

## Marxian crisis theory and the rate of profit in the postwar U.S. economy

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My objective in this paper is to analyse the behaviour of the rate of profit in the United States economy since World War II in order to evaluate the current relevance of various Marxian theories of capitalist economic crisis. I will begin by formulating and contrasting several different variants of Marxian crisis theory; I will then seek to determine the extent to which recent empirical evidence on the rate of profit and related variables is consistent with each variant.

Beginning with Karl Marx himself in *Capital*, political economists working from a broadly-defined Marxian perspective have sought to analyse the sources of the economic crises that have periodically afflicted capitalist economies. Many different types of theories have been proposed, but all share a central concern with the rate of profit as a critical determinant of macro-economic vitality. Indeed, the defining characteristic of a Marxian theory of capitalist economic crisis may be identified as the focus on a falling rate of profit as the source of the crisis. Differences between alternative variants of Marxian crisis theory can be shown to hinge on different explanations of the fall in the rate of profit.

The behaviour of the average rate of profit in a capitalist economy is seen as critical to the explanation of economic crises because it is a major determinant of capitalists' profit expectations. Production is organised and investment is undertaken by capitalists in order to make profits; a fall in the average rate of profit—and consequently in the expected profitability of new investment—is bound sooner or later to discourage such investment. But the rate of investment is a major determinant of both the level and the rate of growth of aggregate output and employment. It affects the level of output (and employment) as a significant—and usually the most volatile—component of aggregate demand; and it affects the rate of growth of output (and employment) as an important source of increased productive capacity in the economy. Thus it is quite reasonable on theoretical grounds to argue that a falling rate of profit will ultimately lead—via profit expectations and the rate of investment—to an economic crisis in which the levels and rates of growth of output and employment are depressed.

Each of the variants of Marxian crisis theory that I will consider can be developed either as a theory of short-run cyclical declines in the rate of profit (to explain the capitalist business cycle) or as a theory of longer-run declines in the rate of profit (to explain

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'long-wave' periods of decline or even secular stagnation). Largely for reasons of data availability, my empirical analysis will be confined to the period since World War II in the United States. I will examine the behaviour of the rate of profit in the short-run cyclical context of five successive postwar business cycles; and I will examine longer-run trends in the rate of profit from each cycle to the next as well as during the postwar period as a whole. In every case I will seek to determine the sources of changes in the rate of profit by decomposing such changes into changes in component variables that are critical for Marxian theorising about capitalist economic crises.

I will begin, in section 1, by discussing the different variants of Marxian crisis theory to be considered. In section 2, I will present some preliminary empirical evidence bearing on the validity of these theoretical variants both in a cyclical and a longer-run context. I will then discuss some of the limitations of the preliminary evidence and undertake a more elaborate theoretical analysis of changes in the rate of profit in section 3. In section 4 I will present more detailed empirical evidence to pursue the theoretical concerns raised in section 3. Finally, I will conclude in section 5 with a summary of my results and some suggestions for further research.

### 1. Three variants of Marxian crisis theory

Reflecting on the extensive Marxian literature on capitalist economic crises, I have found it useful to distinguish three basic variants of Marxian crisis theory that differ mainly in their identification of the initial source of decline in the average rate of profit (see Weisskopf, 1978, for an earlier formulation of this approach). The three variants focus attention, respectively, on (1) technological change and the behaviour of the 'organic composition of capital'; (2) class struggle and the distribution of income between labour and capital; and (3) the problem of 'realisation' of the full value of commodities produced. To differentiate the three arguments, it is helpful to consider first the following expression for the rate of profit,  $\rho$

$$\rho = \frac{\Pi}{K} = \frac{\Pi}{Y} \cdot \frac{Y}{Z} \cdot \frac{Z}{K} = \sigma_{\pi} \varphi \zeta \quad (1)$$

where  $\Pi$  measures the volume of profits;  $K$  measures the capital stock;  $Y$  measures actual output (or income); and  $Z$  measures potential output (or capacity).<sup>‡</sup> The rate of profit is definitionally equal to the product of the share of profits in income,  $\sigma_{\pi}$ ; the rate of capacity utilisation,  $\varphi$ ; and the capacity/capital ratio,  $\zeta$ . Each of the three variants of Marxian crisis theory can be shown to focus on different elements in equation (1) as the initial source of decline in the rate of profit.<sup>§</sup>

#### *Rising organic composition of capital*

The first variant is based on the thesis of a *rising organic composition of capital*; I will refer to it as the 'ROC variant'. This is most fully developed by Marx himself (see *Capital*,

<sup>†</sup> See Glossary of Symbols, pp. 374–375.

<sup>‡</sup> All the variables in equation (1) are expressed in nominal terms at current prices. The variables are aggregates defined over a single capitalist economy, or a sector thereof.  $\Pi$  includes all forms of property income, net of capital consumption allowances but before direct taxation;  $K$  is net of depreciation; and  $Y$  and  $Z$  are net of both capital consumption allowances and indirect business taxes.

<sup>§</sup> Whatever the initial source of decline in the rate of profit, that decline will sooner or later induce a fall in the rate of investment which in turn is likely to lead to a decline in the rate of capacity utilisation. Such a lagged decline in  $\varphi$  should not, of course, be identified with the initial source of the decline in  $\rho$ .

Volume III, especially Part III, Chapters 13–15). It has been applied primarily to explain a long-run tendency of the rate of profit to fall, but it can also be adapted to explain short-run cyclical fluctuations in the rate of profit. The ROC variant is generally formulated within a Marxian value-theoretic framework. Using the standard labour-value concepts ( $c$  = constant capital;  $v$  = variable capital;  $s$  = surplus value), we have

$$g = c/v \quad (2)$$

$$e = s/v \quad (3)$$

$$r = \frac{s}{c+v} = \frac{e}{g+1} \quad (4)$$

where  $g$  is the organic composition of capital,  $e$  is the rate of exploitation, and  $r$  is the value rate of profit. The essential hypothesis of the ROC variant is that the capitalist process of accumulation sooner or later generates an increase in the organic composition of capital. It is further hypothesised that the rate of exploitation does not change appreciably. It follows directly from equation (4) that a rise in  $g$  with constant  $e$  will result in a fall in the value rate of profit  $r$ .

For the purposes of the present study, I wish to translate the ROC variant into a price framework so as to test it as an explanation of the behaviour of the conventional rate of profit  $\rho$ . This may be readily accomplished by identifying constant capital with the stock of (fixed and working) capital  $K$ , variable capital with the total wage bill  $W$  ( $= Y - \Pi$ ), and surplus value with the volume of profits  $\Pi$ .<sup>†</sup> Then the price analogues of the organic composition of capital, the rate of exploitation and the value rate of profit become

$$\gamma = K/W, \quad (5)$$

$$\varepsilon = \Pi/W, \quad (6)$$

$$\rho = \Pi/K = \varepsilon/\gamma. \quad (7)$$

The ROC variant in its price form hypothesises that  $\gamma$  rises while  $\varepsilon$  remains constant, thereby causing the rate of profit  $\rho$  to fall.<sup>‡</sup>

The ROC variant may be related to equation (1) as follows. First of all, the assumption of a constant  $\varepsilon = \Pi/W$  implies that  $\sigma_\pi = \Pi/Y$  and  $\sigma_w = W/Y$  remain constant. Second, the ROC variant does not hinge on the development of excess capacity; thus the rate of capacity utilisation  $\varphi = Y/Z$  must also be presumed constant. Third, the hypothesised rise in  $\gamma = K/W$  must cause the capacity/capital ratio  $\zeta$  to fall; this follows from

<sup>†</sup> I recognise that this translation from a value to a price framework distorts in certain ways the original concepts developed by Marx. Thus for Marx  $c$  is a flow magnitude and  $r$  a flow ratio; while  $K$  is a stock and  $\rho$  a flow/stock ratio. Moreover,  $s$  is usually defined to correspond to a substantially larger share of national income (by any standard of measurement) than  $\Pi$ . I contend, however, that a relevant Marxian crisis theory must ultimately explain the behaviour of that profit rate— $\rho$ —which is actually perceived by (and thus affects the behaviour of) capitalists themselves. I invite readers who would prefer a different formulation of the ROC variant as a theory of decline in  $\rho$  to show that their formulation would lead to a different assessment than I reach in this paper.

<sup>‡</sup> It has been rigorously proved, by Roemer (1977) among others, that under the usual competitive assumptions any cost-reducing technological change introduced by capitalists will have the ultimate effect of raising the rate of profit—assuming that the real wage of workers remains unchanged. However, this proof does not discredit *a priori* grounds the ROC variant of Marxian crisis theory formulated in this paper. That is because I have relaxed the assumption of a constant real wage and instead assumed only a *constant share* of wages in national income—exactly as Roemer (1978) has done in extending his own theoretical analysis of Marx's falling rate of profit.

the constancy of relative shares and the rate of capacity utilisation in the equation

$$\gamma = \frac{K}{W} = \frac{K}{\zeta} \cdot \frac{\zeta}{Y} \cdot \frac{Y}{W} = \frac{1}{\zeta} \cdot \frac{1}{\phi} \cdot \frac{1}{\sigma_w} \quad (8)$$

Thus according to the ROC variant of Marxian crisis theory it is a fall in the third term  $\zeta$  of equation (1) that constitutes the initial source of decline in the rate of profit.

Why should the organic composition of capital—or its price analogue—rise in the first place? Underlying the essential hypothesis of the ROC variant in its long-run form is the argument that the capitalist process of accumulation tends to generate a rise in the ‘technical composition of capital’—or, in price terms, a rise in the real capital/labour ratio. Denoting the latter by  $\bar{k}$ , we have

$$\bar{k} = K/L \quad (9)$$

where  $K$  is a measure of the real capital stock ( $K$  at constant prices) and  $L$  is a measure of labour input in hours. There can be little doubt that the long-run growth of capitalist economies has been associated with a secular increase in  $\bar{k}$  (notwithstanding all the difficulties involved in measuring  $\bar{k}$ ). The most common explanation for this secular trend is that differential rates of growth of the underlying factor supplies (capital can usually be accumulated faster than the rate of population growth) lead to changes in relative factor prices that induce labour-saving technological innovations.† It is not so obvious why short-run expansions should generate cyclical increases in  $\bar{k}$ . But the hypothesis can be made theoretically plausible in the short-run by the argument that the forces which cause a long-run increase in  $\bar{k}$  are likely to manifest themselves most strongly during cyclical expansions, because it is precisely then that the rate of new capital formation (and hence also embodied technological change) is likely to be the highest.

There remains the relationship between the technical and the organic composition of capital. We may express the price analogue of the latter as

$$\gamma = \frac{K}{wL} = \frac{P_k \bar{K}}{P_w \bar{w} L} = \frac{P_k \bar{k}}{P_w \bar{w}} \quad (10)$$

where  $P_k$  and  $P_w$  are price indices for the commodities contained in the capital stock and the wage bundle, and  $w$  and  $\bar{w}$  denote the hourly wage in nominal and real terms. It follows from equation (10) that a rise in  $\bar{k}$  can indeed result in a rise in  $\gamma$  (and hence a fall in  $\zeta$  and  $\rho$ ), but it will not necessarily do so because it could be offset by counter-vailing changes in the price or wage variables. The issue clearly cannot be resolved *a priori*. Equation (10) also suggests another possible argument to explain a rising  $\gamma$ , independent of any increase in  $\bar{k}$ : a rise in the relative price of capital goods *vis-à-vis* wage goods ( $P_k/P_w$ ). Such an argument is plausible at least in a cyclical context, linked to high rates of investment demand in boom periods, and a similar argument could be advanced in a longer-run context. I will ignore the possibility that a decline in the real wage ( $\bar{w}$ ) could cause a rising  $\gamma$ , since the ROC variant assumes constant relative shares.

### *Rising strength of labour*

The second variant of Marxian crisis theory is based on the thesis of a *rising strength of labour*; this ‘RSL variant’ focusses on gains by the working class in its struggle with the

† In correspondence with the author, David Gordon has urged an alternative theoretical explanation for the secular tendency of the technical composition of capital to rise with capitalist growth. Referring to Gordon (1976) and Shaikh (1978), he suggests that a theory based on capitalists’ drive for labour control as the impetus for mechanisation provides a better explanation because it is independent of cyclically contingent factor price movements.

capitalist class. This variant has been developed in recent years by several Marxian political economists pursuing a line of argument presented by Marx (in *Capital*, Volume I, Chapter 25), who originally applied it to explain cyclical economic downturns in capitalist economies. Boddy and Crotty (1975) have adapted Marx's argument to analyse the business cycle in the postwar U.S. economy; while Glyn and Sutcliffe (1972) have developed a secular version of the RSL variant to analyse the apparent long-run decline of the rate of profit in the postwar British economy. The principal hypothesis of this variant is that the capitalist process of accumulation tends to alter the balance of political-economic power between labour and capital, in such a way as to enable the working class to increase the wage share  $\sigma_w$  of national income. Since the profit share  $\sigma_\pi$  may be expressed as

$$\sigma_\pi = \frac{\Pi}{Y} = \frac{Y-W}{Y} = 1 - \sigma_w \quad (11)$$

the hypothesised rise in the wage share will squeeze the profit share. Thus the RSL variant points to a fall in the first term  $\sigma_\pi$  of equation (1) as the initial source of decline in the rate of profit; no prior fall in either the rate of capacity utilisation or the capacity/capital ratio is assumed to occur.

The reasons advanced for the growth in working class power differ somewhat in the cyclical and longer-run versions of the RSL variant. The cyclical version rests on the notion of a periodic depletion of the reserve army of labour. As a cyclical expansion develops the demand for labour grows more rapidly than the supply, the reserve army is depleted, and labour markets tighten. The growing scarcity of labour is then hypothesised to increase its political-economic power and improve the bargaining position of workers *vis-à-vis* capitalists. This line of argument is well grounded theoretically: unemployment rates do indeed decline during cyclical expansions, and it is quite plausible to suggest that tighter labour markets improve the bargaining position of workers (although the balance of power between labour and capital is surely affected by many other factors as well).

The hypothesis of a rise in working class power in a longer-term context cannot so readily be grounded in a secular depletion of the reserve army; for in the long run one might expect (with Marx) that the reserve army would be replenished by periodic economic downturns, by labour-saving technological change, or by new sources of labour supply. Thus Glyn and Sutcliffe (1972) do not appeal to the behaviour of the reserve army in postulating a rise in the strength of British labour since World War II. Instead, they simply describe the growth of trade union power and working class influence on government policy. Their approach appears to beg the question of the *source* of secular growth in working class power; this remains without adequate theoretical foundation in the larger framework of the dynamics of the capitalist accumulation process.

How is increased working class power translated into an increase in the wage share of national income? The RSL variant, in both its cyclical and longer-run form, focusses attention on the inter-related behaviour of wages, productivity and prices. It is useful first to express the wage share as

$$\sigma_w = \frac{W}{Y} = \frac{W/\bar{Y}}{P_y} = \frac{u_w}{P_y} = \frac{w/\bar{y}}{P_y} \quad (12)$$

where  $P_y$  is the (net) output price deflator,  $Y$  is net output expressed in current

prices and  $\bar{Y}$  net output expressed in constant prices;  $u_w$  is average unit labour costs, and  $\bar{y}$  is average labour productivity ( $\bar{Y}/L$ ). As before,  $w$  denotes money wages ( $W/L$ ). The wage share thus increases to the extent that unit labour costs rise more rapidly than (net) output prices; and labour costs increase to the extent that money wages rise more rapidly than productivity.

The following three key propositions have been advanced by RSL theorists. First, an increase in working class power enables workers to bargain more successfully for higher wages and thereby to increase the rate of growth of money wages. Second, an increase in working class power enables workers to resist more successfully capitalist efforts to increase work intensity (via increased discipline, speed-ups, and other measures designed to increase labour efficiency units per hour of work) and thereby to reduce the rate of growth of productivity. Third, the rise in unit labour costs, which will sooner or later result from accelerating wages and/or decelerating productivity, will not be offset by a corresponding increase in output prices; as a consequence, the share of wages will rise. The first two of the above propositions are eminently plausible. The third is more controversial; it runs counter to arguments put forward by Kalecki (1954) and Rowthorn (1977), *inter alia*. To defend their contention that rising unit labour costs will result in a profit squeeze, and not simply inflation, RSL theorists such as Glyn and Sutcliffe (1972) and Crotty and Rapping (1976) have appealed to the discipline of international competition among rival capitalist powers.

### *Realisation failure*

The third basic variant of Marxian crisis theory differs from the first two in that it focusses on the sphere of circulation rather than the sphere of production. The threat to profitability is precipitated in the ROC variant by rising capital costs and in the RSL variant by rising labour costs. The threat to profitability in the third variant stems from difficulties in selling the produced commodities at profitable prices, i.e. at prices that cover the costs incurred as well as the expected profit margin. In Marxian terminology, the problem is that demand conditions prevent the capitalists from realising the full value of the commodities produced; hence this variant is based on the thesis of a *realisation failure* and will be labelled the 'RF variant'.

The RF variant of Marxian crisis theory has been elaborated by many followers of Marx, drawing upon certain observations—but not a complete theory—in Marx's own work. Sweezy (1942, Chapter 10) discusses two principal types of realisation crises, arising from 'underconsumption' and from 'disproportionality', respectively; he develops a version of the RF variant based on underconsumption, which is modified and elaborated into a theory of secular stagnation in Baran and Sweezy (1966). Steindl (1952) and Baran (1957, Chapters 3–4) have also formulated theories of secular stagnation arising from realisation problems; their theories are based on what might better be described as 'underinvestment' than underconsumption. Kalecki's work on the capitalist business cycle (see Kalecki, 1971, Chapters 1, 3, 11, 15) can be considered a cyclical RF theory based on underinvestment; and Sherman (1976, Chapters 3–5) has adapted the underconsumption form of the RF variant in a cyclical context as part of his analysis of the business cycle in the U.S. economy.

The basic hypothesis of this variant of Marxian crisis theory is that the capitalist process of accumulation tends to generate an imbalance in which the demand for commodities lags behind the capacity to produce commodities. The resulting inadequacy of demand obliges capitalists to restrain either their production levels or their output

prices, lest they add involuntarily to their inventories of unsold output. Given the institutional constraints on price reduction that operate in many sectors of contemporary capitalist economies, capitalists can be expected to deal with inadequate demand primarily by cutting back production and consequently lowering the average rate of capacity utilisation in the economy as a whole. The RF variant thus singles out a fall in the second term  $\phi$  of equation (1) as the initial source of decline in the rate of profit; it suggests no reason to expect a fall in either the share of profits or the capacity/capital ratio.

What causes the inadequacy of demand that is central to the RF variant of Marxian crisis theory? Most RF theorists have based their argument on *aggregate* problems of underconsumption and/or underinvestment; I will address this type of argument first. Then I will turn briefly to consider the alternative line of reasoning based on *sectoral* disproportionality.

The logic of the underconsumption thesis, in either a long-run or a short-run context, runs from a declining wage share to a slowdown in consumption demand to a fall in aggregate demand relative to productive capacity. Long-run versions of the thesis attribute a secular decline in the share of wages to a growing degree of monopoly power in advanced capitalist economies. Short-run versions attribute cyclical declines in the wage share to the relative volatility of profits as compared to wages; when a capitalist economy emerges from a contraction into a new period of expansion, profits rebound vigorously from previously depressed levels while wages tend to change less dramatically. A declining wage share—either in the long-run or the short-run—is presumed to restrain the growth of consumption demand because the propensity to consume out of wage income is higher than the propensity to consume out of profit income. A slowdown in consumption demand is in turn assumed to restrain the growth of aggregate demand because the other main source of spending—investment demand—is essentially a derived demand, ultimately dependent on the growth of consumption.<sup>†</sup> It should be noted that the decline in the wage share that initiates the fall in consumption leads by itself to a rise in the profit share; thus the ultimate decline that occurs in the rate of capacity utilisation must be assumed to be greater in its impact on the profit rate than any continued rise in the profit share.

Theories of inadequate aggregate demand that focus on underinvestment—independently of any possible slowdown in the growth of consumption demand—differ in their secular and cyclical formulations. Underinvestment in a secular context is generally associated with the transition from predominantly competitive to predominantly monopolistic capitalist enterprise; it is argued that monopolistic firms have less of an incentive to invest than competitive firms because, for example, monopolistic firms have more reason to worry about spoiling their own markets. Underinvestment in a cyclical context is regarded as part of a pattern of investment volatility that involves periods of unusually high and unusually low rates of investment. Such a pattern is generally explained by an accelerator-type mechanism in which the rate of investment is a positive function of the rate of growth of output and a negative function of the level of capital stock. This

<sup>†</sup> To complete the underconsumption argument (as well as the underinvestment argument to be discussed next), it is also necessary to explain why the capitalist state will not or cannot implement successfully a macroeconomic policy designed to offset cyclical fluctuations—or to stem indefinitely a secular slowdown—in aggregate demand from the private sector. Some reasons for the limited role of the state in this regard are offered by Baran (1957, chapter 4) and Sherman (1976, chapter 9); their arguments are discussed in the context of a general theoretical review of the role of the state in Marxian theories of cyclical crisis by Weisskopf (1978, section VI).

formulation of a cyclical RF variant of Marxian crisis theory clearly has much in common with conventional multiplier-accelerator models of the type first formulated by Samuelson (1939).

The disproportionality thesis differs from the underconsumption and underinvestment theses in its focus on sectoral imbalances between demand and productive capacity rather than an aggregate deficiency of demand. The argument is premised on the anarchy of decentralised investment decision-making that characterises a capitalist economy. This anarchic process is presumed to lead to a sectorally unbalanced pattern of new capital formation and capacity growth, in which some industries will turn out to have excess capacity while others will have insufficient capacity in relation to the structure of demand. In a world of limited (downward) price flexibility, this combination of surpluses and shortages will lead simultaneously to a fall in the aggregate rate of capacity utilisation and to a rise in the rate of inflation.

To conclude this comparative discussion of three basic variants of Marxian crisis theory, I should caution against viewing them solely as competitive alternatives. In Marx's own thinking they were dynamically inter-related: one process of decline in the rate of profit could be expected to lead, in a dialectical manner, to an ameliorative response that would in turn initiate another process of decline. Such dynamic inter-relationships among the three theoretical variants discussed here have been sketched out by Alcala (1978) and developed in a mathematical model of Marxian crisis theory by Laibman (1979). Yet I believe it is nonetheless of interest to raise the question: which of the three variants—the ROC, the RSL or the RF—has manifested itself most strongly in particular historical periods of profit rate decline? It is possible for more than one of the three variants to operate simultaneously, as well as sequentially, to depress the rate of profit. The effort to determine how significant each variant has been can contribute to an understanding of actual declines in the rate of profit, and it can thereby provide a useful empirical foundation for current debates among Marxian theorists of economic crisis. I turn now to this empirical task.

## 2. Empirical evidence for the initial analysis

To analyse the behaviour of the rate of profit in the postwar U.S. economy, I required consistent data on the rate of profit itself as well as on many related variables (such as those introduced in the previous section). Such data are not readily available for the U.S. economy as a whole; however, they can be compiled with a reasonable degree of accuracy for the entire *non-financial corporate business NFCB sector* of the economy. The NFCB sector accounts for approximately 60% of the U.S. gross national product; it leaves out primarily small-scale unincorporated businesses and financial and public service sectors.† Since it includes virtually all of the major private firms and covers the most dynamic industries in the U.S. economy, the NFCB sector is very important in its own right and sufficiently representative of the whole economy to serve as the focus of this study. A decline in the average rate of profit in the NFCB sector surely reflects forces at work in the larger economy, and it likewise influences the future development of the U.S. economy as a whole.

† According to data from the U.S. National Income and Product Accounts, the NFCB sector accounted for 58% of GNP in 1976. About half of the remainder of GNP was accounted for by unincorporated non-farm business; and the rest consisted of output generated in the government, farm, household, financial corporate business and foreign sectors (listed in descending order of significance).



There are, of course, a variety of different ways of conceptualising and measuring the 'average rate of profit'  $\rho$  in the NFCB sector; some possible alternatives are discussed by Nordhaus (1974) and Holland and Myers (1979). For the purposes of this study I have defined  $\rho = \Pi/K$ , where  $\Pi$  is before-tax net capital income (including corporate profits plus net interest) and  $K$  is the net stock of capital (including both fixed capital and inventories).<sup>†</sup>  $\Pi$ , as I have defined it, sums with  $W$  (employee compensation) to equal  $Y$  (the net income generated in the NFCB sector). I have chosen to focus on before-tax rather than after-tax profits because the former is conceptually prior to the latter and because Marxian crisis theory has most often been applied to explain the behaviour of the before-tax profit rate<sup>‡</sup>

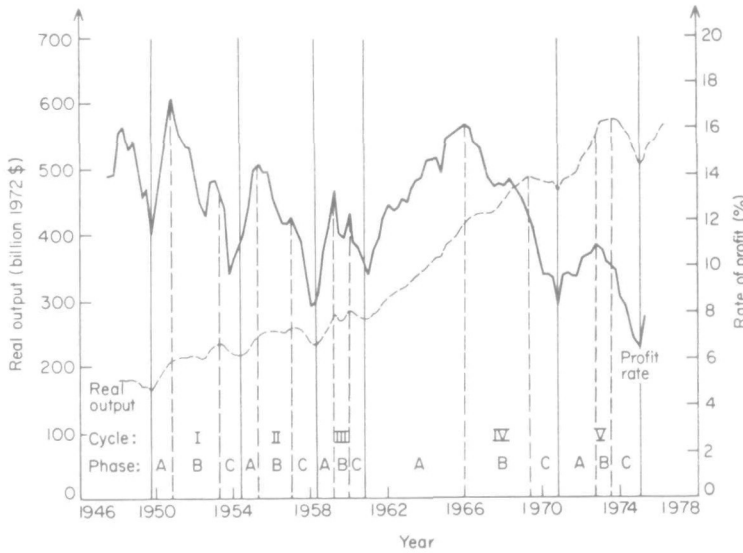


Fig. 1. NFCB output and profitability in the postwar period

The exact period of time to be covered by the empirical analysis of this study was determined with reference to aggregate data on the NFCB sector since World War II. Quarterly data on the level of real output  $\bar{Y}$  (measured as  $Y$  at constant 1972 prices) and the before-tax rate of profit in the NFCB sector are plotted in Fig. 1 for most of the postwar period. § Figure 1 shows clearly a long-run upward trend in  $\bar{Y}$ , and—less clearly—a long-run downward trend in  $\rho$ . This downward trend suggests that the Marxian concern with a long-run tendency for the rate of profit to fall may be appropriate for the postwar U.S. economy. Figure 1 also exposes clearly a cyclical pattern of movement in each variable, with the rate of profit leading the level of real output through every

<sup>†</sup> My concept of  $\rho$  is thus equivalent to Nordhaus' (1974) before-tax 'genuine rate of return on non-financial corporate capital'. Corporate profits are measured net of estimated economic depreciation (which requires a capital consumption adjustment to the capital consumption allowances); they include an inventory valuation adjustment; and they are defined to exclude all capital gains on fixed capital stock and inventories. The fixed capital stock is also measured net of estimated economic depreciation.

<sup>‡</sup> Furthermore, a satisfactory analysis of the behaviour of the after-tax profit rate would require attention not only to corporate profit taxation but also to other forms of taxation and to the state expenditure that is thereby financed. Such a task was beyond the scope of the present study; but I am planning to extend my empirical analysis in this direction in a subsequent study.

§ The sources for all of the data used in this study are fully documented in the Appendix.

cycle. Dating each cycle from a trough in  $\bar{Y}$  through the following peak to the subsequent trough in  $\bar{Y}$ , one can identify five complete cycles beginning in the fourth quarter of 1949 and ending in the first quarter of 1975.<sup>†</sup> To define a long-run period with terminal years at the same phase of the cycle, and to include as many complete cycles as possible, I chose the period from 1949.4 to 1975.1 as the complete time span for all of the empirical analysis to follow.

**Table 1.** *Postwar cycles in NFCB output and profit rates*

Cycle/phase		Keypoint	Quarter	Real output, <sup>a</sup> $\bar{Y}$	Profit rate, <sup>b</sup> $\rho$
I	A	$\bar{Y}$ -trough	1949.4	164.0	11.5
	B	$\rho$ -peak	1950.4	211.3	17.4
	C	$\bar{Y}$ -peak	1953.2	237.0	13.3
		$\bar{Y}$ -trough	1954.2	218.6	11.1
II	A	$\rho$ -peak	1955.2	250.5	14.7
	B	$\bar{Y}$ -peak	1957.1	261.4	12.2
	C	$\bar{Y}$ -trough	1958.2	232.8	8.7
		$\rho$ -peak	1959.2	278.7	13.4
III	A	$\bar{Y}$ -peak	1960.1	287.5	12.5
	B	$\bar{Y}$ -trough	1960.4	273.9	10.2
	C	$\rho$ -peak	1966.1	421.7	16.3
		$\bar{Y}$ -peak	1969.2	490.9	12.5
IV	A	$\bar{Y}$ -trough	1970.4	466.3	8.7
	B	$\rho$ -peak	1972.4	522.5	11.1
	C	$\bar{Y}$ -peak	1973.3	577.4	10.1
		$\bar{Y}$ -trough	1975.1	504.5	6.5

<sup>a</sup> Net domestic income in \$billion at 1972 prices.

<sup>b</sup> Adjusted corporate profits plus net interest as % of capital stock.

Table 1 presents the actual values of  $\bar{Y}$  and  $\rho$  for sixteen key quarters during the chosen period of time. These key quarters include the end-points of each cycle, where  $\bar{Y}$  reaches its cyclical trough, the five quarters in which  $\bar{Y}$  reaches its cyclical peak, and the five quarters in which  $\rho$  reaches its cyclical peak. From Fig. 1 and Table 1 it is evident that each of the five cycles (I–V) can be divided into three distinct sub-periods of time. Phase A is the sub-period from the beginning of the cycle (the  $\bar{Y}$ -trough) to the quarter in which  $\rho$  peaks. Phase B is the next sub-period during which  $\bar{Y}$  continues to rise but  $\rho$  is down from its cyclical peak. Finally, phase C is the sub-period at the end of the cycle during which  $\bar{Y}$  falls from its peak to its subsequent trough.<sup>‡</sup>

<sup>†</sup> Following the conventional procedure for dating cycles in the U.S. economy (as practiced by the National Bureau of Economic Research), I have identified turning points in real output as troughs and peaks only if the turn is sustained for at least two quarters. Thus the dip in real output right after 1959.2 (the beginning of phase B in cycle III) does not constitute a trough because it lasted only until 1959.3.

<sup>‡</sup> For symmetry one might prefer to divide each cyclical contraction (like each expansion) into two sub-periods. I did not do so for two reasons: (1) my main interest was in analysing sources of profit rate downturns rather than upturns; and (2) postwar cyclical contractions in the U.S. economy have been much shorter than the cyclical expansions, and in some cases it is impossible to distinguish sub-periods of falling and rising profit rates within a contraction.

The division of each cycle into phases A, B and C divides the period as a whole into fifteen exhaustive sub-periods. The three phases of each cycle involve qualitatively different behaviour on the part of the real output and profit rate variables. Most significant for the purposes of this study is the division of each cyclical expansion (from the  $\bar{Y}$ -trough to the  $\bar{Y}$ -peak) into two phases: an 'early expansion' (phase A) during which  $\rho$  rises and a 'late expansion' (phase B) during which  $\rho$  falls. The fact that the profit rate falls well before the onset of each cyclical contraction (phase C) lends some empirical support to the sequence of events posited by all variants of Marxian crisis theory: that a decline in the average rate of profit leads to a decline in investment spending that leads ultimately to a decline in real output.

To initiate the analysis of sources of profit rate decline—both in a secular and a cyclical context—I will discuss in the following paragraphs some relevant empirical evidence on the four basic variables in equation (1). These include the rate of profit itself and the three component variables associated with the three basic variants of Marxian crisis theory: the share of profits  $\sigma_\pi$ , the rate of capacity utilisation  $\phi$ , and the capacity/capital ratio  $\zeta$ . By determining the extent to which each component variable accounts for different instances of profit rate decline, one may draw preliminary inferences about the applicability of the alternative variants under consideration.

**Table 2.** *Values of basic variables: full period and cycle averages (percentages)*

	Full period	Cycles				
		I	II	III	IV	V
Rate of profit, $\rho$	12.1	13.7	12.0	11.4	13.1	9.4
Share of profits, $\sigma_\pi$	19.2	21.6	19.7	19.1	19.9	15.5
Capacity utilisation rate, $\phi$	83.6	85.0	83.3	79.8	84.7	82.3
Capacity/capital ratio, $\zeta$	75.5	74.7	73.0	75.0	78.0	73.2

Table 2 displays the values of each of the four basic variables, averaged over the full period from 1949.4 to 1975.1 and over each of the five cycles. Over the full period the NFCB profit rate has averaged roughly 12%; this figure is the product of an average profit share of 19%, an average rate of capacity utilisation of 84%, and an average capacity/capital ratio of 75%. The long-run trend in the profit rate was evidently downward between cycles I and III, upward between cycles III and IV, and then downward again to cycle V.

Since the primary purpose of this study is to analyse *changes* rather than levels of the profit rate, it will be most helpful to present the relevant data in the form of rates of change over time. Denoting by a dot superscript the exponential rate of change of any variable  $x$  at time  $t$ —so that  $\dot{x}(t) = dx(t)/dt$  divided by  $x(t)$ —one can convert the basic equation (1) into the following 'growth accounting equation'

$$\dot{\rho} = \dot{\sigma}_\pi + \dot{\phi} + \dot{\zeta}. \quad (13)$$

This equation allows one to break down the change in  $\rho$  during any period of time into the sum of the effects of each of the three component variables.

**Table 3.** Rates of growth of basic variables: full period and between cycles (all figures represent average annual % rates of growth)

	Full period	Cycles			
		I-II	II-III	III-IV	IV-V
Rate of profit, $\rho$	-1.20	-3.2	-1.5	+2.2	-4.7
Share of profits, $\sigma_\pi$	-1.24	-2.1	-1.1	+0.7	-3.4
Capacity utilisation rate, $\phi$	+0.02	-0.5	-1.3	+0.9	-0.4
Capacity/capital ratio, $\zeta$	+0.02	-0.5	+0.9	+0.6	-0.9

Table 3 provides evidence on long-run trends in the NFCB profit rate and its component variables.<sup>†</sup> The profit rate declined during the full period from 1949.4 to 1975.1 at an average annual rate of 1.2%; this decline was attributable almost entirely to a decline in the profit share, for there was no appreciable long-run trend in either the rate of capacity utilisation or the capacity/capital ratio. The cycle-to-cycle figures reinforce the significance of the profit share in accounting for profit rate declines. In the three cases where  $\rho$  did fall (I-II, II-III and IV-V),  $\sigma_\pi$  accounted for about two thirds of the decline. When  $\rho$  actually increased (III-IV), the increase was due more to a rising  $\phi$  than to a rising  $\sigma_\pi$ . Had the average rate of capacity utilisation not been substantially higher in cycle IV than in cycle III, the average rate of profit would not have been so much higher either; the long-term downward trend in the share of profits was reversed in cycle IV, but only to a small extent.

**Table 4.** Rates of growth of basic variables: phase averages (all figures represent average annual % rates of growth)

	Phases		
	A	B	C
Rate of profit, $\rho$	+26.8	-10.1	-25.3
Share of profits, $\sigma_\pi$	+17.0	-8.8	-15.6
Capacity utilisation rate, $\phi$	+10.8	+0.5	-11.9
Capacity/capital ratio, $\zeta$	-1.1	-1.8	+2.1

**Table 5.** Rates of growth of basic variables: phase B in each cycle (all figures represent average annual % rates of growth)

	Cycles				
	I	II	III	IV	V
Rate of profit, $\rho$	-10.8	-10.5	-9.7	-8.2	-11.5
Share of profits, $\sigma_\pi$	-9.6	-7.9	-10.1	-6.1	-10.3
Capacity utilisation rate, $\phi$	+1.5	-1.1	-1.0	-1.6	+4.5
Capacity/capital ratio, $\zeta$	-2.7	-1.6	+1.3	-0.4	-5.6

<sup>†</sup> The full-period rate of growth of each variable  $x$  was obtained by ordinary least squares regression of  $\log x$  on time (measured in years), with observations for each quarter from 1949.4 to 1975.1; the estimated value of the time coefficient is the average annual exponential rate of growth of  $x$ . The rates of growth between cycles were determined in two stages. First, the (geometric) mean values of each variable were calculated and ascribed to the mid-points of the corresponding cycles. Then, the average annual exponential rates of growth of each variable from one cycle mid-point to the next were calculated by the method described in the following footnote.

Tables 4 and 5 provide evidence on the cyclical behaviour of the NFCB profit rate and its basic component variables. Rates of growth of each of the four variables were calculated for each of the 15 sub-periods defined by cycle and phase;<sup>†</sup> these rates of growth are averaged by phase in Table 4 and displayed for phase B of each cycle in Table 5. The cyclical pattern of behaviour of  $\rho$  is clearly documented by the figures in Table 4. The rapid rise of  $\rho$  in the early expansion phase A is a consequence of rapid increases in both  $\sigma_\pi$  and  $\varphi$ . The subsequent decline of  $\rho$  in the late expansion phase B is attributable almost entirely to a corresponding decline in  $\sigma_\pi$ . The more rapid decline of  $\rho$  in the contraction phase C is (like the rise in A) associated with significant similar trends in both  $\sigma_\pi$  and  $\varphi$ . The remaining basic component variable  $\zeta$ —the capacity/capital ratio—contributes relatively little to the cyclical variation of  $\rho$ .

The most critical task of Marxian crisis theory in a cyclical context is clearly to explain the decline in the rate of profit during the late expansion phase B, which precedes the actual downturn of the economy in the contraction phase C. The evidence in Table 4 points to the significance of a declining share of profits; Table 5 provides figures on phase B of each individual cycle to explore this proposition further. By and large, the impression conveyed by the averaged figures in Table 4 is confirmed by the separated figures in Table 5. In each of the postwar business cycles, most—if not all—of the phase B decline in  $\rho$  can be accounted for by a decline in  $\sigma_\pi$ . In three cycles (II, III and IV) a decline in  $\varphi$  contributed to the decline in  $\rho$ ; and in four cycles (I, II, IV, V) a decline in  $\zeta$  also contributed. But these latter effects were much smaller than the effect of  $\sigma_\pi$ .

At this stage of the analysis it appears that the RSL variant of Marxian crisis theory can best explain the long-run and the cyclical declines observed in the rate of profit in the NFCB sector of the postwar U.S. economy. The significance of a falling share of profits in accounting for each instance of a falling rate of profit is consistent with the hypothesis of a rising strength of labour. The relative insignificance of declines in the rate of capacity utilisation and the capacity/capital ratio casts doubt upon the variants based upon a rising organic composition of capital or a realisation failure. However, the evidence advanced thus far is by no means conclusive. For reasons to be discussed in the next section, changes in the basic component variables  $\sigma_\pi$ ,  $\varphi$  and  $\zeta$  do not provide unambiguous tests of the alternative variants of Marxian crisis theory. To develop a more discriminating analysis of sources of profit rate decline, it will be necessary to construct a more elaborate framework of growth-accounting equations.

### 3. A more elaborate theoretical analysis

The simple empirical tests described in section 2 are insufficient for several reasons. First, they do not confront the fact that movements in the three basic component variables are not uniquely and exclusively associated with the hypotheses underlying the three corresponding variants of Marxian crisis theory. Second, even where a decline in a given component variable accurately reflects the operation of the corresponding

<sup>†</sup> The rate of growth of each variable  $x$ , during any given time period from quarter  $t = t_1$  to quarter  $t = t_2$ , was calculated according to the following formula:

$$\dot{x}(t_2/t_1) = \frac{\log x(t_2) - \log x(t_1)}{t_2 - t_1}$$

where  $\dot{x}(t_2/t_1)$  denotes the average annual exponential rate of growth of  $x$  from  $t_1$  to  $t_2$  and  $t$  is measured in years.

variant of Marxian crisis theory, it does not discriminate between different sub-variants, i.e. different ways in which the variant can operate. Such differences can be significant; to understand fully the sources of profit rate decline one needs to know more about the mechanisms operating within the framework of each variant.

*Overhead labour and the utilisation effect*

The first major ambiguity in the simple test arises from the overhead character of part of the work force. Certain types of labour—e.g. administrative, supervisory and maintenance employees—may be characterised as ‘overhead labour’ in the sense that they must be employed in proportion to the *capacity* of an enterprise, while other types of labour—e.g., most production workers—may be characterised as ‘direct labour’ in the sense that they can be employed in proportion to the actual *output* produced. Therefore, if and when the rate of capacity utilisation falls below an enterprise’s optimal operating rate, the total labour-hours of direct labour can fairly readily be cut back in proportion to output (either by reduced overtime or actual lay-offs), but the total labour-hours of overhead labour cannot easily be altered. As a rough generalisation, one can identify direct labour with hourly wage employees and overhead labour with salaried employees. The notion that the share of hourly wages in total income is relatively invariant over cyclical fluctuations in output, while the share of salaries varies counter-cyclically, has been stressed by Kalecki (1954) *inter alia*. It is also confirmed by empirical evidence from the manufacturing sector of the postwar U.S. economy.†

Because of the overhead labour phenomenon, a rise in the share of total wages (hourly wages plus salaries)  $\sigma_w$ , and hence a decline in the share of profits  $\sigma_\pi$ , may result from a decline in the rate of capacity utilisation  $\phi$  as well as a rise in the strength of labour.‡ Thus the behaviour of  $\sigma_\pi$  may reflect the operation of the RF variant as well as the RSL variant of Marxian crisis theory. To discriminate between those two sources of  $\sigma_w$ -rise (and  $\sigma_\pi$ -fall), one must find a way to distinguish the ‘utilisation effect’ of changes in  $\phi$  on  $\sigma_w$  from the effect of changes in other variables on  $\sigma_w$ .

Toward this end I will introduce the concept of ‘truly required’ overhead labour hours, as distinct from actually employed (and paid) overhead labour hours. Let  $\mathcal{P}$  be actual output and  $\mathcal{Z}$  be capacity in real terms, defined for a given enterprise (or for the NFCB sector as a whole); by definition

$$\phi = \mathcal{P}/\mathcal{Z}. \quad (14)$$

† I am indebted to Frank Munley for drawing my attention to data from the U.S. Annual Survey of Manufacturers which permit the wage and salary components of employee compensation to be separated. In an unpublished paper on ‘Determinants of the Manufacturing Profit Share’, Munley demonstrates clearly that the ratio of wages to manufacturing value added exhibits virtually no cyclicity, while the ratio of salaries to manufacturing value added is highly correlated (inversely) with the cyclically fluctuating rate of capacity utilisation in the manufacturing sector.

‡ The consequences of overhead labour under discussion here could result also from the phenomenon of ‘labour hoarding’, i.e. the retention of some employees during periods of slack capacity utilisation because the costs of firing and rehiring workers may exceed the costs of keeping idle workers on the payroll (see Oi, 1962). In an earlier version of this paper I stressed the labour hoarding effect rather than the overhead labour effect as the mechanism whereby changes in  $\phi$  could affect  $\sigma_w$ . But because several critics questioned the empirical significance of labour hoarding, and because usable data on wages *vs.* salaries proved to be available, I decided that it would be wiser to emphasise the overhead labour effect and to estimate it empirically by identifying overhead labour with salary earners. This identification is not error-free, but one may presume that those salary earners whose labour is direct (i.e. variable) are roughly offset by those wage earners whose labour is overhead (i.e. quasi-fixed).

Now let  $\hat{\phi}$  denote the optimal rate of capacity utilisation, defined as the rate to which the employment of overhead labour is geared. In other words, the number of overhead employees is such that each will be able to do efficiently a full week's work when  $\phi = \hat{\phi}$  and  $\bar{Y}$  is at its correspondingly optimal level, defined as

$$\hat{Y} = \hat{\phi} Z. \quad (15)$$

Should  $\phi$  fall below  $\hat{\phi}$ , and hence  $\bar{Y}$  below  $\hat{Y}$ , overhead employees would continue to work the same hours and be paid the same salary as they would if  $\bar{Y}$  were equal to  $\hat{Y}$  (they must be employed in proportion to  $Z$ ). However, their truly required labour hours would decline in proportion to actual output  $\bar{Y}$ , in the sense that only the latter (lower) number of labour hours would have been required if the whole operation had originally been designed for the lower level of output.

To describe this phenomenon algebraically, let  $L$ ,  $L_d$  and  $L_o$  refer to total, direct, and overhead labour hours, respectively. Then one may write

$$L = L_d + L_o, \quad (16)$$

$$L_d = \lambda_d \bar{Y} = \lambda_d \phi Z, \quad (17)$$

$$L_o = \lambda_o \hat{Y} = \lambda_o \hat{\phi} Z, \quad (18)$$

where  $\lambda_d$  and  $\lambda_o$  represent the labour hours of each type of labour employed (optimally) per unit of output. The truly required overhead labour can be expressed as

$$L_o^* = \lambda_o \bar{Y} = \lambda_o \phi Z = (\phi/\hat{\phi}) L_o. \quad (19)$$

The truly required total labour hours can then be written as

$$L^* = L_d + L_o^* = L_d + (\phi/\hat{\phi}) L_o \quad (20)$$

and a 'labour hour requirement ratio' may be defined as

$$\eta_L = L^*/L. \quad (21)$$

Now let  $w_d$  be the average hourly wage rate of direct labour, and  $w_o$  the average hourly wage equivalent of the salary rate of overhead labour; then one can write the total wage bill  $W$  as

$$W = w_d L_d + w_o L_o. \quad (22)$$

As distinct from the actual wage bill  $W$ , the truly required wage bill is

$$W^* = w_d L_d + w_o L_o^* \quad (23)$$

and a 'wage bill requirement ratio' may be defined as

$$\eta_w = W^*/W. \quad (24)$$

Both of the requirement ratios  $\eta_L$  and  $\eta_w$  are equal to unity when  $\phi = \hat{\phi}$ ; each of them varies directly with  $\phi$ .†

† These characteristics of the requirement ratios  $\eta_L$  and  $\eta_w$  can be confirmed by expressing the ratios in terms of the underlying capacity utilisation variables  $\phi$  and  $\hat{\phi}$ . Using equations (14)–(24), one can derive the following formulas

$$\eta_L = \frac{(\phi/\hat{\phi}) + (\lambda_d/\lambda_o)}{1 + (\lambda_d/\lambda_o)}, \quad \eta_w = \frac{(\phi/\hat{\phi}) + (w_d \lambda_d / w_o \lambda_o)}{1 + (w_d \lambda_d / w_o \lambda_o)}.$$

It is now possible to distinguish from the actual wage share  $\sigma_w$  a truly required wage share

$$\sigma_w^* = W^*/Y. \quad (25)$$

This last variable  $\sigma_w^*$  I will label the 'true' wage share; it represents the actual wage share  $\sigma_w$  controlled for the effect of changing rates of capacity utilisation  $\varphi$  on the efficiency of use of overhead labour.<sup>†</sup> If and only if  $\varphi = \hat{\varphi}$  does  $\sigma_w^* = \sigma_w$ ; when  $\varphi < \hat{\varphi}$ , then  $\sigma_w^* < \sigma_w$ .<sup>‡</sup> Combining equations (24) and (25) one may express the actual share of wages in terms of the true share as

$$\sigma_w = \sigma_w^*/\eta_w. \quad (26)$$

Equation (26) allows the actual wage share to be expressed in terms of two component variables, one of which ( $\eta_w$ ) transmits precisely the 'utilisation effect' of changes in  $\varphi$  and the other of which reflects the effect of changes in other variables on  $\sigma_w$ . For the purpose of testing alternative variants of Marxian crisis theory, one should associate increases in  $\sigma_w$  attributable to decreases in  $\eta_w$  with the RF variant; while increases in  $\sigma_w$  attributable to increases in  $\sigma_w^*$  should be associated with the RSL variant.

#### *Offensive vs. defensive labour strength*

To understand fully the RSL variant, and to discriminate among two rather different sub-variants of it, the variable  $\sigma_w^*$  must itself be further decomposed. Modifying equation (12) from section 1, one may express the actual wage share  $\sigma_w$  as

$$\sigma_w = \frac{W}{Y} = \frac{P_w \bar{W}}{P_y \bar{Y}} = \frac{P_w}{P_y} \cdot \frac{\bar{w}}{\bar{y}} \quad (27)$$

where  $P_i$  represents the appropriate price index for  $i$ , the bar superscript denotes a real value,  $\bar{w}$  is the average hourly real wage ( $\bar{W}/L$ ) and  $\bar{y}$  is average hourly labour productivity ( $\bar{Y}/L$ ). Corresponding to equation (27) is an expression for the true wage share  $\sigma_w^*$

$$\sigma_w^* = \frac{W^*}{Y} = \frac{P_w \bar{W}^*}{P_y \bar{Y}^*} = \frac{P_w}{P_y} \cdot \frac{\bar{w}^*}{\bar{y}^*} \quad (28)$$

where  $\bar{w}^*$  will be defined as the 'true' average hourly real wage ( $\bar{W}^*/L^*$ ) and  $\bar{y}^*$  will be defined as 'true' average hourly productivity ( $\bar{Y}^*/L^*$ ). Just as  $\sigma_w^*$  represents  $\sigma_w$  controlled for the utilisation effect, so  $\bar{w}^*$  and  $\bar{y}^*$  represent  $\bar{w}$  and  $\bar{y}$  controlled for that effect.

<sup>†</sup> One might suggest controlling for the effect of  $\varphi$  on  $\sigma_w$  by regressing  $\sigma_w$  on  $\varphi$  and removing from  $\sigma_w$  that part of its variation which is estimated (as the product of each observation of  $\varphi$  and the estimated coefficient on  $\varphi$  in the regression) to be attributable to variations in the rate of capacity utilisation. I rejected this alternative method in favour of the one described in the text for two reasons: first, the relationship between  $\sigma_w$  and  $\varphi$  is likely to be changing over time as the importance of salary income in the total wage bill changes; and, second, a regression of  $\sigma_w$  might pick up in the estimated  $\varphi$ -coefficient forces operating on  $\sigma_w$  that happen to be correlated with  $\varphi$  yet have nothing to do with the overhead labour effect that I am seeking to isolate.

<sup>‡</sup> It is theoretically also possible that  $\varphi$  could exceed  $\hat{\varphi}$ , in which case enterprises would be operating at a higher rate of capacity utilisation than the overhead labour force would ordinarily (and optimally) be expected to handle. When  $\varphi > \hat{\varphi}$ , then  $\sigma_w^* > \sigma_w$ ; thus capitalists would in effect be getting away with a lower actual wage bill than is truly required—via some combination of longer hours or harder work (without any correspondingly higher pay for the overhead employees). This phenomenon is a recognisable one in the actual practice of business enterprises during short-run periods of peak activity. As an empirical matter, the level of  $\hat{\varphi}$  is likely to be high enough (close enough to unity) so that it is not often exceeded by  $\varphi$  in the case of individual enterprises, and even less often in the case of an aggregate of enterprises such as the NFCB sector.



The true average hourly real wage rate  $\bar{w}^*$  differs from the actual one  $\bar{w}$  because the truly required proportions of direct and overhead labour differ from the actual proportions (except when  $\phi = \hat{\phi}$ ) and because the hourly wage of overhead labour is typically greater than that of direct labour. True productivity  $\bar{y}^*$  differs from actual productivity  $\bar{y}$  (except when  $\phi = \hat{\phi}$ ) because it represents real output per truly required labour hour  $L^*$  rather than per actual labour hour  $L$ . Recalling equation (21), one may express actual productivity in terms of true productivity as

$$\bar{y} = \frac{\bar{Y}}{L} = \frac{\bar{Y}}{L^*} \cdot \frac{L^*}{L} = \bar{y}^* \eta_\ell. \quad (29)$$

Thus actual productivity understates true productivity whenever  $\eta_\ell < 1$  (which is the case whenever  $\phi < \hat{\phi}$ ).

Referring to equation (28), one can see that the true wage share  $\sigma_w^*$  can rise because the true real wage  $\bar{w}^*$  rises faster than true productivity  $\bar{y}^*$ , because the price of wage goods  $P_w$  rises faster than the price of output  $P_y$ , or because of some combination of these two processes (including a rise in one ratio that more than offsets a fall in the other). Whatever the combination may be, it is appropriate to regard a rise in  $\sigma_w^*$  as evidence of a rise in labour strength, for the working class is gaining a larger share of net income or value added (controlling for the utilisation effect). But it would appear useful to distinguish between two sub-variants of the RSL variant of Marxian crisis theory according to whether or not workers are actually winning more rapid real wage increases than the growth in their productivity 'warrants'.

To the extent that a rise in  $\sigma_w^*$  is attributable to a rise in the real ratio  $\bar{w}^*/\bar{y}^*$ , then the working class can be described as 'on the offensive' in the real distributional struggle. But if a rise in  $\sigma_w^*$  is attributable entirely to a rise in the price ratio  $P_w/P_y$ , with no increase—or possibly a decrease—in  $\bar{w}^*/\bar{y}^*$ , then the working class should be viewed as 'on the defensive'. Under these circumstances relative price changes—whose origins need have nothing to do with workers—have caused a decline in the value of output in terms of its ability to meet workers' consumption needs. If the working class is able to maintain its position in the real distributional struggle by holding  $\bar{w}^*/\bar{y}^*$  constant, and if it thereby shifts the burden of the adverse relative price change on to the capitalist class in the form of a higher true wage share  $\sigma_w^*$  (and lower profit share  $\sigma_\pi$ ), labour is showing strength in protecting rather than in improving its real position. It is even conceivable that the adverse relative price change could be so great as to lead to a rise in the true wage share  $\sigma_w^*$  while  $\bar{w}^*/\bar{y}^*$  was falling; in this case labour's defensive effort would not be wholly successful, but it would not be an outright failure unless the rise in  $P_w/P_y$  were fully absorbed by a decline in  $\bar{w}^*/\bar{y}^*$  so as to leave  $\sigma_w^*$  unchanged and capitalists unaffected.

I suggest, therefore, that when the RSL variant is operative (as indicated by a rise in the true wage share  $\sigma_w^*$ ), the RSL mechanism be characterised as working class offensive strength to the extent that  $\bar{w}^*/\bar{y}^*$  rises and working class defensive strength to the extent that  $P_w/P_y$  rises. If it is defensive strength that is involved, the working class is transmitting rather than originating a profit-depressing force. To the extent that this is the case, an understanding of the sources of profit rate decline must go beyond the identification of labour's defensive strength to inquire into the origins of the adverse relative price change.

#### *Technical composition vs. value of capital*

Like the RSL variant, the ROC variant of Marxian crisis theory can operate through

substantially different mechanisms. In section 1 it was noted that the source of a rise in the organic composition of capital—reflected in  $\gamma = K/W$ —could be either a rise in the technical composition of capital—reflected in the real capital/labour ratio  $\bar{k} = \bar{K}/\bar{L}$ —or a rise in the relative price ratio  $P_k/P_w$ . Furthermore, it was shown that if a falling rate of profit is to be attributable to a rise in the organic composition of capital  $\gamma$ , independently of any decline in the rate of exploitation (or share of profits) and independently of any decline in the rate of capacity utilisation, then the rise in  $\gamma$  must be associated with a decline in the capacity/capital ratio  $\zeta$ . Hence to explore further the mechanisms of the ROC variant one must examine in more detail the behaviour of the basic component variable  $\zeta$ .

The capacity/capital ratio may first be decomposed as follows

$$\zeta = \frac{Z}{K} = \frac{P_y Z}{P_k \bar{K}} = \frac{P_y \bar{z}}{P_k \bar{k}} \quad (30)$$

where  $P_i$  represents the appropriate price index for  $i$ , the bar superscript denotes a real value,  $\bar{z}$  is average real capacity per labour hour and  $\bar{k}$  is the real capital/labour ratio. Equation (30) separates the real and price components of  $\zeta$  exactly as equation (27) separates the real and price components of  $\sigma_w$ . But just as equation (27) had to be modified to take into account utilisation effects associated with varying rates of capacity utilisation  $\varphi$ , so equation (30) must be modified before it can be employed for empirical tests. Here one must recognise first that both  $Z$  and  $\bar{K}$  are generally not fully utilised. On the one hand, actual real output  $\bar{Y}$  is equal to the fraction  $\varphi$  times  $Z$ . On the other hand, actually utilised real capital stock—to be labelled  $\bar{J}$ —is bound to be correspondingly lower than the total available real capital stock  $\bar{K}$ . The simplest and most reasonable assumption to make about the relationship between  $\bar{J}$  and  $\bar{K}$  is that

$$\bar{J} = \varphi \bar{K}. \quad (31)$$

It follows then that equation (30) can be rewritten as

$$\zeta = \frac{P_y}{P_k} \cdot \frac{\bar{Y}}{\bar{J}} = \frac{P_y}{P_k} \cdot \frac{\bar{y}}{\bar{j}}. \quad (32)$$

One further modification is still necessary. The real variables in equation (32) now include actual productivity  $\bar{y} = \bar{Y}/\bar{L}$  and an actually utilised real capital/labour ratio  $\bar{j} = \bar{J}/\bar{L}$ . But the numerators in both  $\bar{y}$  and  $\bar{j}$  have not been adjusted to take into account the utilisation effect that causes truly required labour hours  $L^*$  to differ in general from actual labour hours  $L$ . Recalling equation (21), one may define a 'true' real capital/labour ratio

$$\bar{j}^* = \frac{\bar{J}}{L^*} = \frac{\bar{J}}{L} \cdot \frac{L}{L^*} = \bar{j}/\eta_\ell. \quad (33)$$

The equation (32) can be rewritten in its final form as

$$\zeta = \frac{P_y}{P_k} \cdot \frac{\bar{y}/\eta_\ell}{\bar{j}/\eta_\ell} = \frac{P_y}{P_k} \cdot \frac{\bar{y}^*}{\bar{j}^*}. \quad (34)$$

Referring to equation (34), one can see that the capacity/capital ratio  $\zeta$  can fall because the true real capital/labour ratio  $\bar{j}^*$  rises faster than true productivity  $\bar{y}^*$ ,

because the price of capital goods  $P_k$  rises faster than the price of output  $P_y$ , or because of some combination of these two processes (including a rise in one ratio that more than offsets a fall in the other). If the fall in  $\zeta$  (and in the rate of profit  $\rho$ ) is to be attributed to a rise in the technical composition of capital, there must obviously be evidence of a rise in  $\bar{j}^*$  (which reflects the ratio of actually utilised real capital stock to truly required labour hours in the production process, and is thus controlled for all utilisation effects). But changes in  $\bar{j}^*$  are bound to have an impact on  $\bar{y}^*$  as well, for two reasons: first, because a higher ratio of real capital to labour input will surely make possible a higher ratio of real output to labour input;† and, second, because technological progress is likely to be embodied to some degree in new capital equipment, so that the process of increase in the ratio of real capital to labour input is likely to involve a simultaneous increase in the ratio of real output to total factor input (however one may choose to aggregate the different factors). If a rise in  $\bar{j}^*$  is really to be identified as the source of a falling  $\zeta$  and  $\rho$ , then it must be greater than the rise in  $\bar{y}^*$  that will almost surely accompany it. Thus I conclude that empirical verification of the rising technical composition of capital sub-variant of the ROC variant of Marxian crisis theory requires evidence of a fall in the real ratio  $\bar{y}^*/\bar{j}^*$  as well as a rise in  $\bar{j}^*$  itself.‡

The alternative sub-variant of the ROC variant focuses attention on changing relative prices that cause the organic composition of capital  $\gamma$  to rise and the capacity/capital ratio  $\zeta$  to fall. According to equation (10) it is the ratio of  $P_k$  to  $P_w$  that figures in the expression for  $\gamma$ ; but in equation (34) it is the ratio of  $P_k$  to  $P_y$  that affects the behaviour of  $\zeta$ , and the latter is the critical variable associated strictly with the ROC argument (because, unlike  $\gamma$ ,  $\zeta$  is independent of the profit/wage share and utilisation variables associated with the other two variants of Marxian crisis theory). Thus the second ROC sub-variant should be identified with a rise in the price ratio  $P_k/P_y$ , just as the second RSL sub-variant was identified with a rise in the price ratio  $P_w/P_y$ . In the terminology of Marxian value theory, a rise in  $P_k/P_y$  reflects a rise in the value of the elements of constant capital which increases the organic—but not the technical—composition of capital in such a way as to exert downward pressure on the rate of profit. As in the case of the second RSL sub-variant (based on the defensive strength of the working class), the second ROC sub-variant (based on the ‘dearening’ of the elements of constant capital) raises a further question about the origins of the adverse relative price change.

† This is equivalent to the proposition that real output is a positive function of the real capital stock input. While many other factors affect the level of real output, and both conceptual and measurement problems plague studies of the productivity of capital, the presumption that  $\bar{y}^*$  is a positive function of  $\bar{j}^*$  is surely more reasonable than any alternative.

‡ There is a possible source of confusion here between the RSL variant and the ROC variant. One element in the reasoning underlying the RSL variant was that a rise in working class power would cause the rate of growth of labour productivity to slow down (in the context of this argument, the relevant variable is true productivity  $\bar{y}^*$ ). If the RSL variant were indeed operating in this way, then it would exert some downward pressure on the real ratio  $\bar{y}^*/\bar{j}^*$  (and on the basic component variable  $\zeta$ ) that had nothing to do with the technical composition of capital. Yet by the test just suggested, a fall in  $\bar{y}^*/\bar{j}^*$  would contribute to confirmation of the ROC sub-variant based on a rising technical composition of capital.

The underlying problem here is that it is impossible to determine precisely how much of the movement in  $\bar{y}^*$  is really linked to the behaviour of  $\bar{j}^*$ . I will proceed on the assumption that the influence of rising working class power on the rate of growth of true productivity is much less significant than the combined influence of the real capital/labour ratio and technological change. If and when a rise in working class power does in fact coincide with a rise in the technical composition of capital, my assumption here will lead to a slight overstatement of the significance of the ROC variant and a corresponding understatement of the significance of the RSL variant.

*Relative prices and the terms of trade*

To analyse the relative price changes that affect the rate of profit, it will prove helpful to modify the price variables that appear in some of the key equations. Three different price indices have been introduced thus far, but since they always appear in the context of a ratio of two indices, one can be eliminated by an (arbitrary) choice of numeraire.  $P_y$  is a *net* national income/output deflator; as such it is definitionally equal to value added per unit of output (the sum of unit labour costs and unit profits) of the economy and it excludes the cost per unit of inputs from outside the economy.  $P_w$  and  $P_k$  are gross output price indices for wage and capital goods respectively; thus these indices account for unit external costs as well as for unit internal value added, and they directly reflect movements in the prices of external inputs as well as movements in the prices of internal inputs (assuming reasonably that the production of wage and capital goods requires directly or indirectly some amount of external inputs). If some composite of  $P_w$  and  $P_k$  is chosen as the numeraire  $P_x$ , then the adjusted national income/output deflator  $P_y/P_x$  will reflect the terms of trade of the economy *vis-à-vis* the rest of the world. To accomplish this, let the numeraire be defined as

$$P_x = \sqrt{P_w P_k} \quad (35)$$

and let each adjusted price index  $\psi_i$  be determined as

$$\psi_i = \frac{P_i}{P_x} \text{ for } i = w, k, y. \quad (36)$$

It follows from equations (35) and (36) that

$$\psi_k = \sqrt{P_k/P_w} = \frac{1}{\psi_w}. \quad (37)$$

Now the key equations (28) and (34) may be rewritten as follows

$$\sigma_w^* = \frac{\psi_w}{\psi_y} \cdot \frac{\bar{w}^*}{\bar{y}^*} = \frac{1}{\psi_y \psi_k} \cdot \frac{\bar{w}^*}{\bar{y}^*}, \quad (38)$$

$$\zeta = \frac{\psi_y}{\psi_k} \cdot \frac{\bar{y}^*}{\bar{j}^*}, \quad (39)$$

with  $\psi_y$  reflecting the terms-of-trade,  $\psi_k$  reflecting the price of capital goods relative to the price of wage goods, and  $\psi_w$  eliminated entirely.†

Equations (38) and (39) allow the second RSL and ROC sub-variants to be analysed in terms of the behaviour of the terms of trade and the capital/wage good price ratio. Thus the adverse movement in relative prices that can cause the share of profits to fall, via the defensive strength of labour, results from a decline in the terms of trade and/or a decline in the capital/wage good price ratio. The adverse movement in relative prices that can cause the capacity/capital ratio to fall, via the rising value of constant capital, results from a decline in the terms of trade and/or a rise in the capital/wage good price ratio. Because the variable  $\psi_k$  operates in opposing directions on the rate of profit, via the profit share and the capacity/capital ratio respectively, while the variable

† The word 'reflect' is used advisedly here, for  $\psi_y$  and  $\psi_k$  do not measure precisely the terms of trade or the capital/wage good price ratio; rather, they move in the same direction. From equation (37) it is evident that  $\psi_k$  is actually equal to the square root of the ratio  $P_k/P_w$ .

$\psi_y$  operates in the same direction, I will confine my attention in the rest of this section to the behaviour of the terms of trade  $\psi_y$ .†

Why should the terms of trade deteriorate and thereby contribute to a decline in the rate of profit, either via the RSL or the ROC variant of Marxian crisis theory? In the first place, if there is to be any terms of trade at all, there must of course be an external sector with which the economy under consideration trades. The question then becomes twofold: what kind of commodities are typically obtained from this external sector, and why might their prices tend to rise more rapidly than the prices of internally produced goods? There can be no universally valid explanation, for the answers to these two questions will depend on the scope of the economy under consideration. To pursue the issue here, I must therefore consider the specific economy that is the empirical focus of this study: the NFCB sector of the postwar U.S. economy.

The commodities obtained by workers and capitalists—directly or indirectly—from outside the NFCB sector include mainly agricultural and industrial raw materials (from inside or outside the United States) and a variety of services, e.g. financial services, government services, housing and health care. Among possible reasons for a rise in the price of raw materials relative to the price of NFCB output are (1) a growing worldwide scarcity of exhaustible natural resources and (2) a deterioration of the terms on which the United States can import raw materials from abroad. The first reason is essentially Ricardian; the second can be given a somewhat more Marxian flavour by linking it to a decline in U.S. hegemony in the context of growing postwar inter-capitalist rivalry (MacEwan, 1978, develops an argument along these lines). A possible reason for a rise in the price of services relative to the price of NFCB output is an inherently slower rate of increase of labour productivity in services, combined with a wage structure closely linked to that of the NFCB sector (see O'Connor, 1973, for a suggestive analysis along these lines).

With the data available for this study it will not be possible to discriminate between these possible sources of a declining terms of trade for the NFCB sector of the postwar U.S. economy. But if the available data do show that a decline in  $\psi_y$  played a significant role in depressing the rate of profit, either in a cyclical or a secular context, then an important direction for further empirical research will be clearly indicated.

#### *Sources of realisation problems*

Like the other two variants, the RF variant of Marxian crisis theory can operate through substantially different mechanisms. In discussing this variant in section 1, I introduced two different RF sub-variants that differed according to whether the realisation problems were attributed to inadequate aggregate demand or to sectoral imbalance. Moreover, the inadequate aggregate demand sub-variant could be based either on underconsumption or on underinvestment (or conceivably on a combination of the two). The behaviour of the capacity utilisation variable  $\phi$  alone cannot be used to discriminate between these different mechanisms, nor can it help to discriminate between an inadequate aggregate demand sub-variant of Marxian crisis theory and other possible theories of aggregate demand deficiency.

To discriminate adequately between all of these possible sources of decline in  $\phi$ , one would need data on the structure of aggregate demand (consumption, investment, etc.)

† As the empirical results in the following section of the paper will demonstrate, the variable  $\psi_y$  shows far more variation than the variable  $\psi_x$  for the NFCB sector of the U.S. economy, both in the long-run and in the cyclical postwar context. Thus  $\psi_y$  deserves more extensive theoretical attention here than  $\psi_x$ .

as well as data on sectoral output and capacity for different sectors of the economy under consideration. Unfortunately, such disaggregated data are not available for the NFCB sector of the postwar U.S. economy; hence further empirical investigation of the RF variant of Marxian crisis theory is beyond the scope of this study.†

### Summary

The elaborate theoretical analysis of the rate of profit developed in this section of the paper may be summarised as follows. First, decreases in the share of profits ( $\sigma_\pi = 1 - \sigma_w$ ) cannot be associated solely with the RSL variant of Marxian crisis theory, for  $\sigma_w$  is affected by the rate of capacity utilisation as well as by class struggle over distributive shares. The two effects may be distinguished—as in equation (26)—by expressing the share of wages  $\sigma_w$  as the product of the ‘true’ share  $\sigma_w^*$  (which reflects working class power) and a utilisation variable  $\eta_w^{-1}$  (which reflects the rate of capacity utilisation).

Second, one can and should distinguish two alternative sub-variants of the RSL and ROC variants of Marxian crisis theory, according to the underlying sources of change in the relevant component variables—the true share of wages  $\sigma_w^*$  and the capacity/capital ratio  $\zeta$ . Under the RSL variant,  $\sigma_w^*$  may rise (and  $\sigma_\pi$  hence fall) because of either the ‘offensive’ or the ‘defensive’ strength of labour. These two mechanisms can be distinguished—as in equation (28)—according to the extent to which the rise in  $\sigma_w^*$  is accounted for by a rise in a real ratio  $\bar{w}^*/\bar{y}^*$  and by a rise in a price ratio  $P_w/P_y$ . Under the ROC variant,  $\zeta$  may fall because of a rise in the technical composition of capital or because of a rise in the value of the elements of constant capital. These two mechanisms can be distinguished—as in equation (34)—according to the extent to which the fall in  $\zeta$  is accounted for by a fall in a real ratio  $\bar{y}^*/\bar{j}^*$  and by a fall in a price ratio  $P_y/P_k$ .

Third, the price ratios involved in the second sub-variants of the RSL and ROC variants may be decomposed—via equations (35)–(37)—into variables reflecting the terms of trade  $\psi_y$  and the capital/wage good price ratio  $\psi_k$ . This decomposition permits investigation of the significance of deterioration in the terms of trade as a source of decline in the rate of profit.

All of the key variables required for the more elaborate analysis of the rate of profit  $\rho$  can be brought together into a single equation by substituting equations (11), (26), (38) and (39) into the original profit rate equation (1)

$$\begin{aligned}\rho &= \sigma_\pi \phi \zeta = (1 - \sigma_w^* / \eta_w) \phi \zeta \\ &= \left( 1 - \frac{\bar{w}^*}{\bar{y}^*} \cdot \frac{1}{\psi_y} \cdot \frac{1}{\psi_k} \cdot \frac{1}{\eta_w} \right) \phi \left( \frac{\bar{y}^*}{\bar{j}^*} \cdot \psi_y \cdot \frac{1}{\psi_k} \right).\end{aligned}\quad (40)$$

It remains now to examine the empirical evidence compiled for the NFCB sector of the postwar U.S. economy within the framework of this final equation.

## 4. Empirical evidence for the more elaborate analysis

In order to interpret the evidence available for a more elaborate empirical analysis of the rate of profit, it will be helpful to present data on the relevant component variables

† Data on the structure of aggregate demand at the national economy-wide level are of course readily available from the national income and product accounts; and one can also obtain more disaggregated data on output and capacity within the manufacturing sector.

—as in section 2—in the form of rates of change over time. Thus it will be necessary to transform the profit rate equation (40) into a growth-accounting equation in which each variable  $x$  appears in its exponential rate of change form  $\dot{x}$ . The result of this transformation is as follows

$$\begin{aligned}\dot{\rho} &= \dot{\sigma}_\pi + \dot{\phi} + \dot{\zeta} = -\xi(\dot{\sigma}_w^* - \dot{\eta}_w) + \dot{\phi} + \dot{\zeta} \\ &= -\xi(\dot{w}^* - \dot{y}^* - \dot{\psi}_y - \dot{\psi}_k - \dot{\eta}_w) + \dot{\phi} + (\dot{y}^* - \dot{j}^* + \dot{\psi}_y - \dot{\psi}_k)\end{aligned}\quad (41)$$

where  $\xi$  is a positively-valued multiplier that translates the (absolute value of the) growth rate of the wage share  $\sigma_w$  into the (absolute value of the) growth rate of the profit share  $\sigma_\pi$ . It can readily be demonstrated† that:

$$\xi = -\frac{\dot{\sigma}_\pi}{\dot{\sigma}_w} = \frac{W}{\Pi}. \quad (42)$$

To simplify the ensuing presentation and discussion of the evidence, I will first separate the components of  $\dot{\rho}$  in equation (41) into three separate groups, as follows

$$\dot{\rho} = \dot{\rho}_\ell + \dot{\rho}_r + \dot{\rho}_c, \quad (43)$$

$$\dot{\rho}_\ell = -\xi\dot{\sigma}_w^* = \xi(\dot{y}^* - \dot{w}^*) + \xi(\dot{\psi}_y + \dot{\psi}_k), \quad (44)$$

$$\dot{\rho}_r = \xi\dot{\eta}_w + \dot{\phi} \quad (45)$$

$$\dot{\rho}_c = \dot{\zeta} = (\dot{y}^* - \dot{j}^*) + (\dot{\psi}_y - \dot{\psi}_k). \quad (46)$$

The purpose of this three-way categorisation of components of  $\dot{\rho}$  is to distinguish the terms that should be associated with each of the three basic variants of Marxian crisis theory.  $\dot{\rho}_\ell$  measures the effect on the rate of profit of changes in the strength of labour (relative to capital);  $\dot{\rho}_r$  measures the effect of changes in the conditions of realisation; and  $\dot{\rho}_c$  measures the effect of changes in the organic composition of capital. *Negative* values for  $\dot{\rho}_\ell$ ,  $\dot{\rho}_r$  or  $\dot{\rho}_c$  reflect changes that have a negative effect on the rate of profit, i.e. a *rise* in the strength of labour, a *worsening* of realisation conditions, or a *rise* in the organic composition of capital. Positive values for  $\dot{\rho}_\ell$ ,  $\dot{\rho}_r$  or  $\dot{\rho}_c$  reflect opposite changes that contribute positively to the rate of profit. The sum of the three ‘contribution’ variables must, by definition, equal the exponential rate of change of the rate of profit during any given time period.

Once the significance of the RSL, RF and ROC variants of Marxian crisis theory has been established by means of empirical estimates of  $\dot{\rho}_\ell$ ,  $\dot{\rho}_r$  and  $\dot{\rho}_c$ , the significance of

† Since  $\sigma_\pi$  and  $\sigma_w$  sum to unity by definition, their exponential growth rates must have opposite signs. Thus to obtain a positively-valued multiplier  $\xi$ , I define  $\xi = -\dot{\sigma}_\pi/\dot{\sigma}_w$ . Now:

$$\begin{aligned}\dot{\sigma}_\pi &= (1 - \sigma_w) = \frac{d(1 - \sigma_w)/dt}{(1 - \sigma_w)} \\ &= \frac{-d\sigma_w/dt}{\sigma_\pi} = -\frac{\sigma_w}{\sigma_\pi} \cdot \dot{\sigma}_w \\ &= -\frac{W/Y}{\Pi/Y} \cdot \dot{\sigma}_w = -\frac{W}{\Pi} \cdot \dot{\sigma}_w.\end{aligned}$$

Substituting this expression for  $\dot{\sigma}_\pi$  into the definition of  $\xi$ , one obtains:

$$\xi = -\frac{-(W/\Pi)\dot{\sigma}_w}{\dot{\sigma}_w} = \frac{W}{\Pi}.$$

alternative RSL and ROC sub-variants can be inferred from empirical estimates of the component variables that enter into the expressions for  $\dot{\rho}_\ell$  and  $\dot{\rho}_c$ . In equations (44) and (46) the contribution variables  $\dot{\rho}_\ell$  and  $\dot{\rho}_c$  are expressed as the sum of a term involving real variables ( $\bar{y}^*$ ,  $\bar{w}^*$ ,  $\bar{j}^*$ ) and a term involving price variables ( $\psi_y$ ,  $\psi_k$ ). As explained in section 3, the real-variable terms reflect the offensive and the technical sub-variants, while the price-variable terms reflect the defensive and the value sub-variants, of the RSL and ROC variants. Finally, the role of the terms of trade (and the capital/wage good price ratio) can be inferred from the behaviour of the  $\psi_y$  (and  $\psi_k$ ) variables that appear in equations (44) and (46).

To apply this theoretical framework to an empirical analysis of profit rate behaviour in the NFCB sector of the postwar U.S. economy, one requires first of all evidence on  $\dot{\rho}$  and the contribution variables  $\dot{\rho}_\ell$ ,  $\dot{\rho}_r$  and  $\dot{\rho}_c$ . Tables 6, 7 and 8 provide data on these variables† in the same form as Tables 3, 4 and 5 did for the basic component variables  $\dot{\sigma}_w$ ,  $\dot{\phi}$  and  $\dot{\zeta}$ . The only difference between the two sets of data is that in the new set the utilisation effect of  $\dot{\phi}$  on  $\dot{\sigma}_w$  (and  $\dot{\sigma}_\pi$ ) has been removed from  $\dot{\rho}_\ell$  and transferred to  $\dot{\rho}_r$  (where it belongs);  $\dot{\rho}_c$  remains identical to the original  $\dot{\zeta}$ .

**Table 6.** Rates of growth of contribution variables: full period and between cycles (all figures represent average annual % rates of growth)

	Full period	Cycles			
		I-II	II-III	III-IV	IV-V
Rate of profit, $\dot{\rho}$	-1.20	-3.2	-1.5	+2.2	-4.7
Contributions of:					
Labour strength, $\dot{\rho}_\ell$	-1.13	-1.4	+0.9	-0.5	-2.6
Realisation conditions, $\dot{\rho}_r$	-0.09	-1.2	-3.2	+2.1	-1.2
Composition of capital, $\dot{\rho}_c$	+0.02	-0.5	+0.6	+0.6	-0.9

Because there was no appreciable long-run trend in the rate of capacity utilisation, the transfer of the utilisation effect makes little difference to the analysis of the long-run postwar decline in  $\rho$ . The evidence in Table 6, like that in Table 3, indicates that the downward trend in the profit rate from 1949 to 1975 was primarily due to the depressing effect on the profit share of a rise in the strength of labour.

The cycle-to-cycle figures in Table 6, however, do differ significantly from the corresponding figures in Table 3; they lead therefore to a somewhat different (and presumably more accurate) interpretation of the behaviour of  $\rho$ . The empirical evidence suggests that the strength of labour increased enough to contribute significantly to profit rate declines during two of the four cycle-to-cycle periods: from cycle I (1949–1954) to cycle II (1954–1958) and, even more so, from cycle IV (1960–1970) to cycle V (1970–1975). But from cycle III (1958–1960) to cycle IV, the strength of labour did not change enough to have a significant effect on the rate of profit. From cycle II to cycle III, it appears that labour actually lost strength, thereby making a positive contribution to the rate of profit.

† The growth rate figures presented in all of the tables in this section were calculated exactly as described in footnotes † on p. 352 and † on p. 353. Since the multiplier  $\xi$  varies in value over time (with changes in the ratio  $W/\Pi$ ), I needed to use an average value for  $\xi$  in each of the discrete time intervals for which I calculated component variable growth rates. To do so in a way that would preserve the adding-up identities in the growth-accounting equations, I simply set  $\xi = -\dot{\sigma}_\pi/\dot{\sigma}_w$  (as it was originally defined in footnote † on page 363).



The evidence on realisation conditions indicates that they worsened and contributed significantly to the overall profit rate declines that occurred between cycles I–II, II–III and IV–V, and that they improved and contributed significantly to the one instance of a profit rate increase between cycles III–IV. Thus it is possible to explain the direction of movement in the profit rate in every case by the sign of  $\dot{\rho}_r$ . However, the severity of the profit rate declines from cycles I to II and IV to V can only be explained by the behaviour of  $\dot{\rho}_r$ , for in these two cases the evidence shows that a rise in labour strength had a greater downward effect on the profit rate than the worsening of realisation conditions. The third contributing element—the organic composition of capital—made relatively small contributions to changes in the rate of profit in every case.

**Table 7.** *Rates of growth of contribution variables: phase averages (all figures represent average annual % rates of growth)*

	Phases		
	A	B	C
Rate of profit, $\rho$	+26.8	–10.1	–25.3
Contributions of:			
Labour strength, $\dot{\rho}_l$	+3.4	–9.7	+4.7
Realisation conditions, $\dot{\rho}_r$	+27.4	+1.4	–32.1
Composition of capital, $\rho_c$	–1.1	–1.8	+2.1

**Table 8.** *Rates of growth of contribution variables: phase B in each cycle (all figures represent average annual % rates of growth)*

	Cycles				
	I	II	III	IV	V
Rate of profit, $\dot{\rho}$	–10.8	–10.5	–9.7	–8.2	–11.5
Contributions of:					
Labour strength, $\dot{\rho}_l$	–11.1	–6.5	–8.6	–3.8	–18.7
Realisation conditions, $\dot{\rho}_r$	+3.0	–2.5	–2.4	–3.9	+12.9
Composition of capital, $\rho_c$	–2.7	–1.6	+1.3	–0.4	–5.6

Tables 7 and 8 provide evidence on the cyclical behaviour of the NFCB profit rate and the forces that have influenced it. It is obvious from Table 7 that the rapid increase in  $\rho$  during the early expansion (phase A) of each cycle, and the rapid decrease in  $\rho$  during the contraction (phase C), are almost entirely attributable to the corresponding improvement and deterioration in conditions of realisation. The evidence on the strength of labour suggests that it weakens somewhat (in relation to the strength of capital) during both phase A and phase C, contributing thereby a modest upward push to  $\rho$ . The contribution of the organic composition of capital to profit rate changes in phase A and phase C appears to be relatively small and, indeed, opposed to the actual direction of movement of  $\rho$ .

On the whole, the NFCB profit rate declines in phase B of postwar U.S. cycles still appear attributable mainly to a corresponding rise in the strength of labour. The data in Table 7 indicate that on average in phase B there was little significant change in

realisation conditions or in the organic composition of capital. The data in Table 8 show more significant variations in these factors in some individual cycles, but there is no systematic trend. Phase B of cycle IV (1966–1969) is noteworthy in that a deterioration in realisation conditions contributed just as much as a rise in the strength of labour to the overall decline in the profit rate. The profit rate decline in phase B of cycle V (1972–1973) occurred in spite of a substantial improvement in realisation conditions; it was associated with an unusually sharp rise in the strength of labour† and in the organic composition of capital.

In the theoretical discussion of the RSL variant of Marxian crisis theory in section 1, the main argument advanced to explain a rise in the strength of labour was based on the depletion of the reserve army of labour. Although this argument was developed specifically in a cyclical rather than a secular context, it is interesting to consider its possible relevance to all of the empirical results just presented. According to the evidence in Tables 6, 7 and 8, a rise in working class power was significant in contributing to NFCB sector profit rate declines (1) over the full period from 1949 to 1975; (2) from cycle I (1949–1954) to cycle II (1954–1958) and from cycle IV (1960–1970) to cycle V (1970–1975); and (3) during phase B of each of the five postwar cycles. If the behaviour of the reserve army of labour played any role in the operation of the RSL variant during these periods, one should find some corresponding evidence of reserve army depletion.

During the postwar period as a whole in the United States, unemployment rates have been relatively low by historical standards. It is certainly plausible to argue that this long-term relative depletion of the reserve army of labour—whatever its origin—may have contributed to the ability of the working class to increase the true share of wages within the NFCB sector from 1949 to 1975. More detailed evidence on the reserve army for different sub-periods within the postwar period is provided in Fig. 2 and Table 9; Fig. 2 charts the rate of unemployment (for private non-agricultural wage and salary workers), while Table 9 presents data on several labour market indicators averaged for all five cycles under study, for each cycle separately, and for each phase within each cycle.

The evidence in Fig. 2 and Table 9 shows that cycles I and IV were characterised by substantially tighter labour markets, by most indicators, than cycles II, III and V. The two cycles I and IV happen to include the periods during which the Korean and Vietnam Wars reached their peaks. What is most significant in the present context, however, is that these two cycles, during which the reserve army was relatively the most depleted, are also precisely the two cycles during which the working class initiated its greatest between-cycle increases in the true share of wages. The within-cycle evidence in Table 9 shows, not surprisingly, that the reserve army is most depleted in phase B. The fact that labour markets tighten considerably from phase A to phase B, and that they are at their tightest within phase B, is fully consistent with the hypothesis that the power of the working class to increase the true share of wages in phase B arises from the depletion of the reserve army. In sum, the available evidence on labour markets and

† It may appear anomalous to find evidence of a sharp rise in the strength of labour in a period (1972–1973) following the imposition of wage-price controls that were widely regarded as detrimental to labour (see, for example, Gordon, 1975, p. 34). But the data in Table 12 on the underlying component variables in the expression for  $\dot{p}_L$  indicate that labour's gain (relative to capital) was not due to any unusual increase in the true real wage ( $\bar{w}^*$  actually increased more slowly in phase B of cycle V than in phase B of the other four cycles); instead, it was due mainly to an unusually low rate of growth of productivity and a significant deterioration in the terms of trade.

the wage share in the NFCB sector of the postwar U.S. economy is largely consistent with a reserve-army-based RSL variant of Marxian crisis theory, both in the context of the short-run business cycle and in the context of longer-run fluctuations in the rate of profit.

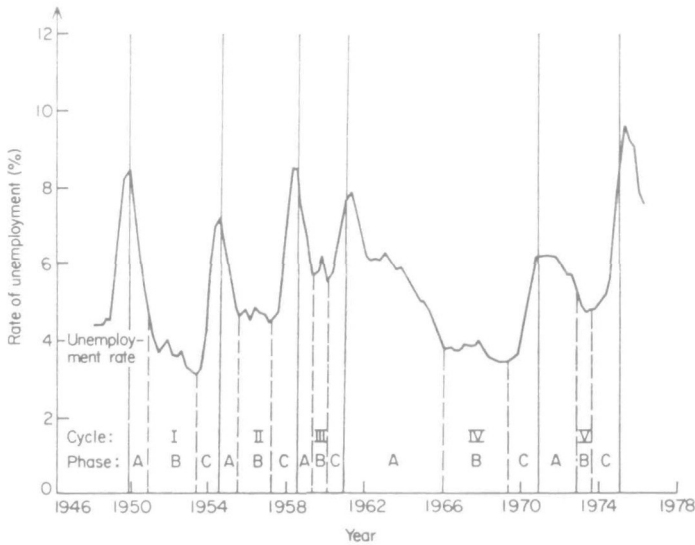


Fig. 2. The rate of unemployment in the postwar period

Table 9. Labour market indicators, averaged for key periods

	Rate of unemployment <sup>a</sup> (%)	Average work week <sup>b</sup> (hours)	Quit rate <sup>c</sup> (%)
Full period (1949.4-1975.1)	5.3	40.3	2.0
Cycle I (1949.4-1954.2)	4.7	40.4	2.5
Cycle II (1954.2-1958.2)	5.6	40.0	1.6
Cycle III (1958.2-1960.4)	6.7	39.8	1.3
Cycle IV (1960.4-1970.4)	5.0	40.5	1.9
Cycle V (1970.4-1975.1)	5.8	40.2	2.2
Phase A	6.4	40.1	1.7
Phase B	4.6	40.8	2.3
Phase C	5.4	39.8	1.9

<sup>a</sup> For non-agricultural private wage and salary workers.

<sup>b</sup> For wage workers in the manufacturing sector.

<sup>c</sup> For all employees in the manufacturing sector.

Having completed the empirical comparison of the three basic variants of Marxian crisis theory, I will now investigate the empirical significance of alternative sub-variants of the RSL and ROC variants. This task calls for data on the more detailed component variables in terms of which the two contribution variables— $\dot{p}_l$  and  $\dot{p}_c$ —are expressed in equations (44) and (46). The required data are presented in Tables 10-12; each of the two variants will be analysed in turn.

The first two lines of Tables 10–12 isolate the extent to which the contribution of labour strength to changes in the rate of profit  $\dot{p}_l$  is due to labour's offensive strength (measured by the combined effect of the real variables  $\bar{y}^*$  and  $\bar{w}^*$ ) and to labour's defensive strength (measured by the combined effect of the price variables  $\dot{\psi}_y$  and  $\dot{\psi}_k$ ). The evidence in Table 10 suggests that the long-run gains made by the working class in the distributional struggle, and the resultant negative pressure on the rate of profit, have been largely due to labour's defensive strength. The combined behaviour of true productivity  $\bar{y}^*$  and the true real wage  $\bar{w}^*$  actually made a positive contribution to the rate of profit, for the true real wage failed to keep pace with true productivity over the full period from 1949 to 1975. Thus the overall rise of the true wage share, and its consequent negative impact on the rate of profit, was wholly attributable to the behaviour of the price variables reflecting the terms of trade  $\psi_y$  and the capital/wage good price ratio  $\psi_k$ . Indeed, the figures for  $\dot{\psi}_y$  and  $\dot{\psi}_k$  alone show that the price-variable effect was entirely due to deterioration in the terms of trade. The long-run rise in the true wage share can therefore be attributed to a decline in the NFCB-sector terms of trade, in combination with labour's (defensive) ability to shift part of the burden of that decline on to capital.†

**Table 10.** *Rates of growth of component variables: full period and between cycles (all figures represent average annual % rates of growth)*

	Full period	Cycles			
		I—II	II—III	III—IV	IV—V
Contributions to $\dot{p}$ of:					
Offensive labour strength, $\xi(\bar{y}^* - \bar{w})$	+1.09	-4.2	+0.5	+3.2	+1.3
Defensive labour strength, $\xi(\psi_y + \psi_k)$	-2.22	+2.8	+0.4	-2.7	-3.9
Technical composition of capital, $\bar{y} - \dot{j}$	+0.62	+0.2	+1.1	+1.0	+0.2
Value of elements of capital, $\psi_y - \dot{\psi}_k$	-0.60	-0.7	-0.3	-0.3	-1.1
Component variables:					
True productivity, $\bar{y}^*$	+3.15	+3.0	+4.0	+3.4	+2.4
True real wage, $\bar{w}^*$	+2.90	+4.1	+3.8	+2.5	+2.1
True real capital/labour ratio, $\dot{j}^*$	+2.53	+2.8	+2.9	+2.4	+2.2
Terms of trade, $\psi_y$	-0.55	+0.0	-0.1	-0.7	-1.0
Capital/wage good price ratio, $\psi_k$	+0.05	+0.7	+0.2	-0.3	+0.1

The between-cycle evidence in Table 10 supports the same conclusion for the rise in the true wage share from cycle IV to cycle V; but it indicates that the other instance in which the RSL variant was significantly operative, from cycle I to cycle II, was one in which the offensive strength of labour was the most prominent. Indeed, this is the only cycle-to-cycle period during which the growth of true real wages exceeded the growth of true productivity.

† If labour had not been able to shift any of the burden of the adverse price changes on to capital, this failure would have been reflected in a slowdown in the growth of true real wages (relative to true productivity) whose negative effect on the true wage share would have exactly offset the positive effect of the price changes, resulting in a value of zero for  $\dot{p}_l$ . The fact that  $\dot{p}_l$  was negative indicates that labour was strong enough to limit the real wage slowdown and thereby to shift some of the burden to capital. But the fact that the real-variable term in  $\dot{p}_l$  was still positive indicates that labour was not strong enough to restrain the real wage slowdown sufficiently to shift the whole burden to capital.

The evidence on short-run cyclical fluctuations, presented in Tables 11 and 12, shows that the true real wage generally grew faster than true productivity only in cyclical phase B (the late expansion period); it did so in phase B of every cycle except IV (when the two growth rates were virtually identical). This indicates that the offensive strength of the working class played a significant role in precipitating cyclical increases in the

**Table 11.** Rates of growth of component variables: phase averages (all figures represent average annual % rates of growth)

	Phases		
	A	B	C
Contributions to $\dot{p}$ of:			
Offensive labour strength, $\xi(\dot{y}^* - \dot{w}^*)$	+5.0	-6.1	+3.3
Defensive labour strength, $\xi(\dot{\psi}_y + \dot{\psi}_k)$	-1.5	-3.6	+1.4
Technical composition of capital, $\dot{y}^* - \dot{j}^*$	+0.6	-0.6	+1.7
Value of elements of capital, $\dot{\psi}_y - \dot{\psi}_k$	-1.7	-1.2	+0.4
Component variables:			
True productivity, $\dot{y}^*$	+5.4	+1.5	+1.8
True real wage, $\dot{w}^*$	+4.4	+3.1	+1.1
True real capital/labour ratio, $\dot{j}^*$	+5.1	+2.1	+0.2
Terms of trade, $\dot{\psi}_y$	-1.1	-1.0	+0.3
Capital/wage good price ratio, $\dot{\psi}_k$	+0.6	+0.2	-0.1

**Table 12.** Rates of growth of component variables: phase B in each cycle (all figures represent average annual % rates of growth)

	Cycles				
	I	II	III	IV	V
Contributions to $\dot{p}$ of:					
Offensive labour strength, $\xi(\dot{y}^* - \dot{w}^*)$	-7.4	-13.0	-2.0	+0.2	-8.6
Defensive labour strength, $\xi(\dot{\psi}_y + \dot{\psi}_k)$	-3.6	+6.5	-6.7	-4.0	-10.1
Technical composition of capital, $\dot{y}^* - \dot{j}^*$	-1.5	-0.7	+2.1	+0.4	-3.1
Value of elements of capital, $\dot{\psi}_y - \dot{\psi}_k$	-1.2	-1.7	-0.8	-0.9	-2.6
Component variables:					
True productivity, $\dot{y}^*$	+1.6	+1.1	+2.2	+2.7	+0.2
True real wage, $\dot{w}^*$	+3.8	+4.5	+2.7	+2.6	+2.0
True real capital/labour ratio, $\dot{j}^*$	+3.1	+1.8	+0.1	+2.2	+3.3
Terms of trade, $\dot{\psi}_y$	-1.1	+0.4	-1.3	-1.0	-2.3
Capital/wage good price ratio, $\dot{\psi}_k$	+0.1	+1.3	-0.5	-0.1	+0.3

true wage share and—as a consequence—cyclical declines in the rate of profit. The evidence shows that defensive labour strength was also at work in phase B of every cycle, except for cycle II. In the other four cycles the terms of trade deteriorated in phase B, and the impact of this deterioration was not absorbed in lower real wages by workers but passed on to capitalists as a second source of a rising true wage share (in addition to the true real wage/productivity growth differential).

My empirical analysis of the ROC variant of Marxian crisis theory has shown that changes in the organic composition of capital had little effect on the behaviour of the NFCB rate of profit, either in a cyclical or in a longer-run context (see Tables 6–8). Yet it may still be of interest to isolate the effects of the technical composition of capital and the value of the elements of constant capital, which are associated with the two alternative sub-variants of the ROC variant. The third and fourth lines of Tables 10–12 separate the ‘technical’ and the ‘value’ components of the contribution of the organic composition of capital  $\dot{\rho}_c$  to changes in the rate of profit.

The evidence in Table 10 is remarkably consistent for the full period trend and for changes from each cycle to the next. In all of these cases the contribution of changes in the technical composition of capital to the rate of profit was positive, while the contribution of changes in the value of the elements of constant capital was negative. For the full period the two effects offset one another almost exactly, which accounts for the absence of any significant overall effect of the organic composition of capital on the rate of profit. The long-run downward trend in the value component was due almost entirely to deterioration in the terms of trade; this would have contributed directly to a profit-depressing rise in the organic composition of capital, except that true productivity  $\bar{y}^*$  grew somewhat faster than the true real capital/labour ratio  $j^*$ . The trend in  $j^*$  itself (the closest approximation to the Marxian technical composition of capital) was always upward, but the trend in  $\bar{y}^*$  was also always upward and somewhat more rapidly so.

The cyclical evidence in Tables 11 and 12 on the ROC sub-variants is less striking than the longer-run evidence because it is less consistent. On average, there was a tendency for the growth of the true real capital/labour ratio  $j^*$  to exceed the growth of true productivity  $\bar{y}^*$  in cyclical phase B (unlike in phases A and C and in the long-run). The resulting downward impact of the technical-composition effect on the rate of profit turns out, however, to have operated in phase B of only three of the five cycles, and in no case very significantly. The value effect on the rate of profit was more often downward than the technical-composition effect, because of the general downward tendency of the terms of trade. The value effect contributed positively to the organic composition of capital—and therefore negatively to the rate of profit—in phase B of every cycle; still, its contribution was much less significant than that of the rising strength of labour. Only in phase C did the value effect tend on average to move favourably for the rate of profit, largely because of improvement in the terms of trade during cyclical contractions.<sup>†</sup>

### *Summary*

The most interesting of the empirical results presented above may be summarised as follows. The long-term decline in the rate of profit from 1949 to 1975 was almost entirely attributable to a rise in the true share of wages, which indicates a rise in the strength of labour. This rise, however, was largely defensive in nature. The working class did not succeed in making true real wage gains commensurate with the growth of true productivity; it merely succeeded in defending itself somewhat more successfully against a long-term deterioration in the terms of trade than did the capitalist class.

<sup>†</sup> The evidence on the cyclical behaviour of the NFCB-sector terms of trade in Table 12 (deterioration in the expansion phases A and B and improvement in the contraction phase C) indicates that non-NFCB-sector prices are cyclically more volatile than NFCB-sector prices. This is quite plausible for two reasons: (1) many raw materials are produced outside the NFCB sector and most manufactures are produced within it, and (2) the non-NFCB sector tends to be more competitive than the NFCB sector.

The long-term decline in the rate of profit was not a steady one: the profit rate fell from cycles I to II and II to III, rose from III to IV, and declined again from IV to V. Deterioration in realisation conditions played a role in each of the cycle-to-cycle declines, but a rising strength of labour was the most significant element in all but one of them. The long-run adverse trend in the terms of trade grew in intensity from the 1950s through the 1970s; it was a major factor contributing to the decline in the rate of profit from cycle IV to cycle V (via both the defensive strength of labour and the value of the elements of constant capital). The organic composition of capital displayed no significant long-run trend in the postwar period, nor did it contribute much to the cycle-to-cycle fluctuations in the rate of profit. This was because the generally negative effect on the profit rate of changes in the value of constant capital (due to the deteriorating terms of trade) was largely offset by a correspondingly positive effect of changes in the technical composition of capital.

Cyclical declines in the rate of profit (in phase B of each of the five postwar cycles) were also attributable mainly to increases in the strength of labour. The main difference between the cyclical and the longer-run results is that in the cyclical context the rise in working class power was as often offensive as defensive in nature. In other words, workers usually benefitted from true real wage gains in excess of true productivity increases in the latter part of cyclical expansions, and the cyclical increase in the true wage share was only partly due to labour's shift of the burden of adverse relative price changes.

Finally, evidence on labour market conditions—both in a cyclical and in a longer-run context—was fully consistent with the argument that the strength of labour *vis-à-vis* capital increases when the the reserve army of labour is relatively depleted.

## 5. Conclusion

In this paper I have sought to formulate different variants of Marxian crisis theory in such a way as to make them amenable to empirical testing with data from national income accounts; and I have conducted empirical tests of the applicability of these theoretical variants to the non-financial corporate business NFCB sector of the postwar U.S. economy.

I began by showing how three different variants of Marxian crisis theory—based on a rising organic composition of capital ROC, a rising strength of labour RSL, and realisation failure RF—attribute to different sources the fall in the rate of profit that is presumed to cause an economic crisis. I also distinguished between alternative mechanisms by which each of these three basic variants could explain a fall in the rate of profit. Each theoretical variant and sub-variant so identified carries different implications for the behaviour of key variables in terms of which the rate of profit can be expressed. Therefore, by examining the actual behaviour of these key variables during any period of profit rate decline, one can determine the extent to which each variant and sub-variant offers a plausible explanation of that decline. I focused my empirical research on the following periods of time: (1) the long-run period from 1949 to 1975, which encompasses five complete business cycles; (2) four shorter-run periods defined from each complete cycle to the next; and (3) three phases within each cycle corresponding to the early and late stages of the expansion period and the whole contraction period. My empirical results may be summarised as follows.

The (before-tax) rate of profit in the NFCB sector of the U.S. economy displayed a long-run downward trend from 1949 to 1975: it fell from cycle I (1949–1954) to cycle II (1954–1958) and from cycle II to cycle III (1958–1960); it rose from cycle III to cycle IV (1960–1970); and it fell again from cycle IV to cycle V (1970–1975). Within each cycle the rate of profit rose during the early stage of the expansion, then fell during the late stage of the expansion as well as in the contraction. For the purpose of testing different variants of Marxian crisis theory, the most relevant empirical tasks were to explain the declines in the rate of profit observed over the whole postwar period, in three of the four cycle-to-cycle periods, and in the critical† late-expansion phase of each of the five postwar cycles.

In brief, the RSL variant received far more empirical support than either the ROC or the RF variants as an explanation of profit rate declines in all of these key periods of time. A rise in the strength of labour *vis-à-vis* capital—as reflected in a suitably adjusted wage share of income—accounted fully for the long-term decline, partly for the cycle-to-cycle declines, and largely for the cyclical late-expansion declines in the rate of profit. Moreover, there was evidence in all these cases to support the hypothesis that the strength of labour is a negative function of the size of the reserve army of labour. Changes in the organic composition of capital—insofar as these were independent of changes in the strength of labour or in realisation conditions—had relatively little effect on the rate of profit. Realisation failure—as reflected in a falling average rate of capacity utilisation—contributed modestly to profit rate declines that occurred from cycle to cycle and during the late-expansion phase of several individual cycles. Changes in realisation conditions accounted for sharp variations in the profit rate only in the early-expansion and contraction phases.

In analysing the possible mechanisms by which a rise in the strength of labour could contribute to a decline in the rate of profit, I found it useful to distinguish between two RSL sub-variants based on ‘offensive’ and ‘defensive’ labour strength, respectively. The former refers to the ability of the working class to achieve real wage gains more rapid than productivity increases, while the latter refers to workers’ ability to pass on to capitalists a disproportionate share of the real income loss resulting from adverse relative price changes (such as a decline in the terms of trade of the economy under consideration). In the case of the NFCB sector of the postwar U.S. economy, the empirical evidence showed that the significant explanatory power of the RSL variant was based on different combinations of the two sub-variants in a cyclical and in a longer-run context. The increases in labour strength that contributed to profit rate declines in the late-expansion phase of each postwar cycle involved both offensive and defensive labour strength: workers’ real wages grew more rapidly than productivity, and capitalists were obliged to absorb a disproportionate share of the effect of adverse price changes. But the long-run and the cycle-to-cycle increases in labour strength were predominantly defensive in nature. The basic reason for the downward trend in the rate of profit from 1949 to 1975 was an increasingly serious deterioration in the terms of trade of the NFCB sector, whose negative impact on real sectoral income was absorbed to a proportionately

† Profit rate decline in the late expansion phase of a cycle is more critical to Marxian crisis theory (applied in a cyclical context) than profit rate decline in the contraction phase because the key to explaining a cyclical economic downturn is showing why the rate of profit starts to fall after a period of increase in both real output and the profit rate. The different variants of Marxian crisis theory under consideration here differ with respect to their explanation of why the rate of profit turns down during the course of a cyclical expansion; but they all share the implication that some time after the profit rate peaks it will be pulled down by the sharply falling rate of capacity utilisation associated with a cyclical contraction.



larger extent by profits than by wages.<sup>†</sup> Over the postwar period as a whole the working class succeeded in increasing the share of wages in NFCB sectoral income, but the real value of the average wage did not keep pace with the growth of average labour productivity.

There are several important respects in which the theoretical and empirical analysis of this study can and should be extended. First of all, the empirical testing of different variants of Marxian crisis theory in a cyclical context can be strengthened by the consideration of shorter periods of time within the critical late-expansion phase when the rate of profit turns down. In this study I have based my empirical investigation of cyclical declines in the rate of profit on growth rates of key variables during the entire cyclical 'phase B'—from the mid-expansion point at which the profit rate peaks to the end of the expansion when real output peaks. But the use of growth rates for the entire phase B might unduly bias the tests in favour of an explanation based on changes in realisation conditions (the RF variant), in cases where phase B is long enough for the original profit rate downturn to affect the incentive to invest and—with a lag—to cause the capacity utilisation rate to fall *irrespective* of the initial source of the profit rate downturn. Furthermore, a close look at the quarterly time series data for the NFCB sector of the postwar U.S. economy (see Fig. 1) reveals that the profit rate, which always turns down sharply at the beginning of each phase B, sometimes turns up temporarily during a later stage of phase B (without reaching its earlier peak). To alleviate both of these concerns one should carry out tests—of the same kind that I have done for the full phase B—for periods including only the first few quarters at the beginning of phase B.<sup>‡</sup>

Second, the important role of the terms of trade in explaining the long-term decline in the U.S. NFCB sector rate of profit points to the need for a more elaborate empirical analysis of the sources of change in the terms of trade. In section 3 I discussed several possible reasons for deterioration in the ratio of NFCB sector prices to those of the rest of the world: a growing scarcity of exhaustible resources (imported into the NFCB sector), a decline of U.S. hegemony within the world capitalist system, and a slow rate of growth of productivity relative to wages in the service sector of the U.S. economy.<sup>§</sup> But I have not yet developed a method of testing empirically the validity of these alternative explanations, nor have I considered other possible explanations. More theoretical and empirical work in this area is a high priority in the study of sources of decline in the rate of profit.

Another area in which I have not sufficiently developed a method of discriminating between alternative theories is the analysis of sources of realisation failure. Although the RF variant of Marxian crisis theory did not prove to be very important as an explanation of profit rate declines in the U.S. NFCB sector between 1949 and 1975, it might well be more significant in other periods or in other economies. It would then become

<sup>†</sup> The long-term deterioration in the terms of trade also exerted downward pressure on the rate of profit because of its negative effect on the ratio of productive capacity to capital stock (measured in current dollars). But this negative effect was almost exactly offset by the positive effect on the capacity/capital ratio of a rise in the average physical productivity of capital. The capacity/capital ratio reflects the impact on the rate of profit of changes in the organic composition of capital, insofar as these changes are independent of changes in labour strength and realisation conditions.

<sup>‡</sup> Inspection of the time series data I compiled for this study suggests that the conclusions I reached on the basis of tests for the full cyclical phase B would not be significantly altered were I to carry out the same tests for shorter periods of time. The most important source of cyclical profit rate downturns is still always a rise in the wage share of income, which typically leads any decline in the rate of capacity utilisation.

<sup>§</sup> Note that this last explanation raises the possibility that a form of the RSL variant of Marxian crisis theory has been operating in the non-NFCB sector of the U.S. economy.

a matter of greater concern whether realisation problems arise from underconsumption or underinvestment or disproportionality—the alternatives I discussed in section 1—or from some other possible source that I have not considered here. To make such distinctions one requires a more thorough theoretical analysis of the structure of aggregate demand and supply, as well as a more extensive range of data than I compiled for this study.

Most important of all, it is essential to go beyond the analysis of the before-tax rate of profit to consider the role of the state and the after-tax rate of profit. I have measured both the wage and the profit shares of income, which are among the key variables utilised in the analysis developed in this study, gross of direct taxes and without reference to the effect of government transfers or government purchases. Yet state revenues and expenditures clearly affect the real income position of workers and capitalists in significant ways, so that a complete analysis of the class struggle over distribution—and hence the RSL variant of Marxian crisis theory—should address directly the distributional impact of the state.<sup>†</sup> Moreover, the state also significantly influences the conditions of realisation in a modern capitalist economy, so that a complete analysis of the RF variant requires attention to the macroeconomic impact of the state. And, insofar as capitalist behaviour—for example, in planning investment—is influenced by after-tax rather than before-tax rates of profit, any analysis confined to the latter is bound to be incomplete. My study must therefore be considered preliminary, if only because of the absence of any consideration of the role of the state.

Finally, it would be desirable to pursue the type of analysis carried out in this study—with the extensions noted above—by investigating the behaviour of the rate of profit in different historical periods and in other capitalist economies.

### Glossary of symbols

All of the symbols used in the main text and the tables of this paper are listed below with their definitions, except for those symbols formed by the addition of superscripts to previously-defined symbols. The meaning of the superscripts is explained following the list of the symbols.

#### *Symbols*

$c$	constant capital
$e$	the rate of exploitation (in value terms)
$g$	the organic composition of capital (in value terms)
$J$	actually utilised capital stock (at current prices)
$\bar{J}$	the actually utilised real capital/labour ratio
$K$	capital stock (at current prices)
$\bar{K}$	the real capital/labour ratio
$L$	hours of total labour (direct and overhead)
$L_d$	hours of direct labour
$L_o$	hours of overhead labour
$P_k$	the price index for capital goods
$P_w$	the price index for wage goods
$P_x$	the price index numeraire
$P_y$	the price index (deflator) for net output
$r$	the value rate of profit
$s$	surplus value
$u_w$	average unit labour costs
$v$	variable capital

<sup>†</sup> Such an analysis might well require a more subtle characterisation of the class structure; thus, rather than distinguishing only between workers and capitalists, one might find it useful to isolate non-working transfer recipients as a separate class.

$W$	the volume of wages (all income from labour, at current prices)
$w$	the average hourly money wage rate (for all employees)
$w_d$	the average hourly money wage rate for direct employees
$w_o$	the average hourly money wage rate (equivalent) for overhead employees
$Y$	actual net output/income (at current prices)
$\bar{y}$	average labour productivity (real output per labour hour)
$\bar{Z}$	potential net output or capacity (at current prices)
$\bar{z}$	real capacity per labour hour
$\gamma$	the organic composition of capital (in price terms)
$\varepsilon$	the rate of exploitation (in price terms)
$\eta_\ell$	the labour hour requirement ratio
$\eta_w$	the wage bill requirement ratio
$\zeta$	the capacity/capital ratio
$\lambda_d$	hours of direct labour employed per unit of output
$\lambda_o$	hours of overhead labour employed (optimally) per unit of output
$\Pi$	the volume of profits (all income from property, at current prices)
$\rho$	the rate of profit
$\rho_c$	the contribution of the organic composition of capital to profit rate change
$\rho_\ell$	the contribution of labour strength to profit rate change
$\rho_r$	the contribution of realisation conditions to profit rate change
$\sigma_w$	the share of wages (in net income)
$\sigma_\pi$	the share of profits (in net income)
$\varphi$	the rate of capacity utilisation
$\psi_k$	the adjusted price index for capital goods (relative to wage goods)
$\psi_w$	the adjusted prices index for wage goods (relative to capital goods)
$\psi_y$	the adjusted price index for net output (reflecting the terms of trade)

#### Superscripts

$\bar{x}$	denotes real $x$ ( $x$ at constant prices)
$x^*$	denotes 'truly required' or 'true' $x$
$\hat{x}$	denotes the optimal level of $x$
$\dot{x}$	denotes the exponential rate of change of $x$

### Appendix: sources of data

To carry out the empirical analysis in this study, I required quarterly time series data for the NFCB sector of the U.S. economy on each of the variables listed in Tables 1–8 and 10–12. In addition, I required quarterly time series data on the three labour market indicators listed in Table 9. All of the required NFCB sector data can be derived (via appropriate equations in the main text of the paper) from the following basic variables:

1.  $Y$ : actual net output/income (at current prices)
2.  $\bar{Y}$ : actual net output/income (at constant prices)
3.  $\Pi$ : the volume of profits (at current prices)
4.  $\bar{Z}$ : potential net output, or capacity (at constant prices)
5.  $K$ : capital stock (at current prices)
6.  $\bar{K}$ : capital stock (at constant prices)
7.  $P_w$ : the price index for wage goods
8.  $L$ : hours of total labour (direct and overhead)
9.  $L_o$ : hours of overhead labour
10.  $w_o$ : the average hourly money wage rate (equivalent) for overhead labour
11.  $\hat{\varphi}$ : the optimal rate of capacity utilisation

The labour market indicators in Table 9 are:

12.  $u$ : the rate of unemployment for non-agricultural private wage and salary workers
13.  $h$ : the average work week for wage workers in the manufacturing sector
14.  $q$ : the quit rate for all employees in the manufacturing sector

I compiled quarterly time series data on each of the above 14 variables from 1946 or 1948 (depending on the earliest date for which data were available) to the second quarter of 1976 (the

latest date for which data were available at the time I began my empirical research). These fourteen time series constitute the essential data base for the study; the sources and methods I used to compile them are documented in the following paragraphs.

1, 2, 3. I obtained quarterly data for the first three variables directly from Table 1.15 of the U.S. National Income and Product Accounts, published regularly by the U.S. Department of Commerce.  $Y$  corresponds to the 'domestic income' of the NFCB sector;  $\bar{Y}$  is measured at constant 1972 prices; and  $\Pi$  is the sum of NFCB 'corporate profits with inventory valuation adjustment and capital consumption adjustment' and NFCB 'net interest'. The two terms that are included in  $\Pi$ , plus NFCB 'compensation of employees' (my volume of wages  $W$ ), exhaust  $Y$ .

4. I constructed a quarterly time series for the variable  $\bar{Z}$  in three separate steps. First, I obtained figures on the rate of capacity utilisation in the manufacturing sector (the closest approximation to the NFCB sector for which such data were available) from the (revised) quarterly series compiled by the U.S. Federal Reserve Board and published in the *Federal Reserve Bulletin* (November 1976). Second, I divided the quarterly data on  $\bar{Y}$  by the corresponding data on the rate of capacity utilisation to obtain a preliminary time series for  $\bar{Z}$ . Third, I constructed the final time series by computing a centered seven-quarter moving average for each quarterly value of  $\bar{Z}$ . The reason I adjusted the preliminary time series with a moving average is that the preliminary series displayed an occasional downturn in  $\bar{Z}$  from one quarter to the next, which is implausible in a potential output series. The moving average smooths out minor fluctuations in the unadjusted time series for  $\bar{Z}$  and results in figures for the rate of capacity utilisation ( $\varphi = \bar{Y}/\bar{Z}$ ) whose variance depends to a greater extent on variations in the more firmly-grounded data on actual output  $\bar{Y}$ .

5, 6. I constructed the required quarterly time series for the capital stock variables  $K$  and  $\bar{K}$  by using the following procedures. First, I obtained annual year-end estimates of net fixed capital stock (residential plus non-residential) in the NFCB sector, both at current prices and at constant 1972 prices, published by the U.S. Department of Commerce in the *Survey of Current Business* (April 1976 and August 1976). To estimate the corresponding mid-year values, I averaged each pair of adjacent end-year values. Then I obtained annual mid-year estimates of inventories in the NFCB sector, at current prices only, from Holland and Myers (1979, Table A2a). To estimate the value of inventories in constant 1972 prices, I divided the current-price figures by the U.S. Department of Labour's monthly wholesale price index for industrial commodities (converted to a quarterly basis and keyed to a value of unity in 1972). To obtain annual figures for the total net capital stock variables  $K$  and  $\bar{K}$ , I then summed the corresponding figures for fixed capital and inventories. Finally, I converted the annual figures into the required quarterly data by linear interpolation: each quarterly value was set equal to a weighted sum of the nearest two annual values, with the weights depending on the time intervals between the mid-point of the quarter and the mid-points of the two years in question.

7. For the wage-good price index  $P_w$  I simply used the U.S. Department of Labour's seasonally adjusted monthly consumer price index for all items (converted to a quarterly basis and keyed to a value of unity in 1972).

8. My quarterly time series for total labour hours  $L$  was based on the U.S. Department of Labour's seasonally adjusted quarterly index of 'hours of all persons' in non-financial corporations. To convert this index (keyed to 100 in 1967) into a time series of actual hours, I multiplied each quarterly value of the index by 0.01 times an estimate of the actual number of person-hours of employment in the NFCB sector in 1967. This number was estimated to be 72.7 billion by Gorman (1972, Table 2).

9, 10. To generate quarterly time series estimates of labour hours  $L_o$ , and the corresponding average money wage rate  $w_o$ , for overhead labour in the NFCB sector, I had to make use of some data available only for manufacturing establishments (including central administrative offices) in the U.S. economy. From the U.S. Department of Commerce's *Annual Survey of Manufacturers* I first obtained annual figures for hours of production workers, hours of other employees (on the assumption of an average of 2000 hours per year for each such employee), the total wage bill of production workers and the total salary bill of other employees. Identifying production workers with direct labour and other employees with overhead labour, I then computed annual values for the ratio of direct to overhead labour hours  $r_h$  and the ratio of direct to overhead labour compensation  $r_c$ . Using the same linear interpolation procedure described above for the conversion of annual capital stock data, I converted the annual time series for  $r_h$  and  $r_c$  into quarterly

time series. Finally, I computed quarterly values for  $L_o$ —compatible with the quarterly time series for total labour hours  $L$ —by substituting the quarterly values for  $r_h$  into the equation

$$L_o = L/(1+r_h). \quad (A1)$$

Similarly, I computed quarterly values for overhead labour compensation  $W_o$ —compatible with the quarterly time series for total labour compensation  $W$ —by substituting the quarterly values for  $r_c$  into the equation

$$W_o = W/(1+r_c). \quad (A2)$$

Equations (A1) and (A2) follow directly from the definition of overhead labour as total labour minus direct labour. It remained only to compute quarterly values for the overhead labour wage rate from the definitional equation

$$w_o = W_o/L_o. \quad (A3)$$

11. For the optimal rate of capacity utilisation  $\hat{\theta}$ —i.e. the rate to which the employment of overhead labour is geared—I chose somewhat arbitrarily the constant value of 90%. My choice was based on the observation that the actual average rate of capacity utilisation ( $\phi = \bar{Y}/\bar{Z}$ ) for the NFCB sector rarely exceeded 90% in the postwar period, and then only by a very small margin. Thus the 90% figure could be considered to represent full utilisation of capacity for practical planning purposes.

12, 13, 14. Time series data for rates of unemployment among different categories of workers, and for average weekly hours and rates of turnover among manufacturing workers, are compiled by the U.S. Department of Labour; I obtained the quarterly figures for the labour market indicators  $u$ ,  $h$  and  $q$  from various issues of the U.S. Department of Commerce's monthly *Business Conditions Digest*.

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