\bar{y}^*} \right)^{1-\varepsilon} f(y_j^*) \right\}^{\frac{1}{1-\varepsilon}},$$

or, since

$$f(y_j^*) = f(y_j),$$

$$\hat{I} = 1 - \left\{ \sum_j \left(\frac{y_j^*}{\bar{y}^*} \right)^{1-\varepsilon} f(y_j) \right\}^{\frac{1}{1-\varepsilon}}. \qquad (3)$$

Muellbauer (1974, pp. 38-42) uses the linear expenditure system to estimate variable budget weights by expenditure class. The linear expenditure system has the attractive theoretical attribute that it permits consumers to substitute one commodity for another in response to relative price changes. Our approach will be more primitive, since we shall estimate Engel functions, which yield fixed (Paasche) budget weights. While our implicit price indices by income class fail to satisfy the constant utility criterion of Fisher's "true" cost of living index, they do have the great advantage of calculating simplicity. Furthermore, recent research has suggested that in practice little is lost by our inelegant econometric strategy (Muellbauer, 1973; Manser and Christensen, 1973).

Given the distribution of nominal expenditures, how do changing relative prices on the expenditure side affect the distribution of real consumption levels? In the remainder of this paper we will seek an answer to this question based on twentieth-century evidence. There are four component parts to the answer, and the congruence of these four forces would ensure a very potent impact of prices on inequality. First, are the Engel functions sufficiently steep so that wide variances in budget weights are observed over income classes? Second, is there a wide variance in total family consumption by income class? The wider is nominal

consumption inequality, the greater will be the observed variance in expenditure patterns given Engel functions. Obviously, if nominal income and expenditures are equally distributed, expenditure patterns are likely to exhibit very little variation, and thus relative price changes will affect all families equally. On these grounds alone, a given rise in the relative price of, say, foodstuffs is bound to have a greater inegalitarian impact in a society with great nominal inequality to begin with. Third, relative prices themselves must change. The Hollister and Palmer (1969) study showed that relative prices changed but little from 1947 to 1967. Section 2 suggested that these two postwar decades are unique by historical standards, and that their trends certainly have not been maintained during the fuel and food crises of the 1970s. Fourth, if expenditures are classified as necessities or luxuries, do relative prices of commodities within these classifications behave consistently or are they offsetting? The evidence presented in section 2 documented consistency in every period since the mid-1890s, with the exception of food prices during the Great Depression and World War II.

What, then, has been the historical impact of prices on inequality in twentieth-century America?

4. Prices and Inequality: Fact

4.1. Historical Lessons from an Earlier Era of Instability, 1917-1929

Compared with the postwar episode following 1948, the first third of the twentieth century was a period of extraordinary volatility in income distribution, price structure, and output mix. How important was the relative price structure as an influence on distribution from the

expenditure side? The answer may be relevant for the 1970s, another period of structural volatility, but the problem is that complete distribution data (urban or economy-wide) do not become available until 1935-1936. However, there is no reason why we can't set aside Atkinson's Index for the moment and construct instead some primitive measures using Kuznets's (1953) top 10 and 5 percent bands. The computations are reported in Table 5.

It appears that as much as a fifth of the 5.2 percentage point decline in the top 10 percent share can be explained by relative cost of living movements from 1917 to 1920. Similar results are apparent for the 1920s: While the top 10 percent share in real income rose by 6 percentage points, one of these percentage points was due to the favorable cost of living changes facing the rich.

It's a pity that urban size distribution data are unavailable for this period, since the reader may be skeptical about the relevance of a calculation based only on the top 5 or 10 percent. An alternative device for establishing the distributional impact of relative price changes during the pre-1929 period is presented in Table 6. Here we ask, What would have been the impact of the 1914-1920 relative price changes on the 1935-1936 distribution of (real) expenditures among urban families? Three values of Atkinson's ε are used, and they tell a consistent story. It appears that the inequality index would have declined considerably. The term "considerably" is used advisedly, since Atkinson's Index suggests that the relative price movements were equivalent to an augmentation of every urban family's real consumption level of from 1 to 1.7 percent per annum. That is, the effect of those relative price changes was to lower the incidence of urban inequality by

Table 5. Deflation of Relative Income Shares, Nonfarm, 1917-1929 (in percent)

Year	Top 10 percent		Top 5 percent	
	Money	Real	Money	Real
1917	34.5	34.5	25.6	25.6
1920	30.3	29.3	22.6	21.8
1920	30.3	30.3	22.6	22.6
1929	35.4	36.3	26.1	26.8

Sources: The nominal income shares are nonfarm estimates from Kuznets (1953, pp. 610-614). The real income shares are derived by using computed cost of living indices. The commodity price data are taken from Table 2 and the weights are estimated from double logarithmic expenditure functions, 1918-1919 urban survey data. See Williamson, 1974, Table 11, p. 36.

Table 6. Prices and Urban Inequality: The 1914-1920 Egalitarian Episode (Using 1935-1936 Weights)

	Atkinson's Inequality Index		
	$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$
Nominal expenditure distribution (urban, 1935-1936)	.1706	.2592	.3574
Impact of historical price changes, 1914-1920 (using 1935-1936 weights)			
All prices	.1602	.2447	.3399
Food	.1868	.2814	.3836
Rent	.1736	.2631	.3618
Fuel and light	.1785	.2703	.3710
Furnishings	.1665	.2534	.3504
Clothing	.1576	.2409	.3351
Miscellaneous	.1465	.2253	.3160

Source: The nominal distribution index is for urban families, 1935-1936, as are the expenditure weights. See Table 7 for sources and methods. The prices used in the calculations are from Table 2.

from 1 to 1.7 percentage points. The measured influence would be far greater, of course, were we able to take account of farm families as well.

4.2. The Egalitarian "Revolution," 1929-1948

Table 7 documents the impact of prices on inequality during the 1930s and 1940s, a period of impressive nominal leveling in the distribution. Look first at the longer term, the two decades from one full employment year to another, 1929-1948. There does seem to be a continuation of our "empirical law of living costs," since relative prices were tending to contribute to the egalitarian drift. The impact is hardly as great as during the more volatile first third of the twentieth century: Atkinson's Index is lowered by only 0.5 to 0.7 percentage points in response to the price changes, and the index falls hardly at all when estimates of quality improvements are introduced. Nevertheless, nominal and real distribution once again move alike.

Curiously enough, the "law" fails for the shorter-term period following 1935. The rise in food prices (Table 3) was sufficiently large to reverse the correlation: While nominal inequality indicators were falling (primarily in response to full employment effects, according to Schultz (1971) and Chiswick and Mincer (1972)), living costs were rising most dramatically for the poor--the only such correspondence in a century of American experience. It should be emphasized, however, that the more relevant long-term experience, between the full employment points 1929 and 1948, yields the more conventional result: While nominal inequality indicators were falling, living costs were also rising most dramatically for the rich.

Table 7. Prices and Urban Inequality: 1929-1948

	Atkinson's Inequality Index				Atkinson's Inequality Index		
	$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$		$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$
Nominal expenditure distribution (urban, 1935-1936)	.1706	.2592	.3574	Nominal expenditure distribution (urban, 1935-1936)	.1706	.2592	.3574
Impact of historical price changes, 1935-1948				Impact of historical price changes, 1935-1948			
All prices	.1735	.2632	.3622	All prices	.1662	.2532	.3504
Food	.1922	.2887	.3921	Food	.1838	.2774	.3790
Housing	.1722	.2613	.3598	Housing	.1693	.2575	.3554
Fuel and light	.1737	.2635	.3627	Fuel and light	.1724	.2617	.3604
Furnishings	.1681	.2556	.3530	Furnishings	.1687	.2565	.3542
Clothing	.1622	.2473	.3430	Clothing	.1646	.2507	.3471
Miscellaneous	.1565	.2395	.3336	Miscellaneous	.1586	.2424	.3372
All prices: quality adjusted	.1766	.2676	.3674	All prices: quality adjusted	.1714	.2604	.3590
Furnishings	.1693	.2573	.3551	Furnishings	.1703	.2588	.3569
Miscellaneous	.1593	.2435	.3385	Miscellaneous	.1630	.2487	.3448

Sources: The nominal distribution indices are for urban families, 1935-1936. These data are taken from the National Resources Planning Board, Family Expenditures in the United States (1941) and refer to total family expenditures over twelve income classes ranging from \$0-\$500 (excluding those on relief) to \$5000-\$10,000. The calculation uses expression (2) in the text. The impact of prices on inequality uses the nominal I (1935-1936) as a base, following expression (3) in the text where the p_{ij} are taken from Table 3 and the w_{ij} are estimated from double-log expenditure functions (total family expenditures the sole independent variable).

4.3. A New Era? Distribution and Inflation in the 1970s

Judged by six decades of previous distribution history, there is nothing unique about the 1970s. The necessary family expenditure distribution data are unavailable, but incomes became more unequally distributed after 1967 and up to 1973, the last year for which data are available. Table 9 documents the inequality trend for three values of ε, and each of these records a pronounced rise over the six years. No doubt expenditure distributions, were they available, would exhibit a less steep inequality trend, but these economy-wide income distribution data are adequate to gauge the magnitude of the impact of prices on urban inequality. Table 8 confirms that the striking relative price movements after 1967 were contributing significantly to the nominal inequality trend. For example, assuming $\varepsilon = 2.5$, the historical price changes from 1967 to March 1975 would have raised urban inequality from a .3165 base (the 1960-1961 figure) to .3298, a rise of 1.33 percentage points. This is no small matter, since it is equivalent to an annual loss in aggregate consumption of 1.3 percent. Nor is the figure small when judged by the actual increase in nominal income inequality from 1967 to 1973. At $\varepsilon = 2.5$, Atkinson's Index rises by 5 percentage points. That is, price trends have had at least one quarter as much effect as nominal income trends in contributing to real inequality movements in recent years.

We conclude that prices have been a significant regressive force since the late 1960s.

Table 8. Prices and Urban Inequality: 1967-1975

	Atkinson's Inequality Index		
	$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$
Nominal expenditure distribution (urban, 1960-1961)	.1913	.3165	.4618
Impact of historical price changes, 1967-March 1975			
All prices	.2004	.3298	.4773
Food	.2178	.3573	.5097
Housing	.1944	.3206	.4659
Fuel and light	.1924	.3180	.4633
Furnishings	.1889	.3125	.4565
Clothing	.1869	.3097	.4536
Miscellaneous	.1780	.2959	.4367
All prices: quality adjusted	.1982	.3273	.4748
Furnishings	.1899	.3142	.4587
Miscellaneous	.1752	.2918	.4320

Sources: The nominal distribution indices are for urban families, 1960-1961. These data are taken from the 1960-1961 survey of consumer expenditures, BLS Report 237-38, Consumer Expenditures and Income, Supplement 3, Part A (July 1964), and refer to total family expenditures over ten income classes ranging from "under $1000" to "$15,000 and over." The calculation uses expression (2) in the text. The impact of prices on inequality uses the nominal I (1960-1961) as a base following expression (3) in the text where the p_{ij} are taken from Table 4 and the w_{ij} are estimated from double-lag expenditure functions (total family expenditures the sole independent variable).

Table 9. Trends in Inequality, 1967-1973: Atkinson's Index Applied to Nominal Family Incomes

Year	Atkinson's Inequality Index		
	$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$
1967	.3274	.5342	.7092
1968	.3157	.5309	.7190
1969	.3222	.5445	.7349
1970	.3411	.5824	.7714
1971	.3324	.5736	.7701
1972	.3369	.5824	.7796
1973	.3328	.5842	.7902

Source: U.S. Bureau of the Census, Current Population Reports, Consumer Income, Series P-60, various numbers (December 1969-January 1975). The data refer to families. To make the data consistent with the requirements of Atkinson's Index, the bottom three income classes have been collapsed to one, $1999 and below.

5. "Strategic" Wage Goods and Inequality

Which wage goods have been most responsible for the regressive impact of prices since 1967? Table 8 confirms in quantitative terms what we already suspected. Virtually all of the regressive price impact can be traced to food. The rise in food prices was a far greater regressive influence by itself than was overall inflation. For example, the movement in all prices acted to raise Atkinson's Index (at $\varepsilon = 2.5$) by 1.33 percentage points after 1967. Food prices by themselves contributed to a 4.08 percentage point rise in the Index! That is, if only food prices had risen after 1967 and all other prices had remained stable, then the regressive impact of the inflation would have been more than three times as great. Similar results appear for 1929-1948 (Table 7). The total impact of inflation was less regressive primarily because of the rise in price of all goods contained in the "Miscellaneous" category. These include car purchases, medical care, education, and recreation. Nonetheless, food prices do indeed dominate, and price-regressivity prevails after 1967.

Certainly part of food's "strategic" role is explained by the extraordinary magnitude of relative price changes over these periods (Tables 3 and 4). But it is also explained by the sensitivity analysis presented in Tables 10 and 11. The computations reported there explore the impact of a 25 percent change in some consumer good price--holding all other prices constant--on Atkinson's Index. Food is the strategic wage good whose price has by far the largest potential regressive impact; "Miscellaneous" is <u>the</u> strategic wage good whose price has by far the largest potential progressive impact. The latter includes car purchases and general services, both of which have an important progressive

price impact. While the "Miscellaneous" category contains almost no necessities, it is of some interest to note that medical care has a regressive price impact of considerable size.

Some surprises emerge when these computed "price-senstitivity" figures are compared with figures from other countries or from earlier points in American history. Food is a far more important strategic wage good in America than it is in the United Kingdom. Compare Muellbauer's (1974) figure (Table 11, col. 1) for the United Kingdom with figures for American urban areas. The figures are not completely comparable, based as they are on data a decade apart while in addition America is restricted to urban areas, but the U.S. figure is twice that of England. A comparison of Tables 10 and 11 also produces the surprising result that food prices have increased their strategic role since the 1930s. In 1935-1936, a 25 percent rise in food prices would have raised Atkinson's Index ($\varepsilon = 1.5$) by 0.63 percentage points; the comparable figure for 1960-1961 is 1.03 percentage points. There are some other changes over these three decades that are worth noting too: (i) Fuel and light have declined from a position of important price-regressivity to unimportance; (ii) medical care has reversed its role from price-progressivity to price-regressivity.

6. Qualifications and Speculations

Two remarks will serve to conclude this paper. First, the surprising sensitivity of distributional indices to prices in twentieth-century America is in part a fabrication--but, I believe, only a small part. We have used an unsophisticated fixed-budget-weight model throughout. More elaborate expenditure models would allow substitution and thus would

Table 10. Sensitivity Analysis: "Strategic" Commodities, Inflation, and Urban Inequality, 1935-1936

	Atkinson's Inequality Index			
	UK, Total, 1970	U.S., Urban Families, 1935-1936		
	$\varepsilon = +1.5$	$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$
Nominal expenditure distribution: I	.0962	.1706	.2592	.3574
"Marginal" impact of a 25 percent change in P_j, holding all other P_k constant: $I-\hat{I}$				
Detail, j=1...6				
Food	+.0054	+.0062	+.0086	+.0102
Housing	+.0028	+.0018	+.0024	+.0027
Fuel and light	0	+.0023	+.0032	+.0040
Furnishings	na	-.0006	-.0009	-.0011
Clothing	-.0013	-.0022	-.0031	-.0037
Miscellaneous	na	-.0073	-.0102	-.0122
Detail, j=1,...,15				
Food	+.0054	+.0063	+.0086	+.0101
Housing	+.0028	+.0019	+.0024	+.0026
Fuel and light	0	+.0023	+.0032	+.0039
Furnishings	-.0043	-.0006	-.0009	-.0011
Automobile		-.0041	-.0054	-.0062
Household operations	na	-.0018	-.0025	-.0029
Clothing	-.0013	-.0021	-.0030	-.0037
Other transport	na	0	0	0
Medical care	na	-.0004	-.0006	-.0009
Recreation	-.0008	-.0012	-.0017	-.0020
Personal care	na	+.0001	+.0001	+.0001
Tobacco	+.0012	+.0003	+.0004	+.0004
Education	na	-.0005	-.0007	-.0008
Reading	na	+.0001	+.0001	+.0001
Miscellaneous goods	-.0011	0	0	0
Miscellaneous services	+.0016			

Source: The 1970 United Kingdom data come from Muellbauer (1974, Table V, p. 47) and refer to the distribution of 1970 expenditures in 1964 prices. For the American data and calculations, see notes to Table 7.

Table 11. Sensitivity Analysis: "Strategic" Commodities, Inflation, and Urban Inequality, 1960-1961

	Atkinson's Inequality Index			
	UK, Total, 1970	U.S., Urban Families, 1960-1961		
	$\varepsilon = +1.5$	$\varepsilon = +1.5$	$\varepsilon = +2.5$	$\varepsilon = +4.0$
Nominal expenditure distribution: I	.0962	.1913	.3165	.4618
"Marginal" impact of a 25 percent change in P_j, holding all other P_k constant: $I-\hat{I}$				
Detail, j=1...6				
Food	+.0054	+.0099	+.0156	+.0190
Housing	+.0028	+.0011	+.0015	+.0015
Fuel and light	0	+.0004	+.0006	+.0006
Furnishings	na	-.0007	-.0011	-.0014
Clothing	-.0013	-.0028	-.0042	-.0051
Miscellaneous	na	-.0077	-.0122	-.0150
Detail, j=1,...,15				
Food	+.0054	+.0103	+.0161	+.0194
Housing	+.0028	+.0012	+.0016	+.0016
Fuel and light	0	+.0004	+.0006	+.0006
Furnishings	-.0043	-.0007	-.0011	-.0014
Clothing	-.0013	-.0027	-.0043	-.0051
Household operations	na	-.0004	-.0008	-.0011
Autos	-.0043	-.0053	-.0078	-.0088
Other transports	na	-.0001	-.0003	-.0004
Medical care	na	+.0007	+.0009	+.0010
Recreation	-.0008	-.0011	-.0017	-.0020
Personal care	na	0	0	-.0001
Tobacco	+.0012	+.0001	+.0002	+.0002
Education	na	-.0004	-.0006	-.0007
Reading	na	0	0	0
Other	na	-.0025	-.0039	-.0046

Source: See notes to Tables 8 and 10.

diminish the price-sensitivity estimates presented in the body of this paper. Since food is the overwhelming strategic wage good, however, I cannot believe that more sophisticated approaches would seriously change our results. Second, why the extraordinarily consistent historical correlation between the relative prices of outputs and the relative prices of inputs? That is, why are periods of "stretching" in the pay structure, increasing nominal inequality in the size distribution, and general drift toward regressivity always periods of relative price changes such that the cost of living inflates faster for the poor than for the rich? Why do trends in nominal inequality indicators always understate the real drift in societal distribution? Any macroeconomic distribution theory must confront these curious and important price facts.

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