Quantitative Marxism

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Contents

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Preface and Acknowledgements

This book arose from a Conference of Socialist Economists (CSE) day conference on 12 December 1987. I am grateful to the other members of the CSE Executive for their assistance in running the conference and to the participants who made it such a success. There have also been a number of CSE conference streams of the same name, and it has become clear that there is a great interest in what might be termed 'quantitative Marxism'. This trend sees Marxists taking a critical rather than dismissive attitude to orthodox analysis, allowing them to become involved in policy debate. This can only be a healthy development for the discipline. Marxism presents an alternative, and it can represent an alternative way of analysing economic and social phenomena. It can be operationalized to confront orthodoxy and to provide a more sensible paradigm. If its insights are to be translated into policy there needs to be some fusion of theory with data. This is our belief, and this book represents an important contribution to the growing task of economists of the Left. Hopefully, it will provide a spur to further work.

I should also like to express my debt of gratitude to Ron Smith for his inspiration, encouragement and help. He has not only helped me personally but has also provided comments and suggestions for most of the contributors to this volume.

1

An Introduction to Quantitative Marxism

PAUL DUNNE

1.1 INTRODUCTION

Marxist economics has been through periods of growth and stagnation in the last few decades reflecting, at least partly, the state of the international capitalist economy. The comparative stability and the growth of international capitalism in the 1950s and 1960s provided a general mood of optimism and almost complete acceptance of mainstream economics, mainly in the form of the neoclassical synthesis of Keynesian economics. Interventionist Keynesian policies seemed to be working well and, apart from a few dissenting voices, there seemed to be no reason to suppose that this might not continue to be the case.[1]

Applied economics, and in particular econometric models of the economy, played a central role in the application of interventionist Keynesian policies, although Keynes himself had been hostile to them (Pesaran and Smith, 1985). The long boom was also associated with the growth of large firms and, outside the United States, a growth in their share of economic activity as they struggled to control production and distribution. Their increasing economic importance led to increased industrial intervention by the state, in particular via competition policy, and a system of state monopoly capitalism emerged. These developments required both an increase in the information collected on the economy and in the sophistication of quantitative methods of control. (See Grahl, 1979).

In the 1970s, however, the long boom came to an end and the world economy headed towards recession, with inflation and stagnation becoming prevalent in the capitalist world. Developments in orthodox economics became more conflicting and less cohesive, with anti-Keynesian attacks from the right having more and more impact. The application of Keynesian policies in government policy no longer

seemed able to provide the answer to worsening economic problems. The large macroeconometric models of the economy, which had represented the pinnacle of applied Keynesian analysis, proved inadequate in predicting macroeconomic performance. Their linear structures were unable to pick up the dynamics of a system heading into crisis.[2] The foundations of economic theory came under attack as empirical failure was considered to imply theoretical weakness. The Keynesian consensus collapsed, with developments tending to come from the Right, as Keynesian economics was increasingly absorbed within the neoclassical paradigm of microfoundations and market clearing. These developments are discussed in more detail by, for example, Bleaney (1976), Aaronovitch and Smith (1981), Fine and Murfin (1984) and Pilling (1986). In parallel there was also a revival of interest in marxist economics. (See Burkitt (1984), for a general discussion of the radical, non-orthodox schools of theory.)

In the United Kingdom, development of the Marxist framework in the late 1960s and early 1970s focused upon the debates over value theory. They were rather abstract debates over the interpretation and reinterpretation of Marx's writings (see, for example, Steedman (1977), Elson (1979), and, for more recent surveys, Fine (1986) and Mohun (1985)). However, they did clarify concepts and analysis and lay the groundwork for the theoretical and empirical analyses of capitalism which followed involving the theory of the state, crisis, the falling rate of profit and the labour process. For recent surveys see Desai (1979), Thompson (1983), Smith (1988) and Clarke (1989).

Within this revival there was a strand which proclaimed anti-quantitative views with great vigour, in terms of both subject matter and methodology. This led to a tendency for marxist economists to develop an inward looking attitude, ignoring developments in the orthodoxy, although there were some influential theoretical critiques of orthodox economics and empirical analyses of the failure of the post-war boom.

Marxist economics became increasingly marginalized, particularly in the 1980s. While this reflected a general malaise of the left and various political defeats, it also reflected a failure to enter the terrain of orthodox economics and become involved in debate. Marxists took a dismissive approach to the orthodoxy, which often came across as a detached arrogance and superiority of understanding of how the world works. The tools and data of orthodox analysis were not considered of any value or interest, since many Marxists would argue that the very attempt to capture the dynamics of capital accumulation with statistical analysis and the available data was useless. The available techniques and the data focus on appearances, with the data being

merely phenomenological forms which give little insight into what is happening.

We believe that such anti-quantitative ideas are misplaced and indeed have been damaging to the development of Marxist economics, limiting its contribution to policy debate and to the Left in general. The increasing supply of empirical research techniques should be seen as an opportunity, rather than as something to ignore. They can be used to attack the orthodoxy in a positive manner in presenting alternatives and in influencing students and academics who only know the orthodoxy but are unhappy with its failure to explain most economic phenomena.

This book is thus intended as a contribution to such attacks on the terrain of orthodox economics, in terms of both its attempts to understand the world and its policy role and implications. The contributions deal with various aspects of quantitative Marxism, ranging from critiques of orthodox analysis, using the tools and data of the orthodoxy, to attempts to develop alternatives to orthodox applied work. All these are seen as important complementary developments.

While quantitative Marxism is not a new development there is a rapid growth of interest in it. We hope that this book will contribute to the development of work in the area by providing a relatively comprehensive coverage of this work, of the problems to be addressed and challenges to be met, and of the great potential for future work.

The rest of this introduction is intended to provide the context for the contributions in the text, to consider what 'quantitative Marxism' is and why there is a deficiency in its development, what the issues and areas are, and to survey briefly the growing literature.

1.2 EMPIRICAL MARXISM

At the risk of over simplification, we can characterise the major features of Marx's method as follows:

- the distinction between appearance and essence;
- the treatment of economic processes as historical and social;
- the use of dialectical analysis, developed from Hegel, using a materialist interpretation.

There is, as we shall see, considerable debate over Marx's method and the emphasis that should be given to particular aspects. Nevertheless, none of these aspects preclude empirical analysis and Marx was extensively empirical in approach, documenting his theories with

data and history, continually moving from the abstract analysis to the concrete reality in his work. But he was in no way empiricist – the belief that knowledge is only attainable through observation. (See Pilling, 1980; Sayer, 1983; Pheby, 1988.)

Disagreements over the actual method of Marx have led to Marxists adopting different positions. There is a continuing debate over the role of the dialectical method in Marx, with some writers seeing it as the distinctive feature of his work, Pilling, 1980; Rosdolsky, 1980; Zeleny, 1980, Williams, 1988, while others consider the dialectic to be a burden. This is particularly true of the 'rational choice' Marxists, who employ a methodology based on a methodological individualism which is very close to neoclassical economics (Roemer, 1981, 1986; Elster, 1985). These writers play down the role of the dialectic and the insights of Marx's early writings. Their aim is to understand the social formation of individuals, while requiring that society be understood on the basis of individual action. They argue that Marxism has to move out of the nineteenth century and take up the tools and analysis of contemporary social sciences, including methodological individualism and technical developments such as game theory. In a recent article Levine et al. (1987) argue a similar line in support of microfoundations for Marxism, but argue against methodological individualism.

In a recent collection Williams (1988) continues the debate criticizing the analytical Marxist approach and calling for a reinstatement of the dialectic and an emphasis on the social forms in which the objects of social science appear, based upon the dominance of the value form. The contributions do not dismiss the analytical Marxist approach; they recognize the usefulness of analysis and model building, but dispute its claim to be a philosophical basis for Marxism or its sole legitimate heir. Williams argues that if the models are used within a dialectical systemic presentation, they can indeed provide a microlevel grounding of a dialectical account of capitalism (see also Carling, 1986).

In a recent article, Gunn (1989) considers the role of philosophy in Marxism, arguing that Marxists must by definition devote themselves to both empirical and methodological research at the same time. He argues that, by understanding theorization as linked to practice, Marx, as with Hegel, unifies theory and metatheory (philosophy). In Marx's work the use of reflexive theorizing (a theory is reflexive when it reflects on and understands itself as inhering in a practical world) unifies theory and metatheory by means of immanent critique (which operates by challenging a view from within) and determinate abstraction. This view implies that there is no room in Marxism for a separate

philosophy or methodology in the sense of a metatheory.

There is clearly considerable debate and controversy within Marxist political economy and it does have the potential to be constructive. Such controversy is not new, as Syzmanski (1985) shows in an interesting attempt to analyze the development of Marxist theory in terms of cyclical movements between orthodoxy and reformism. The state of Marxist theory and its concerns are shown to reflect social movements and the crises of which they are in turn a product (see also the introduction to Baranski and Short (1985)). There are certainly lessons to be learned from previous debates.

It is in fact possible to identify a strand of empirical Marxist analysis historically, as Gorman (1981) shows. Empirical Marxism, for Gorman, comprises thinkers who attempted to synthesize Marxism and empirical science to develop an alternative to orthodox dialectical materialism. Orthodox materialism is anti-empirical; it presumes a complex and dynamic social whole, determined in the last resort by production. Concrete phenomena are then considered to reflect these prior material laws. (See Anderson (1987) for a more general discussion of the nature and evolution of Marxist thought.)

The start of the empirico-critical philosophy can be traced back to late-nineteenth-century Russia, where a number of writers were providing a novel Marxist critique of the orthodoxy which was loyal to empirical method. They questioned the passive reliance of Marxism on abstract non-verifiable theories, preferring to argue that philosophers and scientists had to organize reality actively. This position was developed by Bernstein, who moved from abstract orthodoxy to an approach which did not force facts into preconceived categories. A major problem of empirical verification, however, is that the methods used can influence the researcher's perception of existing reality, accentuating particular aspects of reality, at the expense of others, and this in turn can lead to a particular political bias (e.g. reformism in the case of Bernstein).

The Austro-Marxists, in particular Adler and Hilferding, aimed at maintaining the epistemological priority of empirical data and tried to make concrete models of social change, but without Bernstein's reformism. Adler tried to synthesize Marx and Kant in order to derive categorical principles and *a priori* concepts with which to understand social phenomena. The *a priori* categories are derived from reason, not experience, and provide the precondition of empirical science, bonding individuals into a social unity. This led the school to confront Marx's theories with post-Marxist trends, as exemplified by Hilferding's *Finance Capital*, believing that they measured up to factual reality. Unfortunately the group did not last after the First World

War; they split between reformists and non-reformists, finally to be destroyed by the rise of fascism in the 1930s.

The next development charted by Gorman is the work of Della Volpe, followed by that of Colletti, who was a student and colleague. Della Volpe used deterministic abstractions; he considered that theories used to organize and explain empirical realities must themselves be part of that reality. Colletti followed the general line of Della Volpe; both were anti-Hegelian. Indeed, Colletti (1973) provided the most systematic attack on Hegelianism available, in which he argued that Kant was the true predecessor of Marx. Nevertheless, at that time he was also concerned with re-emphasizing the revolutionary aspect of Marx. In recent years, however, Colletti has shown an increasing disillusionment with both Marxism and bourgeois empiricism.

The strand of empirical Marxism identified by Gorman replaces Cartesianism with dialectics, leading to an approach which can exploit the empirical research techniques of bourgeois empirical science. This gives a means of developing communication and co-operative work and attracting socially conscious empirical economists, without necessarily capitulating to a 'reactionary bourgeois elite'. Nevertheless, it does have the danger that the pursuit of facts can lead to reformism, or conversely that the concern about reformism can lead to old style orthodox Marxism. But these are problems that can be overcome, as a number of the contributions to this book show. Indeed, they seem less serious if we consider the arguments in Gunn (1989) as presented above.

There are clearly a variety of approaches in Marxist economic method but this should not be seen as a weakness. Indeed, it is a great advantage, particularly if the approaches can be seen as complementary rather than necessarily competitive. Debate is a manifestation of a healthy discipline and any attempt to claim, or impose, the dominance of one particular approach can be self-defeating. In this way the development of quantitative Marxism can be seen as complementary to the other existing approaches, focusing on particular aspects of Marxist analysis and engaging the orthodoxy in debate. At the same time, it is necessary to consider the context of the analysis, and to realize its limitations, although hopefully without shackling innovative developments.

1.3 QUANTITATIVE MARXISM

Three types of empirical work can be distinguished: Firstly, historical/institutional, the systematic observation and collection of

qualitative information within an organizing framework; secondly, descriptive empirical analysis of quantitative data; thirdly, statistical analysis using formal probability-based techniques of inference. The first two are widely used by Marxists. Marxist histiography in economics, developed by Hobsbawm (1968) and Thompson (1968), fundamentally changed the study of economic, social and political processes and, as we have noted, Marx's method was very much 'empirical'. Indeed, in chapter 2 Desai provides evidence to suggest that Marx would have been interested in developing a quantitative Marxism, given the tools and equipment available today. If he had been able to develop such an approach it would have been very different from the orthodox empirical analysis. The classical Marxists, such as Lenin and Luxemburg, were certainly empirical in their approach. They had to combine theory and practice, to understand economic and social developments, and to construct policy in response to them (Desai, 1989; Howard and King, (1989)).

The third approach, however, has been little used. To consider why this might be the case we first look at the methodological issues and then move on to practical objections. The argument that Marxist variables are non-quantifiable and non-operational in any absolute sense may be true, but it is also true for all other theories. Many of the supposed problems of operationalizing Marxist theory are no worse than those faced by orthodox economists. In orthodox economic theory, theoretical constructs do not relate to directly observable phenomena, and the process of measurement adds a further level of subjectivity. In orthodox analysis the measurement of unemployment, its natural rate and even demand and price are in no way objective and value free. Rather, they are based upon a theoretical view of the world and a set of social processes. Friedman's seminal contribution to the analysis of consumption can be interpreted as moving from the appearances of measured consumption and measured income to the essence of the abstracted unobservables of permanent income and transitory income (Friedman, 1957).[3]

One important development has been the work of radical statistics groups in various areas. Their analysis of statistics, data and data collection as subjective, socially produced and ideologically non-neutral has had considerable impact on various areas of social research. The book edited by Irvine et al. (1981) gives a comprehensive coverage of the issues, including a chapter by Donald Mackenzie which shows that even statistical techniques cannot be treated as neutral; regression analysis, for example, was the product of eugenics research.

The seemingly unquantifiable nature of Marxist variables is no

worse than that for orthodox economists. The balance of class forces, degrees of militancy etc are no more difficult to measure than many political variables that orthodox economists try to measure.[4] They face the same problems quantifying qualitative variables – for example, the relation between civil liberty, political stability and economic indicators (Kormendi and Meguire, 1985). The use of techniques such as latent variables and principal components is common, and is even required in studies of the money supply, (e.g. Spanos, 1984).[5]

In orthodox economics there is a theory and a set of assumptions, both implicit and explicit, in the light of which the data are collected and processed. Such a process is little different from the steps required to operationalize Marxist theory empirically. Indeed, we could argue that Marxist theory is more productive of quantitative implications than neoclassical microeconomics as it relates more directly to the aggregate social processes. The Soviet net material product system of national accounts was developed before the Western version, and Marx's reproduction schema and the Soviet planning experience are precursors of the Leontief input – output model (see chapter 2 for a discussion and Sharpe (1982)). Marx's predictions for the development of capitalism, the concentration and centralization of production, the relative immiserization of the proletariat, the international expansion of capitalism and so on are all predictions which have direct quantitative implications.

Indeed, Kalecki's two-sector model predated the macrodynamics of Keynes and was also prompted by the reproduction schema (Sawyer, 1988). This together with the monopoly capital approach of Baran and Sweezy (1966) (see Cowling (1982) and Sawyer (1988) for a recent survey), can be considered attempts to operationalize Marx's framework. However, the developments in the monopoly capital school's analysis of capitalism have tended to see Marx's categories and concepts as unquantifiable and to replace them with directly observable quantities, thus focusing on surplus, rather than on surplus value, for example.

While in principle there is no reason why Marxist national accounts could not be constructed, the large resource costs mean that the construction of direct statistical measures of Marxist categories for capitalist countries is not a practical possibility. Thus the emphasis of Marxists researching in this area is more on the adjustment of orthodox data to represent Marxist categories, as in chapters by Alan Freeman (see also Wolff (1979, 1986), Gouveneur (1983, 1989) and Tonak (1987), and the survey by Sharpe (1982) which is particularly useful for its coverage of historical developments). These studies show that any problems in the empirical application of Marxist theory are

no different from those faced by orthodox theory. With a set of assumptions and measurement conventions, estimates can be obtained for value, the organic composition of capital, the value rate of profit and so on.

Despite the vigorous debates that have surrounded the transformation problem, and its treatment by the orthodox as the Marxist's Achilles' heel, it need not cause any concern. It has been solved theoretically a number of times for the static case. More generally, since early studies by Leontief, empirical results have confirmed Ricardo's original supposition that values tend to be approximately proportional to prices, despite the theoretical objections (see Shaikh (1984), Petrovic (1987) and Ochoa (1989) and the survey by Desai (1988)).

Value national accounting is in principle no more difficult than price national accounting. Both depend on complex theoretical structures and require a variety of assumptions and conventions, and face severe problems of measurement. This is clear from Aaronovitch and Smith (1981), who give a good critical introduction to the national accounts data and the issues involved in using such data from a Marxist perspective, while a glance at the 'Sources and Methods' for the UK National Accounts is enough to give some idea of the procedures used and the difficulties encountered, as perceived by the practitioners. The growing concern of orthodox economists is illustrated by Eisner (1988), who provides a recent survey of the range of issues involved in developing the bourgeois national accounts and considers their deficiencies, looking at possible ways of extending the US national accounts to give a better reflection of economic activity and social welfare.

Orthodox measures are not unproblematical observations, as the history of the national accounts shows (Kendrick, 1972). The orthodoxy has the advantage that large amounts of resources are devoted to collecting its information and people have become used to taking the highly abstract categories, like gross national product (GNP), for granted. In attempting to measure Marxist concepts, it is really a matter of where in the move we bring in the Marxist interpretation. If Marxists had the same resources they could improve their data collection, but as things stand they usually have to rely on adjusted orthodox data. Nevertheless, as long as care is taken a lot can in fact be done, as the contributions in this volume show.

There are then three approaches that can be taken in developing quantitative Marxism. Firstly, the least practically feasible but in principle achievable is to attempt to measure Marxist categories directly. The second is to attempt to adjust orthodox data to make

them closer to the required Marxist categories. Third, and most common, is the attempt to use Marxist theory to explain the movement in the orthodox statistics. This may pose less practical problems, but faces severe conceptual difficulties. As we have argued, all these approaches should complement each other, using different types of data to answer different questions at different levels of abstraction.

Unless we wish to assert that Marxist theory is deterministic, there is no reason not to use probabilistic methods of statistical inference. These methods are not inherently Marxist, but are shared with orthodox analysis. More importantly, the equations which are used, typically linear difference equations, do not represent important features of Marxist analysis such as dialectical interactions and crisis. Again, this is not a problem only for quantitative Marxism; orthodox neoclassical economists have similar problems in trying to model the business cycle both conceptually and empirically.

A central problem in these developments is the ahistorical nature of the parts of Marx's work that have been formalized. It is difficult to derive models to represent dialectical contradictory historical processes, and so in general theorists have fallen back on what are essentially equilibrium formulations. Any dynamics introduced into such a framework is not intrinsic nor substantial, although this is changing with the development of chaos models (see Kelsey (1988) and the discussion in chapters two and six). In addition, there have been some developments which have considered the role of equilibrium in Marx's economics (Sohinger, 1988). There are also developments in Eastern Europe which relate to attempts to formalize, quantify and operationalize Marxist categories and theoretical constructs in a manner that is relevant for policy; Sharpe (1982) discusses some of this work.

It is difficult to construct models of crisis and dialectical development. There have been some attempts, most noticeably that of Goodwin (1967) developed by, for example, Goodwin et al. (1984), Goodwin and Punzo (1988) and Skott (1989). In addition, Harris (1979) develops a catastrophe theory model, although in a Harrod–Domar growth model framework. In chapter two Desai discusses some of the work in this area, while Laibmann (1987) gives a recent non-technical survey of a number of developments in Marxist simulation models of this type.

Formalism should not be seen as an end in itself, but we need formal models to understand complicated dynamics, to explain the amplitude and frequency of crisis, and to analyze the effects of other processes such as state intervention and internationalization on the dynamics of

capitalism. Until we can develop such models we shall not be able to develop Marxist econometric analysis and shall continue to be derivative of orthodox models. The development of such models is clearly the way – ahead, the least developed part of quantitative Marxism, but the area with the greatest potential. In chapter two Desai gives some pointers to the paths that such developments might take.

Having considered the historical underpinnings and the issues involved in developing a quantitative Marxism, it is useful to give some idea of the way in which empirical work has been undertaken by Marxists in a particular area. The best example is the empirical analysis of crisis, an area where Marxists have been successful, and in some cases influential, in undertaking applied work. A brief survey is provided in the next section.

1.4 THE EMPIRICAL ANALYSIS OF CRISIS

Crisis and the role of the dynamics of the rate of profit in regulating the evolution of capitalist economies are not only central to Marxist economic theory, but have also been the focus of considerable empirical work. Indeed, in 1986 a special issue of the American journal *Review of Radical Political Economics* was devoted to the empirical analysis of crisis. In the introduction Devine (1986) expressed the hope that the empirical study of crisis theory might further the construction of a leftist macroeconomics. It is certainly an area in which the potential for debate and dialogue with the orthodoxy is great. Of the large amount of work that has been done, however, most of it does not concern the United Kingdom, possibly because of the stronger Keynesian tradition on the Left (see Aaronovitch and Smith (1981), Fine and Murfin (1984) and Pilling (1986) for a discussion).

The empirical analysis of crisis can be conducted at a number of levels, differing in where they emphasize the dominant break in the circuits of capital (Smith, 1988). Firstly, a break in the circuits of money capital would cause a financial crisis. There is a certain autonomy of financial crises: they do not necessarily lead to general crisis, although they are likely to reflect crisis (Kindelberger, 1978; Coakley and Harris, 1983; Pollin, 1986).

Second, a break in the circuits of productive capital would cause a long-wave downturn, affecting the whole structure of production. This can occur in the following areas:

in the link between production and realization, causing over-accumulation;

in production where class conflict can affect profits;

in realization due to a lack of aggregate demand;

in problems of disproportionality between sectors because of the unplanned nature of capitalist production.

Third, breaks in the circuit of commodity capital would in general lead to a regular trade cycle.

The empirical analysis of observed cycles in economic growth has been undertaken for the long run – analysing 'long waves' – by both orthodox and Marxist economists and economic historians. The pioneering work was that of Kondratieff, a Russian economist, who hypothesized a fifty year cycle in capitalism based upon a long-run analysis of price series. This was followed by the work of Schumpeter (1987). While the qualitative evidence for well-defined cycles can be persuasive, the quantitative evidence is ambiguous and there is considerable debate in both the Marxist and non-Marxist literature (e.g. Mandel, 1980, 1987; Maddison, 1982; Kleinknecht, 1984; Rosenberg and Frischtak, 1984; Solomou, 1986; Marshall, 1987; Norton, 1988).

Following Devine (1986), Marxist empirical analysis can be classified into two approaches, although in some cases the delineation is not so clear cut. Firstly, there are those who consider that capitalism has an underlying tendency to severe crisis blocked by countervailing tendencies and that without these counter-tendencies long-term stagnation would be inevitable.

One variant of this approach is the Baran–Sweezy school. For them the survival of capitalism and prosperity is explained by historically specific effects, such as wars and high military expenditure, which are used to overcome realization crises (see Foster and Szlajfer (1984) for a recent example of this approach).

Another approach is that of seeing a long-term tendency for profit rates to fall, leading to increasingly severe crises. Post-war prosperity is explained by counteracting tendencies. Mandel (1980, 1987) emphasizes such a multi-causal approach to the analysis of capitalist dynamics.

The French regulation school based on the work of Aglietta (see Aglietta (1979), De Vroey (1984), Lipietz (1985, 1987) and Petit (1985), and see Clarke (1988) for a recent critique) analyse capitalism as a series of epochs based upon specific regimes of accumulation, which have distinctive social relations of production.

Related work on the 'Golden Age' of capitalism can be found in Armstrong et al. (1984), Glyn et al. (1988) and Marglin and Schor (1990).

There are studies of the decline of the United Kingdom which emphasize the problems of de-industrialization (e.g. Rowthorn and Wells, 1987). A variant of this approach emphasizes the peculiarities of the UK economy (e.g. Glyn and Harrison, 1980; Fine and Harris, 1985). Elbaum and Lazonick (1986) present a historical institutionalist perspective of UK decline; for the United States, see Bluestone and Harrison (1982).

Secondly, we can categorize those researchers who focus on structural crisis, where the social relations of production become obsolete. For this approach, sustained stagnation is possible but not inevitable.

The American social structures of accumulation (SSA) school, developed by Gordon, et al. (1982) and criticized by Nolan and Edwards (1984) (a survey is provided by Norton (1988)), has produced a large amount of empirical analysis of aspects of US economic development. Weisskopf et al. (1983) and Bowles et al. (1986) develop an analysis based upon a particular social structure of accords between workers, capitalists and others. These allow profitable accumulation, but conflicts arise and make the accords obsolete, leading to depressed profits and crisis.

A similar approach, although with more specific emphasis on certain tendencies and developments in production which have allowed the continuation of accumulation, is exemplified by the work of Piore and Sabel (1984) and Murray (1987). This approach emphasizes changes in production, moving from mass production (Fordism) to flexible specialization, and sees these developments as representing fundamental changes in capitalism. (See Fine (1987) for a critical survey of this approach.)

There are also those who emphasize the international economic and military hegemony of the United States, as exemplified by Willoughby (1983, 1985).

According to this theoretical approach, any crisis will be most apparent from what happens to the rate of profit or the rate of surplus value over time. Any break in the production – realization link can cause a falling rate of profit. This was empirically verified in a number of places. For the United States the pioneering work of Gillman (1957), Mage (1963), Weisskopf (1979) and Wolff (1979, 1986) can be

cited, although they differ in approach and there is a great deal of controversy over the detail of their analysis and quantification, in particular as to whether to attempt to measure Marxist categories or to explain the observable orthodox statistics with Marxist theory. Wolff attempts to measure value categories, while Weisskopf uses price measures.

In attempting to make adjustments to orthodox data, there are a number of debates regarding the treatment of the state and un-productive labour. Some include the wages of unproductive labour in surplus value (Moseley, 1985, 1987), and some do not (Sherman, 1979). Alan Freeman provides a more detailed review of these issues in chapter five (see also Sharpe, 1982). There have been a number of long-run studies of various measures of profit, a recent example being that of Dumenil et al. (1987) for the United States.

The value rate of profit can be considered as a composite of the rate of surplus value and the organic composition of capital:

$$\frac{P}{K} = \frac{P}{Y} \frac{Q}{K} \frac{Y}{Q}$$

If the money rate of profit P/K is used, the decomposition can be expressed in terms of the rate of exploitation P/Y, the organic composition of capital as measured by the output – capital ratio Q/K, and any realization crisis which is reflected in the ratio Y/Q of output to potential output.

Weisskopf (1979) uses this decomposition to attempt to quantify the relative influence of the different components on the rate of profit. His empirical analysis provided the springboard for much quantitative Marxist work (See chapters eight and nine, Munley (1981), Moseley (1985, 1987), Henley (1987) and Glyn et al. (1988)).

There is general agreement that crises are associated with declining profit rates, but the different schools of thought focus on particular aspects of the formula:

- a rising organic composition of capital, which leads to the tendency for the rate of profit to fall (Shaikh, 1978; Fine and Harris, 1979; Lipietz, 1987);
- a profit squeeze resulting from too high wages, which means that capitalism cannot cope with high employment (see chapter eight, Glyn and Sutcliffe (1972), Boddy and Crotty (1975) and Goldstein (1985));
- a realization crisis because of a lack of effective demand, which is the underconsumptionist monopoly capitalist scenario for the

United States (see Baran and Sweezy (1966) and Szymanski (1985)).
- a combination of production and realization crises (Sherman, 1979; Wolff, 1978).

The form of crisis and the path it takes can be affected by other considerations. In particular, complications will be introduced by the actions of the state (See O'Connor (1973, 1984), Gough (1979), Aaronovitch and Smith (1981), Fine and Harris (1985), Miller (1986), Jankowski (1987) and the discussion in chapter five).

The American SSA school has provided a great deal of empirical analysis of aspects of capitalist economic development and crisis. They have been particularly successful in engaging the orthodoxy, using formal modelling and econometrics. Naples (1981, 1986, 1988) provides a analysis of the effects of conflict on productivity, Weisskopf (1987) analyses the effects of unemployment, Schor (1988), Moseley (1986b) and Schor and Bowles (1987) analyse the effects of work intensity and strikes, and Green and Weisskopf (1988) consider the worker discipline effect. Although not without its critics, this work has certainly shown that a quantitative Marxist approach can be useful in policy debate and in getting Marxist arguments into orthodox journals.

This brief survey of the empirical studies of crisis is not exhaustive, but it does show the vitality of work in the area. It is clear that the development of quantitative Marxism in a number of variants is adding greatly to our understanding of the dynamics of capitalist economies. There is also great potential for future research in the area as the contributions in this book will emphasize.

1.5 THE CONTRIBUTIONS

The contributions in this book can be considered to fit into three categories; those which deal with methodological issues, those which deal with the creation of Marxist data, and those which deal with particular aspects of quantitative Marxism.

Methodological issues

The first three chapters by Meghnad Desai, Simon Mohun and Ben Fine deal with general methodological issues, although surveying different aspects of the literature.

In chapter two Meghnad Desai considers explicitly the method-

ological problems which face an attempt to develop a quantitative Marxism. He considers and dismisses the anti-quantitative objections which might be used to defend the lack of sustained empirical work in Marxist economics. The first of these regards the notion of fetishization – that reality is not directly observable – and may be distorted at the phenomenal level. This idea is not in fact peculiar to Marxism, as it is similar to the idea that 'true' structural relations are not directly observable, which is a basic tenet of econometric methodology. Although in the Marxist case there are more problems, as both the parameters and the underlying variables are unobserved, the spirit of the objections are not specific to Marxism. The second objection he considers concerns the transformation problem. There are two aspects to this – the simple static problem of value price divergence. In terms of theoretical models the problem has been solved many times. In terms of an actual economy the work of Petrovic (1987) and Shaikh (1984) has shown a high degree of correlation between prices and values, which means that the problem for empirical work is not so serious. The second aspect concerns the distinction between the quantitative and qualitative transformation problem. Desai considers that this distinction was only important when it was not clear that the transformation problem could be solved, although in chapter three Mohun provides a different perspective. Desai considers some of the practical measurement issues and finds them to be surmountable.

Desai then moves on to survey developments in the literature of quantitative Marxism, evaluating their potential for further developments. Firstly, the dynamics of accumulation are considered, from the simple models of Goodwin (1967) to the more complex multi-sectoral models. Developments in catastrophe theory and chaos theory are seen to be of potential benefit. Then the long literature on the falling rate of profit is surveyed. Desai considers that the controversies about the falling rate of profit, and other aspects of quantitative Marxism, arise because of the incompleteness of the original model and because of the necessary updating that is required and would have been required even if the original model had been complete. He then sets up the issue in terms of paths which could be taken to move from the simple to the complex in closing the model. This section gives some stimulating insights into how the subject might develop and highlights the potential for quantitative Marxism.

The debate on the transformation problem is considered further in chapter three by Simon Mohun. The movement from values to prices is, as Desai shows, one of the major concerns in developing a quantitative Marxism. While technically the transformation problem is solvable within the context of the static model, there is a more

general context that must be considered. Mohun presents this case, considering the general issues and pointing to the care which must be taken in the treatment of the transformation of values to prices in order to maintain the essence of Marxian analysis. He argues that the attempts of empirical Marxism to work at the level of prices, or to move between prices and values, have to be undertaken carefully and with reference to the more general context of the analysis. It is important not to lose sight of the qualitative aspects, and by reference to these the limitations of the applied work can be kept in view.

Mohun's concern is to show how an understanding of value should inform empirical work. He argues that an attempt should be made to maintain a distinction between value and value form, and to understand the relation between them as a contradictory dynamic connection which is macroeconomic rather than microeconomic. Such a dynamic cannot be understood by treating Marx's value theory as an equilibrium theory in any neoclassical sense. Nor can it be understood by attempting to relate individual values to their form as prices. Rather, he argues, an analysis has to be constructed which shows how forms of value grow out of their value content and constitute barriers to the further development of that content. The essence-appearance distinction is critical to this argument, and Mohun considers that contradictions which arise are structured in a complex dynamic by the labour performed in production and pricing decisions by capitalists, and *both* aggregate macroeconomic invariances of the traditional transformation problem (which is not compatible with the usual linear model within which the transformation problem is usually posed).

In chapter four, Ben Fine considers the methodological issues involved in the development of quantitative Marxism, both in general and from the perspective of economic history. Cliometrics, the study of economic history using quantitative and statistical methods, has become increasingly important in the profession, and Marxists will need to counter it and provide critiques. The chapter illustrates the issues involved with reference to work done on the British coal industry before nationalization, and shows the importance of a quantitative Marxism approach for both its contribution to analysis and its confrontation with the orthodoxy in the subject.

The standard interpretation of the British coal industry in the interwar period was that of a depressed staple industry suffering from deficient demand. It remained backward, relative to its competitors, with small mine size, low mechanization and low productivity. This is usually explained by the poor state of industrial relations, the incompetence of managers and the effects of state support. Taking a Marxist approach, however, Fine considered that the role of landed

property had been neglected, despite considerable commentary on it at the time. This suggested an application of Marx's theory of agricultural rent, which had been relatively neglected. This sees rent as a consequence of economic and social relations which are historically contingent. It is also an appropriation of surplus value and so a deduction from what is available to capital as a whole. It is composed of two components, absolute rent and differential rent, with the latter being determined by both natural differences and the ability of the landlord to expropriate surplus. In this way landlords can affect capital. Also, as capital seeks pastures new, new absolute rents can be extracted.

The net result is that landed property can act as an impediment to the accumulation of capital, leading to less machine-intensive and less centralized production. This contrasts with the orthodox approach which would see the problems of royalties as a problem of multiple leases in an otherwise Ricardian model. However, it is important to consider the historical economic and social context of this, and Fine considers the background to landed property and the specific relations of production in the industry. The next stage is to consider the empirical evidence and see whether it is consistent with this proposition. Rents are not found to be related to measures of natural advantage. The argument that the lack of mechanization reflected a lack of economies of scale is found to be unsupported. This is done by taking on the orthodox economists directly, constructing a capital index, and estimating an aggregate production function. This discredits the view that mechanization alone and not economies of scale are important. The thesis of entrepreneurial failure is found to be wanting when a consistent empirical analysis is undertaken, as is the argument that state intervention caused the failure of the industry.

In an early contribution to cliometrics, McCloskey used the total factor productivity approach to show that productivity differences between the UK and US coal industries prior to the First World War can be explained by natural conditions. Fine produces a critique of this work, showing the general limitations of the approach as well as more specific problems. He suggests how the analysis should be performed from a Marxist rather than neoclassical perspective, providing a superior approach but taking on the orthodoxy on their own terms. Quantitative Marxism is thus seen to be a powerful tool in confronting orthodox empirical analysis in debates.

Marxist data

Having considered the methodological issues, in chapter five by Alan Freeman we move on to the practical considerations of actually trying

to develop Marxist data. While the ideal would be to have the resources to collect and process the data directly related to the Marxist categories, this is not practical. The best that can be done is to try to work with the available data, but to adjust it to try to obtain measures which are consistent.

The work that Alan Freeman reports on is part of an international project which aimed to produce a set of national accounts for various countries which are consistent with the value categories of Marxist analysis. In chapter five he reports some results for the United Kingdom, providing a detailed discussion of the issues involved.

The starting point is the GNP. This is divided into gross profits and gross wages. The procedure followed subsequently is to correct for the treatment of rentier income and rent and depreciation, for the state and taxation and for the treatment of banking and the retail sector, and to adjust the wage bill for unproductive labour costs. The various debates over how these adjustments should be made, particularly the last, are discussed in the text.

These quantities allow the time path of total value and its components and the rate of exploitation to be analyzed and, using a measure of the capital stock, allows the rate of profit to be computed. It is interesting that the adjusted data tell a different story about the development of the UK economy, and the relative power of capital and labour, than the unadjusted quantities of income from employment and profits. A rising rate of surplus value is found to be associated with a falling rate of profit, while at the same time there has been a rising share of wages in output. It also becomes clear that there has been a continual net transfer of income away from wage earners as a result of state activity. The two peaks of income tax were in fact during Labour governments, with no substantial transfers of income from property-owners to wage-earners.

Aspects of quantitative analysis

The next section includes a range of work which uses orthodox data, either to provide a critique of orthodox analysis, informed by Marxist theory, or to reinterpret the evidence within an explicitly Marxist framework. The contributions illustrate the important role that a quantitative Marxism can play in policy debate and the potential for future research.

In chapter six, Jerry Coakley considers the economic analysis of the financial system. Although financial markets seem to provide the best ground for neoclassical analysis, in particular the efficient markets

hypothesis, the latter is seen to fail on its own ground. In fact, this area is seen to hold less problems for quantitative Marxism as the data are less of a problem, being closer to what Marxists would wish to use. A Marxist approach is thus seen to be potentially superior at both the qualitative and the quantitative levels.

In the financial economics literature there have been numerous failures to reject the efficient markets hypothesis (EMH), a testable version of the invisible hand theory. This has led to renewed faith in the market mechanism and has provided ideological support to more general policies. In its simplest form the EMH suggests that financial asset prices embody all available information, including predictions about the future. Thus price changes can only reflect new unpredictable information and therefore should be random. If this were not the case, then traders could take advantage of systematic errors to make risk-free profits and this would remove the error.

The work on the EMH has had important effects. Most importantly in the 1980s it has provided theoretical support for the policies of deregulation and *laissez-faire* in financial markets. Coakley shows that this has not been without its critics, mainly from the ranks of Keynesian economists, and this trend of criticism has become more noticeable since the crash in 1987. However, the Left has tended to neglect financial markets and shown a reluctance to engage in econometric debate. Coakley argues that this is unfortunate. In a review of the critiques of EMH, Coakley shows that a wide range of approaches, while not from a specifically Marxian perspective, do in fact formalize Marxian, post-Keynesian and common-sense criticisms. This is seen in their common emphasis on the instability of markets, periodic crises, the role of market power and speculation.

Following his review of the literature, Coakley finds that only the chaos theory approach, and to a lesser extent the speculative bubble approach, have the ability to capture the Marxian features of the markets in a quantitative framework. In a similar vein to Desai and Fine, he argues that Marxists should take up the issues and begin to challenge the orthodoxy.

Francis Green examines an important Marxist concept – the reserve army of labour – and considers how it can be operationalized and used to reinterpret analyses based upon orthodox unemployment data. The survey shows the importance of the concept in understanding the behaviour of the labour market, as analyzed by bourgeois economists, and in understanding the dynamics of capitalist development. It also considers how Marxist analysis can be used to inform and readjust the orthodoxy and so to improve upon it.

Although there is some controversy over the precise interpretation

of the reserve army, Green presents a number of points which capture the essence of the concept. The reserve army's manifestation as unemployment is systemic to capitalism, caused by crisis; its function is to regulate wages, benefits and conditions of work. As well as enforcing the pace of work, over the cycle, it is a weapon of class struggle; it is composed of a number of groups, or strata, of differing importance.

Green argues that to operationalize the original concept is not so straightforward, as much has changed since Marx's day. Changes which are important include the increased internationalization of capitalism, unionization, state intervention (both Keynesian policy and the welfare state) and the changing composition of the work-force, in particular the role of women.

As Green argues, these developments need to be brought into the analytical framework before the reserve army can be considered an operational concept. He thus moves on to survey the literature on unemployment to see whether the concept has met the challenge, interpreting the results of various studies as tests of the aspects of the theory and its consistency with the evidence.

He finds that the reserve army hypothesis functions as a permanently existing short-run mechanism, and as such can be extremely useful. However, it is not a mechanistic theory and should not be applied dogmatically. The required modifications are important but they do not add up to fundamental alterations. In principle, Green argues, making the reserve army concept concrete is uncontroversial but there are substantial practical problems. In particular it is difficult to obtain consistent data, given its increasingly international character, which has led to the necessity of using adapted versions of standard unemployment and labour market data. Despite these problems a considerable amount of important and interesting work has been done which is testimony to the value of the approach.

Despite these developments, Green argues that too little attempt has been made to distinguish the reserve army hypothesis from conventional neoclassical market forces arguments. It is, he argues, both possible and important to do so, but it will require future effort in both theoretical and quantitative Marxism. Nevertheless, it is clear that the reserve army is one aspect of Marxist economics which has played an important role in the understanding of unemployment within capitalist economies. It has influenced orthodox theory and has provided an area which can be increasingly contested by Marxists using the tools of quantitative Marxism.

In chapter eight, Andrew Glyn considers the trends in profitability from the 1960s to the 1980s for the major capitalist blocks: the United

States, Japan and Western Europe. His stated aim is more one of description than explanation, looking at what has been happening over the period. It is interesting to analyse the long-run trends in the capitalist system at this level of abstraction, as it brings out points which might be lost in the detail of individual country studies. The approach used is to decompose the profit rate on capital employed into the profit share of output and the output–capital ratio.

Using the data developed over a number of years with collaborators (Glyn and Harrison, 1980; Armstrong et al., 1984; Glyn et al., 1988), Glyn finds that the rate of profit was around a third to a quarter lower in 1973 than in the previous peak, with declines in both the profit share and the output–capital ratio contributing to this and the aggregate fall beginning in 1968. This decline took place at different speeds in the three blocks: over three cycles in Europe beginning around 1960, over two cycles in the United States since 1966 and over one cycle in Japan since 1970.

Glyn comments that it is interesting that 1968 was the year in which the aggregate fall began, as it is the year in which the problems facing the advanced economies became evident in other respects. In addition, it is interesting that the profit rate saw a marked fall prior to 1973, which shows that the 'Golden Age' was running into difficulties before the first oil shock. Since 1983 there has been some recovery in profits, in some cases, noticeably the United Kingdom, back to the 1973 levels, but they are still well below those of the Golden Age.

In the rest of the chapter Glyn goes on to discuss the decomposition of the profit share and the output–capital ratio into their component parts for the periods before and after 1973. This allows a pinpointing of the contributory factors, namely productivity slowdown, wage pressure, constraints on passing on cost increases and the relative prices of inputs. Glyn's contribution provides an excellent starting point for future research which will need to explain the paths of these variables.

The next chapter by David Moreton does indeed develop along these lines. He presents an empirical analysis of the rate of profit specifically for the United Kingdom. He develops a model from the work of Weisskopf to evaluate the effect of different aspects of Marxist crisis theory on declining profitability, and applies it to data for the period 1957–85. An advance on previous work in this area is the use of econometric techniques which take account of the simultaneity of the different variants that determine the profit rate.

The potential and use of econometric modelling for policy analysis are considered in the final two chapters. In chapter ten Paul Dunne provides an introduction to the range of macroeconometric models for

the United Kingdom. This is intended to provide a demystification of these powerful tools, which so often seem to back up arguments with the weight of objectivity and truth. The models are seen to have many problems, and to be tools in the hands of modelling groups who have a lot of influence over the output of the model. Models are often used to answer questions that they cannot really answer, or to back up arguments and provide a technical smokescreen when in fact they are either inadequate or irrelevant. As long as the limitations of the models are understood they can be useful, however, and the increasing potential for the democratization of the models could be of great benefit to the Left.

Finally in chapter eleven Terry O'Shaughnessy describes the development of an alternative to the orthodox models. His model takes various insights from Marxist economics and shows how they can be made operational in the form of a model which takes production and capacity constraints seriously from those based upon markets and distribution to those based on production. This gives a very different picture of the effects of economic policy from that provided by the orthodox models.

O'Shaughnessy considers the development of alternative models to be important at two levels: firstly in considering the policies that a post-Thatcher government might follow, and secondly asking whether formal modelling can help in the discussion of policy issues. He argues that formal modelling is useful in order to make sensible debate about policy possible. Important macroeconomic issues have to be settled before more local issues, involving participation and self-management, can be considered.

The alternative approach used in the model is to treat capital equipment as an array of produced means of production rather than as given endowments. This derives from the approach of the classical economists, given a modern focus by Leontief and Sraffa, and planning models of centrally planned economies. It is more akin to a Marxist approach, in that production rather than distribution is the focus of attention. The model is multi-sectoral (ten sectors), treating the general macroenvironment in rather Keynesian terms with demand determining output in most sectors. However, the manufacturing sector is modelled differently: its output is limited by available capacity, with capacity depending on past investment and scrapping behaviour. A vintage model is used to capture these features.

A discussion of economic development in the United Kingdom since 1959 is undertaken, with the emphasis on the role of capacity constraints on output, during recoveries, and the use of expansionary policies. This shows how expansionary policy has in the past hit

capacity constraints, which led to import penetration and deteriorating balance of payments, which led to pressure to modify policy, which occurred some time before the new investment became available. Therefore the economy ends up with spare capacity and with imports having a foothold from which to grow. At the next expansion entrepreneurs are wary to expand capacity after this experience and so increases in demand are met by imports. This has serious implications for any recovery at the present time, given the rundown that has occurred in capacity.

O'Shaughnessy then uses his estimated model to evaluate the probable economic effects of different possible policies that a post-Thatcher government might undertake. The base scenario is unchanged policies. The alternatives are special employment policies with and without an investment programme. He finds that an employment programme without an investment programme leads to unsatisfactory outcomes. In addition, he considers that a compulsory savings scheme will be required to hold down consumer demand and so prevent excess demand caused by capacity constraints without attacking incomes. This policy mix is found to provide a viable, consistent and sustainable scenario.

1.6 FURTHER RESEARCH

These contributions show the range and potential of quantitative Marxism but they are certainly not exhaustive. In this section we give a brief overview of the areas in which work has taken place and considers what future research might be.

Firstly, we might consider some of the influences that developments in Marxist economics have had on orthodox economics. Insider–outsider models, segmented labour market models and hysteresis in labour economics and macroeconomics are all based upon Marxist ideas. Neoclassicals have produced formal models taking away interesting components and removing their conflict/political/social nature. Marxist ideas are being used but their Marxist background ignored (see Green (1988) for a discussion of how neoclassicals are discovering production). These developments do at least imply that the issues being considered might be converging, and that the potential for debate is increasing.

In industrial economics, there have been some moves away from simple comparative static analysis. The increasing concern with role technology, barriers to growth and other such features of capitalist economies needs recourse to dynamic theory. This usually follows the

Schumpeterian tradition, which is based on Marx's work. In addition, the area of applied industrial economics with its concern for monopoly, multi-nationals, concentration and market behaviour, has always seen the development of work based upon Marxist analysis in its wider context. Thus Kaleckian modelling, monopoly capitalist modelling (Cowling, 1982; Sawyer, 1985, 1988; Cowling and Sugden, 1987) and post-Keynesian modelling are prevalent (Pheby, 1989).

There are also developments in orthodox economics which make the potential for Marxist influence, critique and debate seem more likely than in the past. The debate between the mainstream Keynesians and the new classical economists is of particular interest. The development in the analysis of business cycles (see Gordon (1986) for a recent survey), while ideologically loaded, shows a concern with the dynamics of the capitalist economy. This makes it easier for Marxists to talk to and debate with new classical than with many Keynesians. In econometrics there has been considerable debate over the methodology of econometric modelling and the role of theory (see Smith (1984), Pesaran and Smith (1985), the supplement to the *Oxford Economic Papers*, edited by De Marchi and Gilbert (1989) and Pesaran (1988b)) which has provided the scope for a less restrictive use of theory and interpretation of applied econometric analysis, thus leaving it open to non-orthodox uses. Indeed, in econometrics there has been a great deal of discussion of causality and modelling (see Aigner and Zellner (1988) for a survey), which has led to the development of techniques which are of as much use to Marxist as to neo-classical analysis.

In addition, there have been important developments in hardware. The increasing power of personal computers means that individual researchers can potentially perform the more complex analysis required of Marxist type dynamic models. In particular it will be easier to develop the complex simulation models, that might be required of such dynamic models (see Laibmann (1987) and the discussions in chapters by two and six). This computing power, and the development of higher-level software which is easier to use, means that many of the skills in applied work can be acquired were easily. This means that there is the potential for greater accessability, which can lead to democratization and demystification of existing empirical models and techniques as discussed in chapter ten.

There is clearly great potential for the future development of quantitative Marxism along a number of routes. It is also important that these opportunities be taken. The developments of the tools of empirical analysis are taking place and being used by the orthodox, and they are developing a mode of discourse in which Marxists must

engage if Marxism is not, in Ben Fine's words, to be 'rendered ineffective by its perceived unsophisticated level of "rhetoric"' (chapter four).

NOTES

This introduction has benefited greatly from the contributions, comments and suggestions of Ron Smith. I should also like to thank the contributors, Geoff Harcourt, Alan Hughes, Michael Landesmann and Bob Rowthorn for comments on an earlier draft.

1   Although of course radical alternatives were tolerated in the social sciences in the 1960s and early 1970s.

2   Although there were 'maverick' models such as that of the Cambridge Economic Policy Group (CEPG) which did manage to forecast the recession – a success which was awarded by a removal of their funds! See chapter ten.

3   Indeed, we might even consider the use of averages in statistics and the smoothing of data series in a similar vein. They are based on some theoretical and social constructs in the move from individual values to aggregates and the concept of well-behaved and smooth paths of variables over time.

4   Indeed, the labour content of commodities is in some ways an easier concept to deal with than utility.

5   There is in fact considerable debate over the approach to applied work in economics. Traditional econometrics emphasized the identification and estimation of a given econometric model, but this came under attack from a number of viewpoints. These attacks rejected the idea of a correct theoretical specification and suggested various approaches for the problems of pre-testing, model revision and specification testing. These differed between Bayesian and classical statistics (Pesaran and Smith, 1984; Smith, 1984). Nowadays there exist a variety of approaches to model building, depending upon the extent to which theory is used in the formulation and the evaluation of econometric model, and in the methods of estimation, specification searches and testing that are undertaken. This is a healthy situation for the non-orthodox applied economist as many useful empirical tools are developed which are no longer tied to the trappings of orthodox theory. Aside from this debate within econometrics are the wider debates about the role of econometric methods and model building *per se*. See, for example, the debate between Lawson (1981, 1983) and Hendry (1983) in the *Cambridge Journal of Economics*.

2

Methodological Problems in Quantitative Marxism

MEGHNAD DESAI

2.1 INTRODUCTION

> . . . I told Moore here about a problem which I have been
> wrestling with in private for a long time. But he thinks that
> the matter cannot be resolved, or at least, is not to be
> resolved pro tempore because of the many and largely
> unknown factors involved. The thing is this: you know the
> tables which give prices, discount rate, etc. etc. in their
> movement during the year, in ascending and descending
> zigzags. I have tried several times – for the analysis of
> crises – to calculate these ups and downs as irregular curves
> and thought (I still think that it is possible with enough
> tangible material) that I could determine the main laws of
> crises mathematically. Moore, as I say, considers the matter
> impracticable, and I have decided to give it up for the time
> being . . . (Marx to Engels, letter of 31 May 1873)

It is a pity that Marx was put off his putative econometric investiga-
tions by Samuel Moore. Technically, of course, Moore was right. In
1873 there was no adequate statistical theory of time series analysis for
Marx to estimate a dynamic simultaneous equation model to fit the
data, although the monumental statistical compilations of Tooke were
well known by this time and Juglar had already published his classic
study of commercial crisis (Juglar, 1862). At about this time Marx's
other contemporary, Jevons, was struggling with the harvest cycle and
speculating about sunspots (*plus, ça change . . .*) (see Jevons (1884)
and Morgan (1984) for a discussion).

However, my purpose in this paper is not to demonstrate that Marx
pioneered econometrics, nor to claim Marx's authority to sanction the

contention that we need many more empirical studies of Marxian economics. It is natural for anyone engaged in studying economic life to take to empirical analysis, to try and check against the observed data whether one's theoretical speculations are fruitful. However, whatever Marx did or did not do, it is the lack of sustained empirical effort in subsequent development of Marxian economics that concerns us here. In what follows, I shall consider (but dismiss) the anti-quantitative objections made in this regard. These arise from a long habit of diehard and defensive attitudes taken by Marxists against the attack that Marx's predictions have proved false. I have also tried to scrape together a survey of empirical work in Marxian economics that has been done *malgré tous* and to sketch an approach that I believe could be fruitful. However, I have no results to report.

2.2 OBJECTIONS TO A QUANTITATIVE MARXISM

A principal objection to confronting Marx's theory with empirical observations comes from the notion of fetishism. A glance at the chapter on 'Buying and Selling of Labour Power' (*Capital*, vol. I, ch. six) will suffice. The proposition is that there is an observable phenomenal level at which exchange relations are juridically equal and voluntarily contractual. However, it is necessary to penetrate the underlying non-observable structural/real level to unmask the unequal exploitative class relations. Thus, according to Marx, reality is not directly observable. However, what is more, reality may be distorted; it may be inverted at the phenomenal level. Thus prices are observable and values are not; exchange is equal but production and extraction of surplus value are unequal. This implies that merely looking at observable facts may be seriously misleading. Sometimes this objection is put as saying that one must not be empiricist. I would define this to mean that one should not let the observed data totally dictate the 'model' one derives from them. One must use a prior theoretical framework to confront the data. In this sense, the contention is correct but not all empirical work is empiricist. Good empirical work looks precisely for the interaction of theory and data in a complex dialectical way. There is a rival methodological view that one must approach data in an atheoretical fashion and establish empirical regularities. Indeed, this is the only task that science can and need perform. In economics, this is the 'National Bureau' approach that led to Koopmans's famous jibe 'measurement without theory' (Koopmans, 1947, 1949; and Vining 1949a, b). The debate is not in any

way settled, and the battle has continued under other labels such as Box–Jenkins time series analysis versus econometric methods, vector autoregressive (VAR) models versus error correction models (ECM) etc. My own preference is for the empirical, not the empiricist approach. (Some of these issues are also dealt with by Morgan (1984).)

However, the objection that the 'true' structural relations are not directly observable is not peculiar to Marxism. Indeed, it is a basic tenet of econometric methodology. The distinction between structural-form (unobservable) and reduced-form (observable) and the need to ensure identifiability, i.e. to ensure that the observable arises directly from the underlying structural model, are identical in spirit to the fetishism objection. (The classic reference is Koopmans (1950).) I used this idea to characterize the transformation problem in econometric terms in Desai (1974). Of course, in the standard econometric case the parameters are unobservable, and only the coefficients can be estimated but the variables themselves are usually observable. In Marx's case, the variables as well as the relations at the structural level are unobservable. Econometric methodology has of course increasingly begun to deal with latent variables and also accommodates situations where the observed outcomes are a censored version of the underlying events. Therefore, again in spirit, these objections are not specific to Marxism. Of course, however, they need to be addressed properly by anyone embarking on empirical Marxism. Let us take the various problems in turn.

2.3 THE STATIC VALUE – PRICE PROBLEM

What is needed is a well-articulated (i.e. identified) model that connects the phenomenal and the structural/real levels. This is available in some but not all aspects of Marxian economics. Thus the value price divergence is very well analysed at the static level. We know how to derive a set of value relations from a set of price relations by solving the inverse transformation problem (see Desai (1988) for a survey). Thus, values and prices can diverge, but their divergence can be systematically worked out. In general, we do not know how serious the divergence would be and therefore how distorting the effect of the lens which social relations have to penetrate. However, we now have some solid evidence from Anwar Shaikh's work that quantitatively the value price divergence is empirically very small (Shaikh, 1984). Prices are proportional to values when these are calculated from input–output tables and cross-sectionally related across sectors. Using input–output tables for the Italian economy, Shaikh found that prices

and values are very highly correlated and that the correlation is stable across time. Thus regressing the ratio of prices of two sectors on their ratio of labour values, he found elasticities of 0.87 for 1959 and 0.85 for 1967, and R^2 values of 0.87 for 1959 and 0.92 for 1967. The price ratio of 1967 relative to 1959 was exactly proportional (i.e. an elasticity of unity) with respect to the value ratio for the two dates. In this case Shaikh had a 25 sector input–output table. When US data are used, the results are even stronger. For 1947 and 1963, the cross-sectional elasticity is unity in each case. This is for an 83 sector input–output table.

Shaikh's work has been followed up much more thoroughly by Petrovic (1987). He is careful to distinguish between value and production price, takes account of durable capital and introduces the complication caused by data being cast in market prices rather than production prices. Petrovic obtains the important result that the price – value deviation is an increasing function of the actual profit rate. Thus using Yugoslav input–output data for 47 sectors, he finds that assuming that price–value proportionality would lead to a root mean square error (RMSE) of only around 6 per cent if the profit rate was 4.1 per cent but around 20 per cent for a profit rate of 15 per cent.

Petrovic also generalizes the price–value calculation considerably by allowing profit rates to be unequal across sectors, or, if equal, by distinguishing between actual and maximal profit rates. Apart from the profit rate the other major variable accounting for the deviation is (the physical equivalent of) the organic composition of capital which Petrovic calls the integrated capital–labour ratio.

Thus Shaikh and Petrovic have considerably advanced our knowledge about the size of the price–value deviation problem in an actual economy. There are even more problems, as we shall see below, but at least it can be concluded that empirical work is not rendered impossible by the presence of the price–value transformation problem.

2.4 QUALITATIVE VERSUS QUANTITATIVE TRANSFORMATION PROBLEMS

The Marxist may continue to object. Is there not a distinction between the qualitative and the quantitative transformation problem? Do we give the observed phenomenal world a primacy by resorting to input–output tables? My answer to the first question is 'yes', but even then the quantitative transformation problem is not an insurmountable obstacle. The point of making the distinction between the qualitative and quantitative transformation was to defend Marxism

against the alleged insolvability of the quantitative transformation problem by saying that at least the qualitative problem was soluble. This was partly a defensive tactic and was not necessary since the quantitative problem is soluble.

As for the second objection, one can only say that the input–output table derives precisely from Marx's circuits of capital. Indeed, the creation of input–output methodology in the early years of revolutionary Russia was precisely because of its relevance to the implementation of Marxian economics to a concrete case. Nove (1986) has described some of these attempts of the 1920s, and Otto Neurath's much maligned attempt to compute natural values was part of this (Neurath, 1920). (This is the work that begat the Mises-Hayek attack on planning; for a recent reinterpretation of Neurath in terms of ecological equilibrium see Martinez-Aller and Schumpmann (1987)). Since then, the use of input–output tables has been quite widespread, to compute planning prices (Kyn, Sekerka, and Hejl, 1967) and to calculate exploitation rates (Wolff, 1975) for example.

One further point needs to be made about the use of input – output tables. In terms of Marx's three circuits of capital, the input–output table concentrates on the circuit of physical capital (Desai, 1974, ch. four), leaving out the circuit of commodity capital which is needed to articulate surplus value. The raw data which are used to construct input–output tables are money flows, i.e. elements of the circuit of money capital. However, the monetary aspects are soon suppressed and we pretend that the entries in an input–output table are based on physical data. Let me explain.

The interaction of the money circuit and the circuit of productive capital (leaving out for the moment the circuit of commodity capital) can be written in an elementary form as

$$M \left\{ \begin{array}{c} \nearrow L \\ \\ \searrow MP \end{array} \right\} \quad Q \longrightarrow Q' \longrightarrow M' \qquad (2.1)$$

where M is the initial money capital advanced, L is the labour power purchased and MP is means of production. Together these heterogeneous physical commodities constitute input Q. The output is Q' which when sold obtains an amount M' of money capital for the capitalist. Now, an input–output analyst starts with money flows of input purchases and output revenues, i.e. M_j' would be equal to the revenue to $p_j Q_j'$ of the jth enterprise/industry/sector. By the same token

$$M_j = \sum_i M_{ij} = \sum_i p_i Q_{ij}$$

where M_{ij} is the money value of inputs purchased by the jth enterprise etc. from the ith enterprise, the price of input is p_i and the amount purchased is Q_{ij}.

At any but the most disaggregated level, we have no direct measure of Q_j or Q_{ij} but we obtain them by deflating M_j' and M_{ij} by the appropriate price indices p_j and p_i. Thus the input coefficients a_{ij}, defined as Q_{ij}/Q_j, are actually:

$$a_{ij} = \frac{M_{ij}/p_i}{M_j'/p_j} \tag{2.2}$$

This is the problem of aggregation, which is not peculiar to Marxian economics but is endemic to all economics. For Marxists, a further problem is that the $p_i p_j$ are not prices of production, i.e. price per unit of labour value embodied in physical output, but market prices, i.e. price per unit of physical output. These are market prices in the sense used by Marx (*Capital*, vol. III, ch. ten). In a cross-section sample they are annual averages, but even then the connection between market prices and production prices has to be clarified. Thus what Shaikh has demonstrated is that the deviation of market prices from labour values is minimal. We indirectly infer from this that the gap between market prices and prices of production, as well as the gap between the latter and values, must also be small. It is unlikely, although not impossible, that both these gaps may indeed be large and of opposite signs.

However, there is one further layer of complication which involves the neglect of the circuit of commodity capital. From an input–output model, i.e. from a combination of the two circuits of money and physical capital, we can derive the market prices. This information also enables us to calculate total labour values. If that is all we wished then we do not need to bother about the circuit of commodity capital, but if we want to separate total value as between necessary and surplus value and derive profits in terms of surplus value then computation of prices of production and the use of the circuit of commodity capital becomes essential.

It is at this stage that the structural form – reduced form dichotomy becomes most acute. The circuit of commodity capital, involving as it does value relations, is not directly observable. It can be derived by solving the inverse transformation problem, but that requires us to make some crucial assumption about wage formation. If we regard all wages as subsistence, then the problem is easy; the mark-up above unit labour costs measures the rate of surplus value. However, the world is

rarely that simple. We may wish to allow for the fact that not only are there many wage rates and many types of labour but that the wage exceeds subsistence. If that is so then the labourer has clawed back part of the surplus value (see Desai (1979, 1988) for a discussion of this). However, if we grant that, how do we separate out necessary from surplus labour?

This is where I believe Marxists have to take demand analysis and consumption behaviour seriously. Roemer has already provided an escape from the subsistence wage assumption for the theory of exploitation (see Roemer (1981) and Desai (1988) for a discussion). At wage equal to subsistence, the rate of exploitation is at a maximum. However, once one departs from that, choice in consumption comes into play. Even then one can make an attempt to separate necessary (though not subsistence) consumption from extra consumption. I would advocate the Klein–Rubin–Stone–Geary linear expenditure system since this allows a separation of minimal quantities (x^*) consumed from those above the minimum $(x - x^*)$. A measure of necessary labour could then be computed by estimating the vector of necessary consumption x^* and the labour content of x^* using the given input–output table.

If we can do this, and it is by no means easy, then we can separate the value (labour content) of total output $p_i x_i$, the wage bill $w_i l_i$ and the vector of necessary labour corresponding to $p_i x^*_i$. We then have

$$\text{observed profits} = \sum_i \left(p_i - \sum_j a_i p_j - w_i l_i \right) x_i \tag{2.3}$$

$$\text{`full' profits} = \sum_i \left(p_i - \sum_j a_{ij} p_j \right) x_i - \sum_i p_j x_j^* \tag{2.4}$$

Any model of the class struggle over shares should concentrate on the division of 'full' profits, i.e. revenue minus material input costs and costs of necessary consumption.

2.5 DYNAMICS OF ACCUMULATION

In dynamic analysis, a well-developed one-sector model of accumulation and cycles is given in *Capital*, vol. I, part VII. In this respect, Goodwin's formalization of the class struggle as a predator prey problem is extremely fruitful. Although Goodwin does not need to deal with the value–price dichotomy as his is a one-good model, his small model captures the spirit of Marx's model very well. The cycle is perpetual although there is no trend in the rate of profit. It is also a

model which has been worked on and extended by a large number of people and is clearly very promising (see Goodwin (1967) for the original model, Goodwin et al.(1984) for a number of new developments, and Gabisch and Lorenz (1987 pp. 139-144 and the bibliography)). There has not been much empirical work on the Goodwin model since it raises some tricky econometric problems. I did some work on UK annual data for 1855-1965 with the Goodwin model and found it very good for 1860-1914 but not so useful for the later period (Desai, 1984). The problem is that the trend in the profit rate has to be integrated with the Goodwin cycle. The model also needs much more work on the financial side.

The main further problem in fashioning an empirical Marxism is the incompleteness of Marx's dynamic theory when we come to a multi-sectoral model. Since much is asserted about Marx's having discovered the laws of motion of capitalism, this may come as a surprise. I have argued before (Desai, 1979) that in the schemes of expanded reproduction Marx deals with the commodity circuit of capital, treats value magnitudes as if they were directly observable and manipulable (e.g. department I invests half of surplus value!) and completely neglects the circuit of money capital. Thus the last section of volume 2 does not gel with the first sections, nor with the notion of fetishism. However, it is not only some doctrinal nicety that makes me say this. Money plays a very crucial role in Marx's way of looking at capitalism: the realization problem, the problem of fictitious capital, the struggle between rentiers and capitalists over the determination of the rate of interest – none of these can take place without the ubiquitous presence of money (on the rate of interest see Panico (1983)). Fictitious capital is relatively neglected, but in the light of the stock market crash a very potent concept to develop, while the realization problem is very well covered in the literature from Rosa Luxemburg onwards.

However, though there is no integration of the disequilibrium dynamics (*capital*, vol. I) and the circuits of capital (*Capital*, vol. II) with the schema of reproduction (*Capital*, vol. II) and the transformation problem (*Capital*, vol. III), there are developments outside the confines of Marxian economics defined narrowly to deal with some of these issues. The dynamic input–output model put forward by Leontief in his later work is unstable, as was pointed out by Denis Sargan (1958). There is a dual instability problem here. If the output path is stable, the price path is unstable and vice versa. This is because the dominant real root of the characteristic equation of the output system is a reciprocal of the root of the dual system corresponding to the price equations. Thus unstable multi-sectoral dynamic systems arise naturally in these systems. There was an interesting debate on this

issue for a few years following Sargan's observation of Leontief instability (Solow, 1959; Jorgenson, 1960, 1961; Morishima, 1964). In the light of my earlier observations about the price value calculation in static models, this is clearly of interest.

Another strand is a very recent revival of interest in classical dynamics. Thus the deviation of market prices from the prices of production, of the sectoral profit rate from the equilibrium profit rate or of output from demand can all be modelled in terms of dual dynamic systems (Semmler, 1986; Dumenil and Levy, 1987). These models correspond to Goodwin's system in their mathematical structure and can be used as a theoretical starting point for empirical work.

2.6 THE FALLING RATE OF PROFIT

There is a great deal of empirical work on the profit rate. The earliest account that I have come across of an attempt to 'test' Marx's theory against the data is by Stiebeling, referred to in Engels' Preface to *Capital*, vol. III. Discussing the various attempts made to solve the transformation problem that occurred before the publication of that volume, Engels talks somewhat dismissively of the efforts of G.C. Stiebeling. However, having described these efforts, Engels goes on to say:

> He (Stiebeling) proves, for instance, by comparing US census figures for 1870 and 1880 that the rate of profit has actually fallen, but interprets it wrongly and assumes that Marx's theory of a constantly stable rate of profit should be corrected on the basis of experience. (Engels, 1895a, p. 21)

Let us not worry about Stiebeling's misreading of Marx's theory of the rate of profit. He inadvertently confirmed the hypothesis that he thought he was refuting. (Not for the first time, nor I am sure the last, someone has picked the wrong tail of the *t* test.) Although I have not succeeded in reading Stiebeling's *Das Werthgesetz und die Profitrate* (it is not in the British Library), it is obvious from Engels' account that his test was based on cross-section data at enterprise or industry level, and that the comparison was across two dates. (Incidentally, Stiebeling is mentioned in the recent book on Marxism in the USA by Paul Buehle as '. . . perhaps the closest reader of *Capital* among the editors . . . (of *Arbeiter Stimme*)' (Buehle, 1987, p. 30); the reference is of course to volume I.)

Following Steibeling's work, there is little further action as far as I know until we reach Gillman's classic study which looks at the rate of profit in the United States decennially for 1849–1899, quinquennially for 1899–1919 and annually for 1919–39. For the period 1849–1899 Gillman (1957) used Census of Manufacturing data, i.e. the same as that used by Steibeling, and we should be able to compare their results. There is no discernible trend in the profit rate for 1849–1919 and if anything there is a slight upward trend in the interwar period. Making some deductions for unproductive expenditures, he does obtain a downward trend for 1919–39 but the bulk of the fall is in the first year (1919–20). The issue is not the numbers obtained but the fact that the roles of unproductive expenditure and of export of capital have not been integrated into the theory of the rate of profit to allow more than an *ad hoc* approach to the statistical problem. The next major work on profit rate is an unpublished Ph.D. thesis by Mage (1963) which is cited by Mandel (1987).

The approach adopted by Marxist economists has been to take as given the national income accounting categories of wages, profits, investment, depreciation, output etc., rather than to redefine or reclarify these in a different framework. The emphasis then is on providing an alternative theoretical interpretation of these observed movements. This obviously begs some very crucial questions, but then the Marxian theoretical model is incomplete and there is not much that a single researcher can do (although see chapter 5).

Weisskopf (1979) has the merit of decomposing the fluctuations in the rate of profit by its component determinants. He also looks at each cycle separately and thus allows for different forces to hold a determining role at different times. The method still involves decomposing an identity into its component parts and theorizing implicitly about them separately. Thus the rate of profit can be written in terms of the share of profits, the capacity-utilization ratio, and the capital-output ratio. Note that the Goodwin model takes the last two of these to be constants, although subsequent work has modified these assumptions. Weisskopf distinguishes three variants of the explanation of the falling rate of profit: the rising organic composition of capital (ROC), the rising strength of labour (RSL) and realization failures (RF). Note that in the Goodwin model there is no RF but RSL and ROC do not by themselves lead to a secular fall in the rate of profits but only to cycles. Indeed Goodwin's model is about the fluctuating strength of labour (FSL, and the ROC is a product of the (constant) capital-output ratio and the fluctuating share of labour in total income:

$$\frac{K}{WL} = \frac{K}{Y} \frac{Y}{WL}$$

where K is constant capital, W is wages, L is labour and Y is total output.

Weisskopf's evidence shows that over the period from April 1949 to January 1975 there were five complete cycles. The average profit rate was 12.0 per cent over the period. It declined from 13.7 per cent in the 1949–54 cycle to 11.4 per cent in the 1958–60 cycle, rose again to 13.1 per cent in the Kennedy–Johnson cycle of 1960-70, to fell again to 9.4 per cent in 1970-5. Over the whole period the rate of profit fell at 1.2 per cent per annum, mainly due to RSL (-1.13 per cent) and RF (-0.09 per cent) with a small compensation from ROC ($+0.02$ per cent). By and large ROC is numerically not very important between phases of a cycle or within and between cycle. For bibliographical completeness I should also mention the work of Chung (1981).

There is much more in Weisskopf's long paper than I have described here. It is clearly a fruitful source for much further research. There had been previous work in this area by Glyn and Sutcliffe (1971, 1972) which concentrated on the RSL explanation. This was criticized by Yaffe (1973), although the problems that Yaffe raises are as much about the political lessons to be drawn from the work of Glyn and Sutcliffe as about the many articulations between large and small capital, between the state (the public sector) and the private economy, between accumulation, technical progress and the wage relation etc.

Weisskopf's work has been criticized by Moseley (1985). Moseley's main contention is that the share of profits in national income is not a good measure of the rate of surplus value. In one sense the observed share is the (endogenous) outcome of many different agencies. However, the most important is the role of the unproductive sector. As in the case of Gillman (1957), we come up against the lack of a theoretical rationale as against merely a statistical measure of unproductive labour. Not only do we need to articulate an economy as part of an overall polity interacting with each other but we also need to separate out the maximal surplus value/profit possible in the system from that actually accruing. This is not a simple measurement issue but one of articulating a full theoretical model.

More recent work by Funke (1986) for the United Kingdom and Henley (1987) for the United States has updated Weisskopf's work, while Moseley (1987) has updated his results on the profit rate/rate of surplus value, and Dumenil et al. (1987) have looked at the long-run trends in the US profit rate. In addition, in Chapter nine of this book,

Moreton uses regression analysis based upon the Weisskopf frame-
work for the United Kingdom (see also chapter eight). Despite these
developments the considerations mentioned in the previous paragraph
still remain to be taken into account.

2.7 INCOMPLETENESS AND OUTDATEDNESS OF MARX'S MODEL

These controversies about the falling rate of profit or other aspects of
Marxian political economy arise because of the incompleteness of the
original model, to say nothing about the need for updating it for recent
developments even if the original model had been complete. It is
compounded by various people grasping one piece of the jigsaw puzzle
and by quotations claiming it to be the true, original and complete
model. In what follows I wish to concentrate on these problems of
incompleteness and updating which require much further work.

The best way to discuss the incompleteness issue is to set up the ques-
tion in terms of a sequence of models starting from the simpler to the
more complex. There are several dimensions along which we can
proceed.

1   We could go from a pure economic model to a complex model
    encompassing the economy, the state and the society in a
    national or global context.
2   Within the pure economic model we could go from a two-class
    model of the capitalist mode of production (all discussion will be
    within this mode) to a multi-class or occupation/strata model.
3   Also within the pure economic model we could go from a one-
    good model (*Capital*, vol. I) to a two-good model (schemes of
    simple and extended reproduction) to a many-good model
    (circuits of capital in *Capital*, vol. II and much of vol. III).
4   Alternatively we could slice the pure economy model in
    terms of the 2×2 classification static–dynamic, equilibrium–
    disequilibrium (table 2.1). Of course each of the dimensions
    along which the pure economic model is stretched can also
    by implication be extended to the economy–polity–society
    progression.

Another incompleteness which has generated a lot of controversy is
the question of causality. This is at the heart of historical materialism.
To put it crudely, does the economic determine the political or the
other way around? Is it, in contrast, all simultaneous with no priority

Table 2.1 Alternative disaggregation strategies

	Equilibrium	Disequilibrium
Static		
One good	–	Vol. I, part VII, Goodwin 1967
Many goods	Value price duality (vol. III) Scheme for simple reproduction (vol. II)	
Dynamic		
One good	–	Falling rate of profit
Many goods	Scheme for expanded reproduction (vol. II)	Circuits of capital

for either the economic or the political? Adopting the base – superstructure duality, even within the base, we have the same problem about forces and relations of production: recursive or simultaneous, and, if recursive, which is the (ultimately) prior variable? These questions, while very general and deeply philosophical, can also be posed precisely in economic/econometric terms. The long debate on simultaneity–recursiveness and causality–exogeneity gives economists a good framework to formulate these questions. Thus the economy–polity, base–superstructure and forces–relations dualities are issues of Granger causality rather than exogeneity (Engle and Granger, 1987). There can be a lot of interaction between two variables (or sets of variables) through time, but one can still say that ultimately y_1 causes y_2 but not vice versa (see Desai (1981) for definitions of these concepts). To illustrate, we would write

$$\begin{bmatrix} B_{11}(L) & B_{12}(L) \\ B_{21}(L) & B_{22}(L) \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \end{bmatrix} + \begin{bmatrix} C_1(L) \\ C_2(L) \end{bmatrix} z = \begin{bmatrix} u_1 \\ u_2 \end{bmatrix} \tag{2.5}$$

where $B_{ij}(L)$ and C are vector polynomials, L is a lag operator, y_1 and y_2 are (vectors of) endogenous variables and z is exogenous, although C_i may be zero. Now we know that if $B_{ij} = 0$ $(i \neq j)$ y_i is prior to y_j, i.e. y_i causes y_j but not vice versa. This is the block recursiveness concept generalized to dynamic systems. However, much of the long debate in Marxian circles is not about recursiveness: that is far too crude. It is probably sufficient to say that if the maximum lag in $B_{ij}(L)$ is shorter than that in $B_{ji}(L)$ $(i \neq j)$ then i is 'prior' with respect to j. This allows for much simultaneity without giving up a

hierarchical ordering of variables. The most ambitious Marxian model would endogenize everything, i.e. leave $C_1 = C_2 = 0$, but still allow for a hierarchy of variables without specifying unidirectional causality (Simon, 1953; Ando et al., 1962).

Within the pure economy model, we have a very well specified static equilibrium analysis of price–value transformation and of the scheme for simple reproduction. In the dynamic equilibrium case we have the scheme for expanded reproduction. The schemes are two-good models whereas the transformation problem is a goods case. The dynamic disequilibrium case is well specified in a one-good model by way of the business cycle model (*Capital*, vol. I, part VII) and the falling rate of profit. However, the multiple-good extension of these two areas is still very undeveloped. Some initial work, mathematically demanding but economically still quite simplistic, has been done in classical and Marxian dynamics (e.g. Semmler, 1986).

When we leave the pure economy model life becomes very difficult indeed. Even the nineteenth-century British economy needs a specification of the political structure if we are to understand what is going on. Factory legislation, poor law, central bank policy, imperial relations, the export of commodities and capital etc. all subsume a state which is more than a nightwatchman. However, this has not been formalized within a Marxian model or anywhere else for that matter. I emphasize formalized because there is much debate about this in the literature and in many empirical exercises economic historians have had to make their own *ad hoc* links. Even the notion of the aristocracy of labour becomes messy when one tries to articulate the formal links implied in the slogan.

Although it is not strictly relevant, I would like to say something about the economy – polity (base – superstructure) interaction on the lines of equation (2.5). Since much of the issue here is qualitative rather than quantitative, I adopt a different modelling device. Let p and e represent the political (superstructural) and economic (base) systems and let the levels of complexity be denoted by i. We could then say that in the simplest version of the Preface to the *Contribution to the Critique of Political Economy*, $e_0 \subset p_0$, i.e. e_0 contains p_0 the base contains/explains/sustains the superstructure. However, if we were now to enlarge the concept of polity to explain its longer-run evolution this may encompass e_0. Thus the resurgence of right-wing market-oriented polity in the 1980s can be explained in economic terms by the crisis of profitability, but the crisis in turn can be explained by the rise of Keynesian consensus politics in the 1950s and 1960s. However, that in turn was only sustained by certain technological innovations and social arrangements of the 1930s and 1940s etc. Whatever the merit of
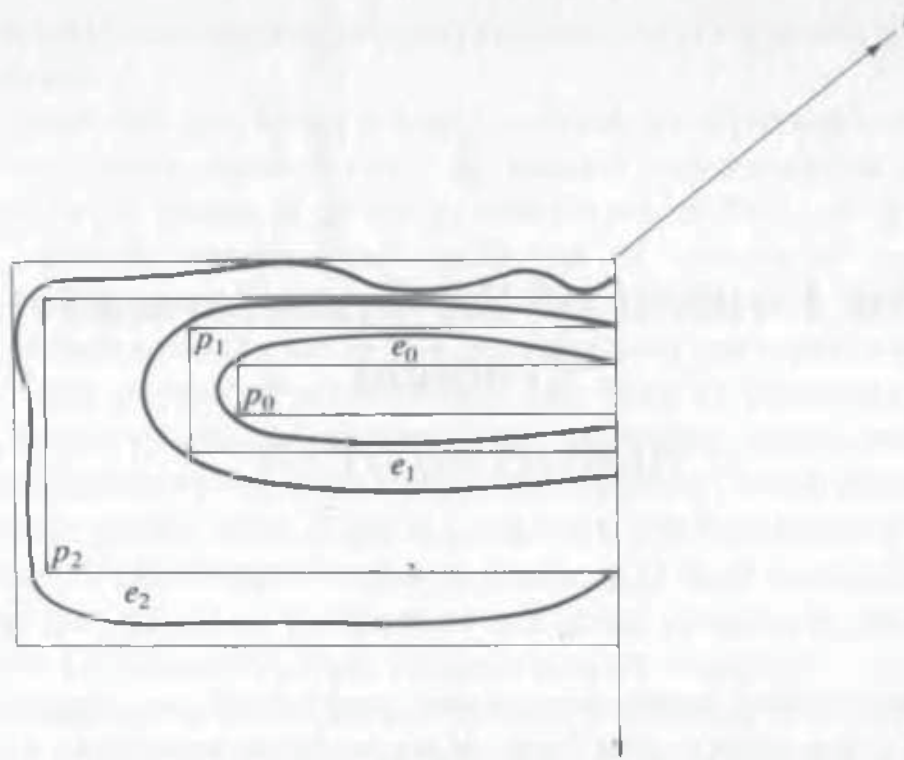
Figure 2.1   A hierarchy of overlapping causal models: e_t, economic
sphere; p_t, political sphere.

my particular example, we can have a series of Chinese boxes:

$$p_0 \subset e_0 \subset p_1 \subset e_1 \subset p_2 \ldots$$

A pictorial representation of a cross-section of such boxes is given in figure 2.1. The dimension t indicates that these boxes are stacked across time. Of course these e_t and p_t are not as easily separable in practice as in theory, and someone could pick up $e_0 \subset p_1$ or $p_1 \subset e_1$ as alternative patterns of causation when t, $t + 1$ are not easy to identify.

2.8 CONCLUSION

Let me conclude by saying that empirical Marxism is not a new development but it is currently rapidly growing. There are some very tricky problems that must be faced if this work is to be done in a satisfying way. It is not an individual who will do it but only the collective work of many people that can meet the challenge.

NOTE

This is an extended and revised version of a paper first read at the CSE Conference, 11 July 1987 and then at the CSE Day Conference on Quantitative Marxism on 12 December 1987. I am grateful to Alan Freeman, Tony Lawson, Bob Rowthorn and Ron Smith for their comments. I claim property rights over all the errors.

3

The Context of the Transformation Problem

SIMON MOHUN

One cannot forget that on the question of the relation between content and form, Marx took the standpoint of Hegel and not of Kant. Kant treated form as something external in relation to the content, and as something which adheres to the content from the outside. From the standpoint of Hegel's philosophy, the content is not in itself something to which form adheres from the outside. Rather, through its development, the content itself gives birth to the form which is already latent in the content. Form necessarily grows from the content itself. (Rubin, 1973, p. 117)

3.1. INTRODUCTION

In this chapter we are concerned with how an understanding of value theory should inform empirical work. This is a difficult issue, because virtually every controversy within Marxist economics is at bottom a controversy concerning the nature and status of value theory. Recent work has rendered this foundation quite explicit, culminating in the proposition that the retention of value theory is a positive hindrance to the materialist analysis of capitalism. This has been particularly forcefully argued by Steedman (1977), who has presented the criticisms of Marxian value theory as a matter of irrefutable logic. In form these recent criticisms are elaborated with considerable analytical vigour and clarity, but in substance most of them are not particularly new (as Steedman (1977, pp. 27–8) acknowledges). Their ancestry can be traced to around the turn of the century, when Bohm-Bawerk in 1896 and Bortkiewicz in 1907 between them established the main lines of criticism of Marxian economic theory. For both of them, what was particularly unsatisfactory (albeit in different ways) was Marx's

transformation of surplus value into profit and of values into prices of production.[1]

In *Capital*, vol. III, Marx's analysis of the transformation of surplus value into profit showed that, in general, commodities cannot be presumed to exchange at prices proportional to their values in money terms. Instead, commodities exchange at 'prices of production' formed by the sum of costs plus a profit mark-up, such that each firm earns the average rate of profit on its production processes. While value is only produced according to the firm's advances of variable capital, it is distributed between firms according to the total quantity of capital advanced by each firm. Consequently, since the method of distribution cannot alter what is produced, the deviations of prices of production from values in money terms must sum to zero, so that in the aggregate prices of production are equal to value in money terms and profit is equal to surplus value in money terms.[2]

Bohm-Bawerk's critique was written on the basis of an adherence to the new 'subjectivist' account of economic principles founded on methodological individualism. His comment on Marx's transformation was forthright:

> Marx's third volume contradicts the first. The theory of the average rate
> of profit and of the prices of production cannot be reconciled with the
> theory of value. This is the impression which must, I believe, be received
> by every logical thinker. (Bohm-Bawerk, in Sweezy, 1949, pp. 29–30)

He also criticized Marx's 'dialectical hocus-pocus' (p. 77), his 'dialectical speculation' (p. 79) and his 'monstrosities of logic and method' (p. 79) in holding to a labour theory of value which Marx himself had shown to be false. Bortkiewicz was also very critical of this approach, but in contrast with Bohm-Bawerk's individualism, Bortkiewicz was a great admirer of Ricardo. He at least partly saw his task as one of defending Ricardo's analysis against Marx's criticisms and subjecting Marx's analysis to a sustained critique. Much of this latter was based on what Bortkiewicz basically interpreted as unconscious special pleading; what was 'characteristic of the author of *Das Kapital*' was the way in which 'he holds the nature of the object to which his theoretical construction refers, responsible for the inner contradictions afflicting this construction' (Bortkiewicz, 1952, p. 13), whereas the real problems lay in the theoretical model itself. But Bortkiewicz ignored fundamental issues of epistemology, taking it as unproblematically obvious that Marx's 'desire to project logical contradictions onto the objects themselves, in the manner of Hegel' was 'perverse' (cited by Rosdolsky, 1977, p. 119, n. 34). Again

issues of method are casually dismissed. For both Bohm-Bawerk and Bortkiewicz, while critique was apparently one of logic and was explicitly presented as such, questions of method continually obtrude which counterpose the Marxian dialectic to an axiomatic deductive logic.

The issue of dialectical method is particularly important, for if theory is to be adequate to its object, and that object is a contradictory one, then theory must be able to reflect those contradictions and their elaboration. However the rejection of dialectical method is not a conclusion of the different analyses of Bohm-Bawerk and Bortkiewicz; rather, it is a premise. This is also typical of modern criticisms of Marxian value theory, which make much of the power of formal logic and the seeming inability of dogmatic defences of Marx's writings to appreciate such logic. But presuming that formal logic and dialectical method are incompatible confuses the *committing* of a contradiction with the *describing* of one. As a matter of formal logic, no serious theory can advance self-contradictory propositions, but equally any serious social theory has to describe a reality which is class divided and hence contradictory. The way in which Marxian theory captures and elaborates such contradictions is by means of inclusive oppositions (whose terms or poles presuppose each other) which are both real and organically related to some mystifying form of appearance. Since the oppositions are real their poles existentially presuppose each other, and while they are at the same time fetishized, their empirical grounding differentiates them from Hegelian hypostatization.

As a matter of formal logic, dialectical contradictions, so understood, can be consistently described, and this in turn provides the framework for the scientific explanation of capitalist society. Indeed, Marx defined science in terms of its explanation of the fetishized or inverted world of appearances: 'That in their appearance things are often presented in an inverted way is something fairly familiar in every science apart from political economy.' (*Capital*, vol. I, p. 677), and again, 'all science would be superfluous if the form of appearance of things directly coincided with their essence' (*Capital*, vol. III, p. 956).

Accordingly, Marxian dialectical methodology attempts to explain reality in terms of essences and appearances, or content and form, such that the relation between the two is organic and intrinsic (rather than arbitrary and extrinsic); content produces its own form, but at the same time does this in such a way that form attains a certain independence from content which creates barriers to the further development of that content. Since form is the only way in which content presents itself, then the empirical study of forms has

to be sensitive to precisely what is being represented by those forms.

Therefore in this chapter we are particularly concerned with advancing an interpretation of Marx's dialectical methodology in order to consider how empirical work in the Marxian tradition should be structured by the underlying theory. This is not so much about the specifics of the solutions to the transformation problem, as about how and why prices can meaningfully be considered as forms of value. In the next section we look first at the relation between value analysis and technology, and then more generally at the way in which an embodied labour approach forces an absolute separation between value and value form. In the following section we consider how the relation between value and its form of appearance might be understood organically in terms of a dialectical process, and in the last section we propose an approach to the structure of Marx's analysis of capitalist economic relations and the position of the transformation problem within it.

3.2. VALUE ANALYSIS AND THE TECHNOLOGY OF PRODUCTION

In standard linear models,[3] values are derived as the solution to a set of simultaneous linear equations on the basis of previously specified input–output coefficients and patterns of labour time worked. However, a major difficulty of this procedure is just this prior specification of the technology of production, for it amounts to specifying a particular pattern of the production and distribution of use values from which values are to be derived. This assertion of the primacy of physical data over the value derivates abandons the dialectic of the Marxian relations of determination, in which it is also the case that value relations determine the physical structure of production and patterns of labour allocation at any particular time. Of course the forces of production determine what relations of production are *possible*. Thus Marx wrote

> As soon as the labour process has undergone the slightest development, it requires specially prepared instruments . . . Relics of bygone instruments of labour possess the same importance for the investigation of extinct economic formations of society as do fossil bones for the determination of extinct species of animals. It is not what is made but how, and by what instruments of labour, that distinguishes different economic epochs. (*Capital*, vol. 1, pp. 285–6)

However, the level of technology does not thereby *determine* social relations, for these same social relations define the classes whose contending struggle shapes the history of technology, as it does all human history.

There is thus a complex and mutually conditioning interdependence between forces and relations of production, reducible neither to the simple primacy of forces of production (technological determinism) nor to that of the relations of production (ahistorical voluntarism). There are various formulations of this interdependence in Marx's writings, not all of which contain the same emphasis. The interpretation adopted here follows Marx's later writings, such as the famous passage in *Capital*, vol. III:

> The specific economic form in which unpaid surplus labour is pumped out of the direct producers determines the relationship of domination and servitude, as this grows directly out of production itself and reacts back on it in turn as a determinant. On this is based the entire configuration of the economic community arising from the actual relations of production . . . It is in each case the direct relationship of the owners of the conditions of production to the immediate producers – a relationship whose particular form naturally corresponds always to a certain level of development of the type and manner of labour, and hence to its social productive power – in which we find the innermost secret, the hidden basis of the entire social edifice . . . (*Capital*, vol. III, p. 927, see also p. 957)

Accordingly, the production process cannot properly be conceived as merely a technical process, to be summarized in the form of the physical data of input–output coefficients and expenditures of labour time. The determination of input requirements is not just a *technical* process but a *social* one. This is not simply to appeal to the context of class struggle within which profit maximization occurs; rather, the specification of what is produced (the composition of output) and the techniques by which it is produced (the technical coefficients of production) are meaningless considered in isolation from the ways in which labour processes are internally organized and externally related to each other. Further, relations between different labour processes are established through the exchange of their products, commensurating labours and establishing socially necessary labour times, and these latter determine both what is produced and how it is produced.

These considerations are often ignored in linear models. The value equations contain a vector of direct labour inputs, measured in units of socially necessary labour time, and the price equations contain a

vector of direct labour inputs which on multiplication by the wage rate gives a vector of unit wage costs. However, these two labour input vectors cannot be the same. The price equations are concerned with the hours of labour power purchased by the capitalist; the value equations are concerned with those hours of labour extracted from the worker in production which add value to the means of production. An hour of labour power hired does not automatically translate into an hour of labour time in production. Indeed, class struggle will determine the terms of this translation – class struggle over the length of the working day and over the intensity of the work performed during that day, involving continual conflict over work discipline, speed-ups, the fragmentation and deskilling of work, and so on.[4]

Furthermore, the empirical measurement of actual hours worked is not a measurement of abstract labour in terms of socially necessary labour time. Obviously, to perform its function properly, any measure must be homogeneous with respect to any unit, and so observed labour time must be corrected for differences in skill, differences in the intensity of work and the extent to which the particular technique of production employed differs from the social average. However, the point is not just that concrete labour is not abstract labour; what is critical is the *process* whereby the labour which is concretely employed in production is *rendered* abstract. For while value certainly has an objective content in production, it is not a content which can exist independently of its form, and its only independent form of existence is as a sum of money. This in turn cannot be known until the commodity outputs, as bearers of value, are successfully sold in the market. Hence there can be no technical determination of value, for not until commodities are actually sold can the products of individual independent production processes be determined to satisfy the needs of others and thus acquire social validity. The value realized in exchange is then the form of appearance of that labour, and only that labour, which was socially necessary to the production of the commodity in question. Thus the reduction of labour to abstract labour is something which is posited in production but only achieved in the market.

Accordingly, class struggle in circulation over the value of labour power, interclass struggle in the 'despotism' of the work-place's production process and intraclass struggle in the 'anarchy' of the market-place all serve to structure the technology of the economy. Consequently, linear models must be understood to provide a proximate derivation of values from physical data in circumstances in which those physical data only have an existence at all in terms of the social quantifications imposed by class struggle within each labour

process, and by the distribution of social labour across the different production processes of the economy via capitalist competition. Therefore any argument which takes physical data as given, i.e. which takes input–output coefficients, labour input coefficients and real wage data as given, *presupposes* the determination of these social quantifications. Values can then indeed be calculated. However, this is not to say that technical input–output and labour input coefficients and real wage data *determine* values.

These considerations suggest that in order to pursue further the connection between content and form, it is rather important to distinguish value interpreted as abstract labour from value interpreted as embodied labour, for the latter makes an absolute separation between value content and value form in a way that the former does not. To the extent that this is considered at all, the justification for separating consideration of value content from value form derives from an interpretation of Marx's own procedure: value theory is used to analyse class relations and in particular the exploitation of working class by capitalist class. With a focus on the production and reproduction of value and of value relations, the process of circulation whereby value is realized in money form is presumed to proceed unproblematically; the realization of value in the market is clearly a secondary matter which cannot be considered properly until the production of value has been first understood. Thus Marx remarked that,

> While it is not our intention here to consider the way in which the immanent laws of capitalist production manifest themselves in the external movement of the individual capitals, assert themselves as the coercive laws of competition, and therefore enter into the consciousness of the individual capitalist as the motives which drive him forward, this much is clear: a scientific analysis of competition is possible only if we can grasp the inner nature of capital, just as the apparent motions of the heavenly bodies are intelligible only to someone who is acquainted with their real motions, which are not perceptible to the senses. (*Capital*, vol. I, p. 433)

This methodological procedure of apparently separating value and its determination by time from the realization of value in money form becomes in the embodied labour approach an absolute separation of content from form. On the one hand, there is a 'value system' of embodied labour and its own unit of account of labour time appropriate for the examination of certain types of questions, and on the other hand there is a quite different 'price system' in which prices are determined by costs of production marked up by a general rate of profit, appropriate for the examination of other types of questions.

Since elementary analysis of the transformation problem shows the impossibility, in general,[5] of an exact mapping from values to prices in a way which preserves the determination of exchange ratios by embodied labour ratios, the value system and the price system must remain autonomous entities, independent ways of conducting exercises in social accounting. Each system retains validity in terms of the particular questions asked of it, and no intrinsic or organic connection is established between value form (as a sum of money) and value content (as a quantity of socially necessary labour time) whereby the former is posited by and grows out of the latter. The connection remains extrinsic, and indeed contingent, as it becomes a matter of choice of whether to account for social phenomena in terms of labour time or in terms of money. Hence, because of their independence of one another, neither system can claim ontological priority over the other, unless by assertion.

Thus values in embodied labour units, and prices in monetary units, are merely different ways of aggregating heterogeneous commodities in order to derive relationships between bundles of them. If the starting point is the heterogeneity of use values, it is not difficult to show that there are no issues that are not better analysed in terms of prices, leaving embodied labour values redundant. The embodied labour approach has therefore no convincing defence to the critiques of Steedman (1977) and Roemer (1981).[6]

3.3. THE DIALECTIC OF VALUE AND VALUE FORM

A successful account of capitalism requires that the forms of appearance of values grow out of their value content rather than be treated either identically as that content or separate from it. Value form is generated on the basis of value content such that both coexist as part of a contradictory reality. Part of Marx's project of delineating the historical specificity of capitalist production, and hence of the value form, was to try to show how content determines form but in ways which give form an certain independence of content such that it appears to contradict its own determinants. This means that analysis of the contradictory coexistence between value content and value form has to focus on how such contradiction can meaningfully be sustained. Marx himself considered that

> . . . The exchange of commodities implies contradictory and mutually
> exclusive conditions. The further development of the commodity does

not abolish these contradictions, but rather provides the form within which they have room to move. This is, in general, the way in which real contradictions are resolved. (*Capital*, vol. I, p. 198)

It is this insight which must now be developed further.

In section 3.2 we argued that while there is a necessary connection between a certain article and that fraction of aggregate social labour time required to produce it, this is socially as well as technically determined, for it is the market which makes this connection. Only market processes realize the quantitative expression of abstract labour, and this quantitative expression only has a price form. Neither the substance of value (abstract labour) nor its measure (socially necessary labour time) have a form of representation which is independent of the market. The value of a commodity has to be expressed in terms of another commodity, which can only happen in exchange. Value is thereby only expressed relatively, in terms of the use value of another commodity of equivalent value. The history of exchange is then partly a history of how one particular commodity comes to monopolize this representation of value such that all other commodities express their value in it, and achieve social validity only in so far as they do so.

However, while the value abstraction yields the money form directly, as soon as competition is accounted for, then abstract labour cannot directly be assigned to individual commodities, for commodities only have value in so far as they can claim to represent a portion of aggregate social labour time in production. But it is the exchange abstraction that determines which labour times of which labour processes are to count towards this aggregate, and it only does so through expressing quantities of abstract labour as prices which yield to each capitalist an average rate of return on total capital advanced. Therefore while value is posited in production, it is exchange which determines whether such positing is to count, and it does so only through the price mechanism.

Thus there are two aspects to value. First, value is the socially synchronic representation of abstract labour, distributed across the various production processes of the economy. Second, value is the individually diachronic representation of abstract labour in particular production procsses, continually striving for social validation in the market. Value therefore pulls in two directions at once, synchronically across production processes and diachronically through production processes. The value of money mediates the contradictions engendered by these different pulls, but when a contradiction becomes 'too great', such that it cannot be contained (or 'suspended') by gradual and

piecemeal price fluctuations (Marx wrote that 'this suspension appears up to a certain point merely as a quiet equilibration' (*Grundrisse*, p. 406)), then reconciliation of value content with value form is forcibly effected through a crisis, a process of general devaluation or destruction of capital, occurring in Marx's day via a general depreciation of prices.

This interpretation owes much to a metaphor recently employed by Lipietz:

> Think of the way a scarf is woven. It will be nice and smooth with no creases or tears, if the threads pulled by the shuttle (the woof) lie neatly one beside another between the laterally arranged threads (the warp). The threads of the woof represent values-in-process, and those of the warp the succession of synchronic maps of the distribution of social labour measured 'in instantaneous value'. The duality holds as long as the norms of production and exchange stay the same, or vary together in fixed proportions. Otherwise 'holes' or 'lumps' will appear, expressing the fact that the values-in-process cannot follow their own logic of survival and growth at the same time as the relative relations imposed on them by the system of instantaneous values in a coherent regime of accumulation. (Lipietz, 1985, p. 30)

Lipietz also emphasizes that precisely because class struggle in production and distribution are continually altering the synchrony of 'instantaneous values', this warp–woof duality cannot be maintained. While small divergences are contained via fluctuations in market prices, gradual accumulation of such divergences is the fundamental cause of crisis.

In similar picturesque vein, Foley remarks that:

> If you drive or bicycle to the Southwest from Palo Alto you will pass through a series of gently rolling hills and valleys covered with grass, scrub and live oak trees. Through one of these valleys passes the San Andreas fault, but it is easy to overlook it, since the crust of vegetation and topography shows no sharp break there. To the observer the two sides of the fault, the hills, the oaks, look like part of the same process, the rise of the hills towards the Santa Cruz Mountains.
>
> In fact, as people have known for only a few years, the San Andreas fault is the location of a gigantic and cataclysmic break in the structure of the Earth. As you move across it you move from one of the great shifting plates that make up the surface of this planet to another which is on a geological time scale burying itself beneath the first with incredible violence. We cannot discover this by looking at the surface of the Earth in the foothills behind Stanford, because that surface bears to our senses and cognition only a message of continuity in the vegetation, in the slow

rise of the hills. To know this extraordinary fact people had to study the
sea floors, the magnetism of rocks and the distribution of fossil
remains. (Foley, 1975, pp. 36–7)

Concentrating the focus of the metaphor, this suggests that social and
economic reality betrays to rigorous analysis a similar contradiction
between essence and appearance, content and form. Whereas casual
inspection of markets and prices, and theorization of these
appearances, yields notions of continuity and unification, the reality is
one of discontinuity, violence and conflict contained for periods by
surface appearances until the strain becomes too great, when the
appearances are forced back into a harmonic coexistence with the
underlying content.[7] However, such coexistence can only be
temporary, since the underlying content is always in motion. The
barrier of surface appearances is precisely that, a barrier, which is
continually posited, and overcome, only to be reposited by the
antagonistic social reality of class-divided society and the economic
relations that are thereby established.

3.4. THE CONTEXT OF THE TRANSFORMATION PROBLEM

Thus far, the argument has insisted that while value has a content of
abstract labour as the materialization or objectification of socially
necessary labour expended in production, it only takes independent
expression in the form of units of money in circulation. This is not to
say that there is no distinction between produced value and realized
value, for the argument has also insisted that value has opposing
determinations, with forms of value in circulation creating barriers to
values in process striving for validation, barriers which have to be
overcome, only to be continually reposited. It is this context which
structures an understanding of the transformation problem, both as
the relation between value and value form as it really exists, and in
terms of its position in Marx's analysis of capitalism.

As a dialectic of paid and unpaid labour, the analysis of the dynamic
of capitalist production remains an analysis of the process of produc-
tion alone. It is an analysis of value as it is valorized, of value in
process. Nothing is said in *Capital*, vol. I, as regards the compatibility
of this diachronic process of abstract labour's becoming with the
synchronic representation of abstract labour which forms the eco-
nomic environment within which the capitalist advances value and
then recovers it in money form following production. At least, nothing

is said except to assume away non-compatibility. However, assuming away non-compatibility is not a simple assumption, for three different elements are involved: the assumption of the constancy of the value of money, the proportionality assumption concerning the relationship of values to prices and the assumption that all the value posited by production achieves money form in circulation.

Consider first Marx's analysis of money. The argument of the first three chapters of *Capital*, vol. I, establishes the basis of the synchronic representation of abstract labour. It enabled Marx to give preliminary answers to the fundamental questions of why commodities have a value at all, and how and why this value manifests itself in exchange, or what the substance of this value is and why it appears in money form. The answer to the last question requires a detailed analysis of the value of money, both in relative and equivalent forms. The use value of the money commodity is its role as universal equivalent, the only immediate and direct representation of abstract labour. The fact that the money commodity has a relative form of value enabled Marx to define the price of a commodity as the socially necessary labour time required to produce it divided by the number of hours of such time objectified in a unit of the money commodity. Marx could then conduct his argument in terms of monetary expressions of value. However, in considering the production of commodities as values, it is obviously simpler to rule out those changes in value which arise from changes in the value of money. For this reason, he assumed a constant value of money. (As soon as he came to consider capitalist production as a repetitive process – as a process of reproduction – he had to extend the assumption: the value of money is not only given for one production period, but is assumed not to change from one period to the next, again in order to allow a clear focus on the processes of reproduction and accumulation of value.)

On the basis of a constant value of money, Marx turned his attention from the synchronic to the diachronic representation of value. Since his concern was with the origins of surplus value, and since he had located these origins in production, he wanted to ignore transfers of value through unequal exchange in the market. Capitalist market processes *are* processes of unequal exchange, but that is a complicating factor which, if allowed at the outset, must lend a lack of clarity to the location of the origins of value in production, for transfers of value between capitals involve differential power relations which distinguish some capitals as more powerful in the market than others, thereby blurring the focus of what it is that all capitals have in common as bearers of valorization. Transfers of value from labour to capital (and, less plausibly, vice versa) involve an unequal exchange in the market

which has a different ontological status to the unequal exchange established in production. While differential market power relations are part of the everyday experience of participation in capitalist markets, Marx wanted to establish something rather less obvious. That is, even if worker and capitalist were to meet on an equal basis in the market, he could still show that capitalism was a class-divided society structured around exploitation in production. Accordingly, he assumed equivalent exchange in circulation in order to focus on non-equivalent exchange in production. The way in which he did this was to assume that commodities exchange at their values (in money terms). This can be represented as assuming that all commodities exchange at prices proportional to their values, with the constant of proportionality being the reciprocal of the value of money.

On this basis, Marx proceeded to analyse the process of production itself as the formation of diachronic value. In doing so, he developed a particular conception of capital, which is both an abstraction from how capitals differ (in location, size, use value of output and so on) and is real, since valorization is common to all capitals no matter how they might otherwise differ. Capital so considered is a 'real abstraction', and was called 'capital in general' by Marx. He described it in the following terms:

> To the extent that we are considering it here, as a relation distinct from that of value and money, capital is *capital in general*, i.e., the incarnation of the qualities which distinguish value as capital from value as value or as money. Value, money, circulation etc., prices etc., are presupposed, as is labour etc. But we are still concerned neither with a *particular* form, nor with an *individual* capital as distinct from other individual capitals etc. We are present at the process of its becoming. This dialectical process of its becoming is only the ideal expression of the real movement through which capital comes into being. The later relations are to be regarded as developments coming out of this germ. (*Grundrisse*, p. 310, original emphasis)

In a later passage, Marx made it clear that his conception was more than purely methodological.

> Capital in general, as distinct from the particular capitals, does indeed appear (1) *only as an abstraction*; not an arbitrary abstraction, but an abstraction which grasps the specific characteristics which distinguish capital from all other forms of wealth or modes in which (social) production develops. These are the aspects common to every capital as such, or which make every specific sum of values into capital. And the distinctions within this abstraction are likewise abstract particularities

which characterize every kind of capital . . . (2) however, capital in general, as *distinct* from the particular real capitals, is itself a *real* existence. This is recognized by ordinary economics, even if it is not *understood*, and forms a very important moment of its doctrine of equilibrations etc. For example, capital in this *general form*, although belonging to individual capitalists, in its *elemental* form as capital, forms the capital which accumulates in the banks or is distributed through them . . . Likewise, through loans etc., it forms a level between the different countries . . . While the general is therefore on the one hand only a mental [gedachte] mark of distinction [differentia specifica], it is at the same time a *particular* real form alongside the form of the particular and individual. (*Grundrisse*, pp. 449–50, original emphasis)

The presupposition of 'value, money, circulation etc., prices etc.' is a presupposition of synchronic value; the process of the 'becoming' of capital is the process of the formation of diachronic value. Therefore an immediate question is: what if the process of 'becoming' contradicts its 'presuppositions'? What if synchronic and diachronic representations of abstract labour turn out to differ? What if contradictions between value and value form arise? This was not really an issue when Marx analysed the process of production as such, for questions concerning the value form do not arise when the focus is on the subordination of labour to capital in production, and in the presupposition of circulation etc. the proportionality assumption will suffice.

However, as soon as Marx turned his attention to the process of production as a repetitive process of reproduction, the situation is slightly different for he had to assume that the value posited by production was realized or achieved in circulation in order that one process of production could lead straightforwardly to another through time. He did not want the intervention of synchronic value form in circulation between two processes of production to do anything other than provide a medium for the transition of diachronic value from one production process to the next in the course of its valorization through time. As long as capital is treated as capital in general, the proportionality assumption can be maintained as well. The effect of both assumptions – the proportionality of prices to values and the realization of posited values – is to introduce circulation merely as an automatic conduit from one production process to the next.

As a treatment of circulation of course this is less than adequate, and while *Capital*, vol. II deals with 'the new determinations of form which arise out of the process of circulation' (Marx to Engels, 30 April 1868, *Selected Correspondence*, p. 240), its basis is still the premises of

volume I. In particular, the proportionality assumption is maintained. Only when capital in general is individuated into many competing capitals is the proportionality assumption abandoned, and a full treatment of the production and circulation of diachronic value achieved via the formation of a general rate of profit in competition. Now, for Marx, competition realized 'the inner tendency as external necessity, (*Grundrisse*, p. 414); it

> *expresses* as real, posits as an external necessity, that which lies within the nature of capital; competition is nothing more than the way in which the many capitals force the inherent determinants of capital upon one another and upon themselves. (*Grundrisse*, p. 651, original emphasis)

Yet in such an analysis of competition, Marx showed that exchange cannot take place at prices proportional to values, as unequal exchange in the market is the norm, and he related the necessity of unequal exchange in circulation to differing production conditions (concentrating his discussion upon the composition of capital).[8] Because posited values are assumed to be realized, however, there is no real confrontation with synchronic value as a pre-existing distribution of social labour; rather, the latter passively adapts to whatever the diachrony dictates.

Only when the assumption that posited values are realized is dropped is a true crisis theory allowed to develop, for only then can synchrony and diachrony pull in different directions. Then disproportionalities between prices and values allow both systemic distortion of the relation between value (form) conceived as synchronic and value conceived as diachronic, and force their reconciliation with systemic periodicity. The assumption of a constant value of money is thereby also abandoned.

This argument suggests that some care is needed in the interpretation of the concept 'the value of money'. Earlier in this section, the value of money was considered in terms of the value of the money commodity, with the latter being determined by the socially necessary labour time required to produce a unit of whatever the money commodity is (usually gold, hence determined by the conditions of production in gold-mining, diachronically in individual gold mines and synchronically across the gold industry and in its relation to other industries). However, the value of the money commodity only varies as such socially necessary labour time varies. The value of money is a more fundamental concept and is concerned with how the aggregate labour time expended by society is translated into the value in money terms of the net product created in that time (Foley, 1983, 1986). If

prices are proportional to values, the value of money and the value of the money commodity coincide, since the factor of proportionality is uniform, but this is not the case when prices are not proportional to values. The value of money retains its coherence, however. It is unaffected by unequal exchanges since it is defined macroeconomically, and, in aggregate, unequal exchanges must sum to zero as long as it is maintained that value is only created in production and not in exchange. Further, it renders precise the notion that money is a form of value, and again, being defined macroeconomically, is a property of value as abstract rather than embodied labour. Finally, it is determined by capitalist pricing decisions in the aggregate, and hence the mechanisms whereby posited value is realized become critical to the Marxian account of capitalism.

Thus just as Marx used equal exchange to show the necessity of unequal exchange, so he used a microeconomic approach to show the necessity of comprehending the theory of value in macroeconomic terms. It is this which gives the contradiction between the theory of value and the requirements that an equalized rate of profit makes of individual prices 'room to move'. Embodied labour is recast as abstract labour, and its value form, as price, is shown to be precisely that – a form of value. Just as the contradiction between use value and value is given 'room to move' by the differentiation of commodities from money, so forms of value in competition are rendered both independent of and intrinsic to their value content, an independence constrained by and an intrinsicality expressed by the aggregate equalities of price and money value,[9] and profit and surplus value in money terms.

3.5. CONCLUSION

The approach considered here is one which both attempts to maintain a distinction between value and value form, and at the same time attempts to understand that distinction in terms of a connection between them which is intrinsic rather than extrinsic. That connection constitutes a contradictory dynamic of value and value form whose locus is constructed around the simultaneous processes of the distribution of social labour across society and the production and distribution of capital through valorization.

This contradictory dynamic cannot be understood by comprehending Marx's theory of value as an equilibrium theory in any neoclassical sense. True, prices of production are long-run centres of gravity, but they only derive meaning in Marx's theory through

understanding the theory of value in macroeconomic terms. Value is a sum of money, created by the activity in the aggregate of all productive labour in the economy; the form which it takes for the individual production process (at unit level) is as a price of production. Not only is this a dialectic of synchrony and diachrony. It is also a dialectic of macroperspectives and microperspectives, which structures Marx's view of the appearances of competition as being 'upside down' (*Capital*, vol. III, p. 311) or 'inverted' (*Capital*, vol. III, p. 136; see also pp. 267-8).

The relation between value and price must therefore be understood both qualitatively and quantitatively. To consider that relation only in qualitative terms amounts to an advocacy of the use of price data in any specific investigation, informed by an overall Marxian sociology and buttressed by appeal to some variant of the 'fundamental Marxian theorem'. The existence of any content to value is thereby rendered somewhat elusive, and the danger of a slippage into an individualist approach to the determination of the value form becomes acute. To consider the relation between value and price as solely a quantitative microeconomic problem for the individual firm recreates Ricardo's difficulties, and begs the question of how and why capitalism presents itself as something other than it really is.

Value as essence and value form as its necessary appearance, value as simultaneously diachronically in motion and synchronically at rest, value theory and value form theory as a quantitative macro-micro dialectic – it is these perspectives which must be preserved in any examination of the specific way in which Marx transformed values into prices of production, and it is these insights which must structure empirical work based on the Marxian theory of value.

NOTES

1   In this chapter we are solely concerned with prices of production, and 'prices' in this chapter should accordingly be understood in these terms.
2   Recent work suggests that the relevant invariant aggregate is a net rather than a gross concept, so that total value, for instance, is total value added by direct labour, and not the total value derived from adding the value created by direct labour to the value of constant capital. See Foley (1982) and the references cited therein.
3   Standard references are Morishima (1973) and Pasinetti (1977).
4   Lipietz (1982) suggests a tensor of exploitation to make the translation.
5.   That is, outside of very special circumstances. (e.g. Morishima, 1973, ch. seven).
6   Since the determination of value by embodied labour time and the

determination of a general rate of profit are not consistent with one another, for Ricardo, the contradictory reality thereby implied appeared as a contradiction at the level of formal logic within his theory: he demanded of his (embodied) labour theory of value that it directly determine price in circumstances in which that was theoretically impossible. Hence a logically rigorous approach to Ricardo in a sense prefigures the redundancy critique of his intellectual descendants. Himmelweit and Mohun (1981) discuss this further.

7   For a neoclassical argument see Dixit (1977, p. 25), who argues that even if we know that the one-hoss shay is going to collapse at some time, we cannot live on the basis of the expectation that it is going to collapse in the very next instant of time, for this would render life intolerable. Because experience suggests continuity between contiguous moments of time, continuity is 'a better working hypothesis than that of a structural break lying in wait around every corner'. But it is difficult to see how the notion of a meaningful structural break can be incorporated into a theory founded on individual experience, or how notions of appearance and essence can be considered, other than as misperceptions in signal extraction problems or perhaps as fallacies of composition. However, this is only to say that a theory predicated on methodological individualism cannot reproduce the understanding of one based on class struggle.

8   Recent accounts which emphasize this, albeit in very different ways, include Fine (1983) and Shaikh (1984).

9   But see note two.

4

The British Coal Industry before Nationalization: a Role for Quantitative Marxism?

BEN FINE

4.1 INTRODUCTION

In this chapter I describe some of the results of my research on the British coal industry prior to nationalization.[1] More important than the detail for the purposes of this book is the light that the chapter sheds on the relationship between hypotheses drawn from Marxist theory, empirical investigation and the confrontation between Marxist theory and the orthodoxy. But can the research itself be justifiably described as quantitative Marxism? The latter is, of course, undefined as the novelty of this book illustrates and, unlike many other schools of thought within economics, a contribution to Marxist economics often prides itself on claiming that others are false pretenders to the title. In addition, this chapter differs from most of the others in the volume by being concerned with economic history. It is worthwhile then to begin with some brief discussion of the potential scope of quantitative Marxism.

First, orthodox econometrics is essentially undertaken on the basis of the most simple and erroneous foundations – as if theory is constructed separately from evidence and statistical methods are used either to support or to reject the theory, although it may be doubtful whether this is done in practice (Green, 1977). From a Marxist point of view, this positivism and its associated practices create severe problems. These are methodological, once it is recognized that the data are not neutral, and theoretical, as orthodox models do not allow for dialectical analysis in which the development and transformation of economic relations gives rise to the formation of new economic categories. Second, Marxism has other aims than the orthodoxy,

where activity is socially determined and often unduly bound by the historically evolved criteria of the discipline. But such academic endeavours are also otherwise engaged – in teaching, in ideology and in policy-making.

Yet Marxism is a profoundly empirical science rooted in the conscious theoretical appropriation of material reality. No doubt the presentation of its endeavours could have been improved through the use of more advanced statistical techniques (and calculating machines). But the availability and use of these methods is only one amongst many factors determining the course of theory and knowledge. It is in its wider social role that Marxism prides itself, not only as a political practice (unlike the passive positivism), but also as a political philosophy (although the scientific basis of praxis remains problematical).

The scope for quantitative Marxism to change the world, however, is surely extremely limited. The one exception lies within academic life itself, where theory and ideas constitute a terrain of struggle. Here the challenge to the orthodoxy can usefully be constructed on the grounds of both a theoretical and an empirical critique. This is not to hold out any great hopes of absolute success, as it is a very poor neoclassical economist who cannot explain everything by reference to the divergence from conditions of competitive equilibrium. In practice, the acceptance of a Marxist alternative is generally circumscribed by the predisposition to the validity of the orthodoxy. For any alternative, you have to make your own case as well as show that the evidence is not consistent with some acrobatic reconstruction of the orthodoxy. This is difficult, as economics makes severe technical and ideological demands upon its students with little room for the history of economic thought let alone for Marxism. The very existence of an alternative tradition, however, is crucial for those wishing to challenge the orthodoxy. At times the alternative may be strong enough to generate its own internal momentum, as occurred in the revival of political economy from the late 1960s onwards. In current conditions, limited progress is liable to be made in interpreting, let alone changing, the world; there is more scope for contesting the orthodoxy.

I have to confess that these conclusions are undoubtedly heavily influenced by the progress of my own research on the interwar coal industry. Much more attention was devoted to revealing problems with the orthodoxy in terms which it might be persuaded to accept, than with, as it were, uncovering the historical process concretely from a Marxist point of view. This was more a function of the difficulty of undertaking the empirical research involved of the latter type, in terms of time involved and availability of data, rather than some decision in

principle. Nor was the direction of research determined by the bending to some inevitable pressures to address the orthodoxy (although these pressures should not be underestimated).

Therefore the first section contains an interpretation of the British interwar coal industry from a Marxist point of view with emphasis on the role of landed property (coal royalties) in obstructing capitalist development of the industry. This is not to endow landed property with an overwhelming nor even with a primary influence, although for brevity other factors are scarcely mentioned. This is followed by a series of sections in which, whilst some evidence is presented directly in support of the theory offered, it is mainly shown how limited is the orthodoxy's explanation of the slow pace of rationalization and mechanization, thereby indirectly supporting the alternative view of the coal royalty thesis. The penultimate section is concerned with the industry prior to the First World War. It offers a critique of an article by McCloskey (1971), a leading neoclassical historian, and may serve as a guide to those wishing to undertake similar exercises for other case studies. Some concluding remarks take up the themes of the introduction in the context of the emergence of cliometrics. Throughout, this chapter is, I hope, written in a style which suits its purpose – as a narrative of research undertaken to serve those engaging in quantitative Marxism within an academic environment.

4.2 MARXISM AND ROYALTY

During the mid-1970s Marxist economics within Britain, especially in the Conference of Socialist Economists, had begun to take a new direction. Whilst by no means coming to a full halt, (re)interpretations of Marx's own writings were on the wane and giving way to analysis of both theoretical and empirical issues concerning the collapse of the post-war boom. Of increasing importance was the theory of the state, with an understanding of its economic role that had begun to reach far beyond what had previously been little more than a radical Keynesianism (Fine and Harris, 1979).

In this context, I wished to study the historical origins of state economic intervention – in terms of both its economic and political pre-conditions. For this reason, the British coal industry seemed most apposite. It had been nationalized following the Second World War but had been the focus of intense industrial and political struggle during the interwar period, with the demand for public ownership prominent. Surely here was an industry from which were to be found

significant insights into the whys and wherefores of state economic intervention?

This paper is not about this issue, for study of the interwar coal industry soon took on an importance of its own and in a completely unanticipated direction. The standard interpretation of British interwar coal is that of a staple industry suffering from lost export markets and low levels of domestic demand through depression, greater efficiency in fuel usage and competition from other fuels. It is equally recognized, however, that the industry failed in terms of remaining backward, relative to its competitors. Mine size was small, and mechanization and productivity were low and slow to increase. This is usually explained by reference to the poor state of industrial relations, the incompetence of managers and the cushioning effect of state support in the 1930s, which sustained both excess capacity and the less productive mines (Kirby, 1977; Buxton, 1979; Supple, 1986).

From a Marxist approach, there was one feature of the industry which appeared to have been neglected: this was the role of landed property, despite considerable commentary on it at the time. Almost every official report on the industry in the interwar period that commented on the matter considered that the 'coal royalties' should be taken into public ownership. In the United Kingdom coal in the ground belonged to the surface owner, and mine-owners and landowners were predominantly and increasingly distinct economic agencies. Accordingly, the one had to pay the other a royalty for the privilege of extracting the coal. Indeed, the ownership of royalties remained in private hands until 1938 when they were compulsorily nationalized by a Conservative Government. The immediate arrival of the Second World War has tended to conceal the 8-year interval separating this from the nationalization of the mines themselves.

Putting together backwardness in production and the intervention of landed property immediately suggested an application of Marx's theory of agricultural rent. This had not, however, received the same attention in discussion of Marx's value theory as had been devoted to falling profitability or the transformation problem. Indeed, interest in rent theory only began to emerge with radical approaches to urban economics, hardly fertile ground for analytical insights into agricultural rent, let alone rents for coal-mining!

Marx's rent theory for capitalism is extremely complex, and even more so to unravel as it is spread across *Capital*, volume 3, and parts of the *Theories of Surplus Value* in unfinished form. There are, however, some basic propositions that can be simply stated.[2] First, rent is the consequence of underlying economic and social relations, and these are historically contingent. It is a question of how landed property is

integrated into the rest of the economy. This cannot be reduced to the physical properties of the land (as in Ricardian and neoclassical theory) nor even to a simplified notion of conflict between landlord and capitalist (as in many radical and usually monopoly/ distributionist theories of rent).

Second, rent is an appropriation of surplus value and hence a deduction from what is made available to capital as a whole. It is paid in return for access to the land, but the term 'access' must be understood in a very wide sense. At one level it will be specified by conditions in the lease, but these coexist with other external conditions such as the law, availability of markets and transport, and the general and particular conditions governing the ability to accumulate capital.

Third, Marx distinguishes between differential rent (DR) and absolute rent (AR). The amount of DR results partly from natural differences (favourable locational or geological conditions, for example, which are, of course, socially determined and not simply bestowed by nature), but the ability of a landlord to appropriate such a rent also makes it possible for such DR to be demanded from the capitalist who is seeking surplus profitability through intensive accumulation (raising the organic composition of capital). Whereas in industry in general, a capitalist would expect to accumulate and hence enhance and appropriate profits, with the intervention of landed property the landlord can demand a portion of the extra profits, thereby potentially blunting the incentive to intensive investment.

Fourth, if instead, capital seeks pastures new for the added application of capital, an amount of AR will be demanded (as landed property never permits free use of land) leading to rent on the worst land in use. This will at most be the surplus profitability that would have been obtained and appropriated with intensive application of capital on the existing land in use.

The net result of landed property then is potentially to act as an impediment to the accumulation of capital, leading to less machine-intensive and less centralized production as a consequence of rent acting almost like a tax on the profits of such developments. The parallel between the theory and the conditions of the British interwar coal industry then appear to be quite striking.

4.3 MARXISM, MINING AND BRITISH LANDED PROPERTY

But not so fast. Marx's theory specifically views the obstacles posed by landed property to industrial development as being historically

contingent. He also characterizes development in terms of increases in the organic composition of capital with more raw materials, represented by constant capital c, worked up into commodities through the use of machinery in a given time by a given amount of labour power v. This suggests the need to explore the specific nature of landed property surrounding the coal industry and to recognize that mining takes as its 'raw materials' minerals in the ground that have not previously been the product of capital and are not constant capital.[3]

Fortunately, the peculiarity of British landed property in general and relative to the coal industry had to some extent been documented in the last quarter of the nineteenth century. The high concentration of ownership of land had been revealed by the New Domesday survey of the 1870s (Bateman, 1883). More specifically, in the case of coal, a Royal Commission reported between 1890 and 1893 on the effects of mineral royalties. Whilst it concluded that they presented only a few minor problems, relying on the abstract theoretical grounds of Ricardian rent theory and on the more practical grounds that the industry seemed to be doing reasonably well, it presented much information on the comparative systems of ownership of coal royalties in other countries.

In summary, Britain had a unique system of coal royalties because of the existence of large landed property. In the rest of Europe, the minerals had usually been taken into state ownership by the beginning of the nineteenth century. There the ownership of land had been so fragmented through the creation and persistence of a landed peasantry that this had been essential so that mine-owners could lease working areas of sufficient size. By contrast, landholdings in Britain were so large that one or more mines could be accommodated on a single estate. Minerals remained in private hands, as laid down by Elizabethan law, with the ownership of all but precious metals belonging to the private surface owner.[4] In the (former) British colonies, the same law applied, except that mine-owners tended to have been allocated large tracts of land that they owned themselves.

To some extent, landowners did work their own coal in Britain in the nineteenth century. But, equally, they had an incentive to encourage and facilitate coal-mining by others on their land by providing collective amenities such as transport. By this means, the aggregate capitals of many small-scale entrepreneurs could be drawn onto their land and a royalty extracted from each, there being an obvious analogy with present-day subcontracting and franchising. In this way, together with a most heavily proletarianized work-force, equally arising out of the system of large landed property that early on had erased the possibility of a significant independent peasantry, the

system of landed property served to promote the development of the coal industry. In Marxist terms, coal proved an outstanding avenue for the production of absolute surplus value – labour-intensive methods of production that could be readily extended piecemeal through additional accumulation of surplus value.

This situation could not last. First of all, as mines extracted coal from around their shafts, so they necessarily expanded their operations into bordering property rights. Second, as the seams worked became deeper, mines became larger scale in order to be able justify the increased outlay of capital expenditure, also requiring leases on a wider scale. Third, this was all accelerated by the high demand for coal to serve export markets and to power industrialization, and the opening up of the railways from the 1840s onwards acted both as a source of demand and to facilitate competition between different producing areas.

Around the last quarter of the nineteenth century, the problems associated with the expansion of mines were beginning to emerge. There is an irony in that the problems were sufficiently serious for the Royal Commission to be set up to investigate their effects but insufficiently serious for it to propose any remedial action. Given the rapid growth of the industry over the 50 years up to the First World War, it is hardly surprising that the emergence of the problems, given their underlying cause, should soon give way to their rapid intensification. In a sense, the relationship between landed property and mining which had necessitated state ownership on the continent in order that mining could begin to develop had been created in Britain by the development of the industry itself. Here, the fact that the 'raw matera' of the industry is not constant capital is of some importance, since accumulation of capital in mining inevitably leads to spatial spread of production in pursuit of seams of coal (subject to exhaustion of deeper seams); this is common but not essential to capitalist or other forms of agriculture where intensive production can in principle remain spatially confined.

But there was one other major development as well around the turn of the century: the mechanization of mining or the increasing shift to the methods associated with the production of relative surplus value. Whilst there had often been large-scale capital expenditure in coal-mining, this was more often geared towards establishing the fabric of the mine – as it were, a peculiar requirement in creating the 'mining factory'. Mining itself remained predominantly a labour-intensive industry whether in extracting the coal or in bringing it to the surface (and then preparing it for sale by sorting and, sometimes, washing). Increasingly important from 1900 onwards was the development and

use of mechanical coal cutters, applied above and below the coal seams, and mechanical conveyors, although most interest has concentrated on the cutters.

Now mine-owners could accumulate capital in pursuit of surplus profitability through mechanization, amalgamation or expansion of mine size, or any combination of the three. Potentially, landowners could intervene to enhance their share, depending on the leases already laid down and the lie of the (ownership of the) land and of the coal within it relative to existing and continuing facilities used by the mine. Thus, whilst in the interwar period royalties were often seen as a practical problem of negotiating multiple leases (and the Ricardian theory of the previous century was conveniently forgotten), royalty owners clearly had an incentive and the power to intervene into the accumulation process and in a way that would tend to obstruct the rationalization and the mechanization of coal-mining.

4.4 MARX AND RICARDO

What evidence is there to support this point of view or, more appropriately, can the mechanisms at work be identified? Ideally, the individual history of each mine and its relations to the industry as a whole would have to be uncovered. This might be done for a few mines, but then the problem would arise of how representative they are. Instead, an approach was adopted of uncovering empirical evidence that was consistent with the theory proposed but which contradicted orthodox interpretations.

We can begin with the Ricardian theory of rent which continues to underlie most economic analysis of the coal industry, although this is not always made explicit. This would suggest, apart from declining productivity over time as more marginal mines or seams were brought into production,[5] that royalties would reflect differing geological conditions (together with other more or less favourable factors such as location and coal quality). This is, however, simply not borne out by what happened, as is illustrated by table 4.1. If average width of seam cut is taken as a (poor) proxy for natural advantage, then leaving Wales aside, there is, if anything, an inverse relation between this and the level of royalties. However, there is no systematic relation between the level of royalties and the percentage of mechanization. Overall it seems as if royalties are at best random and at worst perverse!

However, suppose that royalties increase with mechanization: whilst they initially reflect natural conditions to a large extent, mechanization occurs on the worst mines first as competitive pressures force co-operation between mine and royalty owners to allow survival.

Table 4.1 Coal royalties and fertility compared

District	1925 Royalties/ton (old pence)			1924	
	Lowest	Highest	Average	Average width of seam cut (ft)	Coal cut by machine (%)
Scotland	1.50	26.50	6.68	39.55	46.4
Northumberland	3.00	12.42	5.74	41.83	26.7
Durham	2.21	24.00	6.32	45.26	16.0
S. Wales and Monmouth	2.00	21.00	7.83	53.08	5.4
S. Yorks	1.35	14.00	4.38	57.07	10.5
W. Yorks	1.35	9.75	4.85	43.37	24.2
Notts and Derby	1.20	10.05	3.90	50.97	14.8
Leics, Worcs and Cannock Chase	0.50	15.18	3.72	62.33	15.0
Lancs, Cheshire and N. Staffs	0.50	20.23	4.84	52.01	16.7

Source: (Samuel) Report of the Royal Commission in the Coal Industry, Cmnd 2600, 1926, vol II, p. 768

This would yield an inverse relation between mechanization and width of seam (as indeed there is) and a complex relation between royalties and width of seam according to the extent that mechanization has proceeded. Two polar extremes illustrate this: Wales and Scotland. Both have high royalties but each is towards one or the other extreme of both width seam and level of mechanization.

4.5 ECONOMIES OF SCALE VERSUS MECHANIZATION?

These are only rough and ready figures with other influences entirely set aside. Consider now, however, an influential argument of Buxton (1970) whose view is that, whilst mechanization is important in the interwar period and entrepreneurs were deficient in this respect, there were no economies of scale to be had so that limited progress in rationalization was not a failure. Buxton's evidence is seriously deficient. He finds a positive correlation between mechanization and productivity but no such positive correlation between mine size and productivity and considers that this suffices to support his case.

The problem is that if both mechanization and mine size are determinants of productivity and mechanization tends to proceed in the small mines first to compensate for competitive disadvantage, then Buxton's two simple correlations may well emerge. What should have been done is to have taken a multiple correlation of productivity against both mine size and mechanization (or to have compared equally mechanized mines of different sizes). There is nothing 'Marxist' about pointing out these statistical deficiencies, although the Marxist notion of the productivity of increasing size of capital may have inspired a closer examination of the statistics.

To press this point home, an attempt was made to estimate the degree of economies of scale. There are problems in this even for the orthodoxy. Measurement of a production function of the type $Y = F(K,L)$ falters on the Cambridge critique for identifying distributional market shares with contributions to production as if the economy were composed of a single good (and capital can be measured empirically at its money value). Even this method requires constant returns to scale and so is inappropriate for measuring returns to scale.

4.6 THE MARXIST AGGREGATE CAPITAL STOCK AFTER SRAFFA

Accordingly, a physical measure of the capital stock (in mechanization) was sought with which to estimate production functions

(without using the pernicious total factor productivity approach of neoclassical economics). As the methods of estimating the production function, even without using factor rewards, should be relatively familiar, the way of constructing the capital index may be of more interest. Again it cannot be claimed in some sense to be 'Marxist', although it is inspired by the wish to explore the relation between machinery and the more intense working of raw materials which is central to Marx's notion of productivity. There is, for example, a limited parallel with Marx's measurement of 'technical progress' in the cotton industry in terms of the number of spindles in use per operative.

During the interwar period there were four types of machine in use for coal cutting – bar, disc, chain and percussive. At the beginning of the period only 17.1 per cent of the coal cut mechanically was cut by chain machine, but this had risen to 94.9 per cent by 1938. In constructing an index for the capital stock, account has to be taken of the different productivity of the different machines, and this changes over time. To simplify matters, it was assumed that the machines provided a service that was not mine specific or, more exactly, district specific. Differences in machine productivity were taken to be the result of influences other than differences in other inputs and mining conditions.

In order to calculate these machine services, a simple average of machine productivity (output per machine) was taken across districts for each machine. However, it was observed that, not surprisingly, machine productivity in any one district in any one year was highly dependent upon the level of output, i.e. on the level of capacity utilization. Consequently, the period 1921–38 was divided into three subperiods: 1921–8, 1928–33 and 1933–8. For each period in each district, the peak productivity was calculated for each machine in order to attempt to capture full-capacity productivity. Then the average was formed across the districts. The results are shown in table 4.2.

On the basis of the table, the following rough conclusions can be drawn. The productivity of bar, disc and percussive machines remained relatively constant over the whole period. Their persistence

Table 4.2 Mean productivity (thousand tons per machine per annum)

	Bar	Disc	Chain	Percussive
1922–8	12.5	12.0	13.0	3.1
1928–33	12.4	13.0	17.0	2.8
1933–8	11.7	9.8	23.3	2.7

in use is likely to be explained in part by their presence on mines being worked out, or by their gradual displacement by the superior chain machines on continuing mines. At the beginning of the period, each of the bar, disc and chain machines were of roughly equal productivity and 'worth' four times a percussive machine.

The productivity of chain machines, however, almost doubled over the interwar period. This is probably due to their being confined to the worst and worsening mining conditions. This was calculated over an 18-year period to yield a growth in technical progress of approximately 4 per cent per annum. On this basis an index was constructed for the capital stock by the formula

$$K = e^{0.04t} K_1 + K_2 + K_3 + K_4$$

where K_1, K_2, K_3 and K_4 are respectively the quantity of chain, bar, disc and percussive machines in use.

With this measure of the capital stock, an aggregate production function was estimated both for the United Kingdom as a whole and for each of 18 regional districts for which the appropriate data were available. The statistics showed the importance of both scale economies and mechanization. Whilst there must remain considerable reservations about the significance of such estimated production functions, the exercise did serve its purpose of discrediting the view that mechanization alone and not economies of scale were of importance.

4.7 FAILURE OF THE HYPOTHESIS OF ENTREPRENEURIAL FAILURE

Within the literature a central focus has been entrepreneurial performance with failure in the interwar period being explained by intransigent and incompetent mine-owners. There was a relatively simple way of testing their competence, as suggested by the apparent superiority of the chain cutter as revealed previously. Entrepreneurial competence could be judged on the basis of the extent of mechanization but this, in turn, could be assessed in three separate ways. First, how many mines had actually installed coal cutters at all? Second, what proportion of coal had actually been cut mechanically? Third, to what extent had the superior technology of chain cutters been put in place?

Each of these measures of mechanization was assessed as a diffusion process as illustrated in figure 4.1.[6] The diffusion curve has associated with it both a speed of adjustment, represented by the slope of the

Level of
mechanization
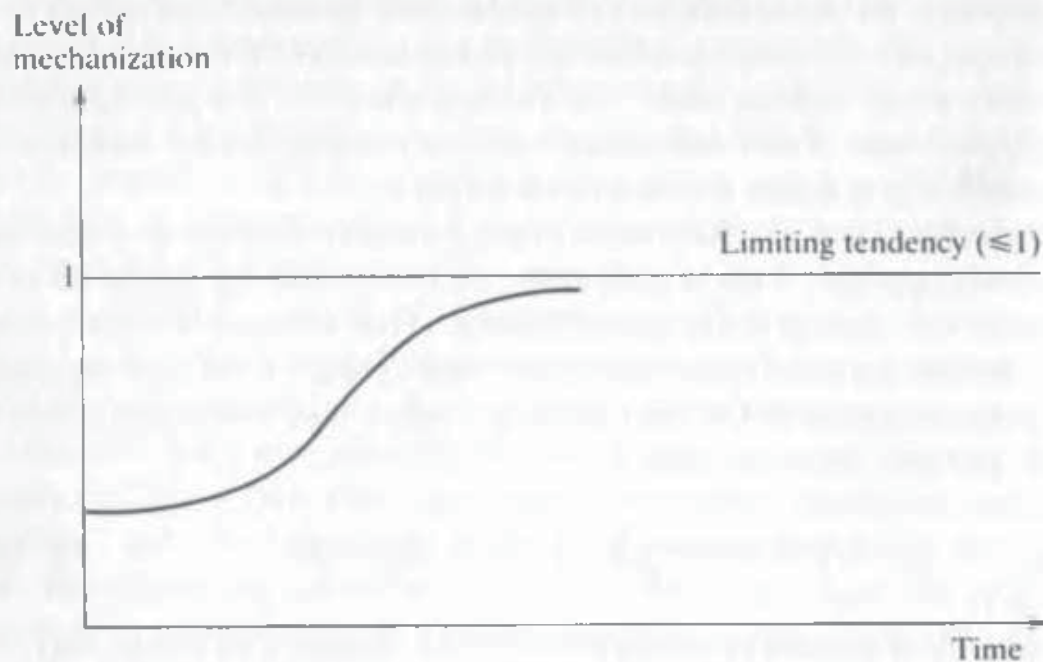
Limiting tendency ($\leqslant 1$)

1

Time

Figure 4.1   Diffusion process.

curve, and an ultimate level of attainment, represented by its asymptotic tendency. Again the algebraic and statistical details need not detain us nor is estimation of diffusion a specifically 'Marxist' technique. The results revealed that, in terms of momentum and attainment, choice of chain cutters was highest (and successful in absolute terms, hardly surprising given that they produced over 90 per cent of all mechanically cut coal by 1938), followed by the proportion of coal cut and, last, the number of mines mechanized.

This suggests that the thesis of entrepreurial failure faces difficulties. For, where they had a choice to make, mine-owners seemed well aware of what technology to use, with the implication being that factors other than their own incompetence influenced the motives to mechanize or not. Of course, it could be argued that the entrepreneurs fell into two groups – failures and non-failures. But this then puts us back into the problem of explaining why the competitive process did not see the elimination of the failures.

4.8 MARXISM AGAINST MONOPOLY VERSUS COMPETITION

This leads to another central theme of the orthodoxy for the British interwar coal industry. This is that state intervention from the 1930s

onwards was both inconsistent and ultimately an obstacle to rationalization of the industry. This view is particularly associated with Kirby (1973). He notes that the Labour Government introduced a cartel to support the industry during the 1930s and also set up the Coal Mines Reorganization Commission (CMRC) which was charged with the task of bringing about amalgamations. Certainly, the CMRC failed in its endeavours as voluntary schemes were impossible to enforce, and its first and last scheme for a compulsory amalgamation was judged to be illegal and its activities were effectively suspended. Consequently, the state's role in forming a cartel is seen as decisive by Kirby for it supported the lack of effective powers it had given to the CMRC by featherbedding inefficient producers.

Kirby's account has theoretical and empirical deficiencies. At a theoretical level, there is the presumption that cartelization is the antithesis of competition, so that it leads to a failure to rationalize through amalgamation. This is akin to the notion that monopoly is output restricting and price increasing. But even this is not so for the orthodoxy. For whilst inefficiency is supposed to arise out of oligopoly pricing, this is not productive inefficiency. Whatever price support the state cartel provided, the industry still had an incentive to provide output at the lowest cost possible. There is no reason why rationalization could not have occurred.

Further, in terms of dynamic change, it is well recognized that cartels are often the basis for bringing about large-scale reorganization of industry. Ironically, the example of the German coal industry of the same time is often quoted as a case of rationalization through cartelization. Thus the existence of the cartel organized by the state is neither necessary nor sufficient for the creation of an obstacle to rationalization. Again, these theoretical considerations are not unique to Marxism, but its emphasis on the coexistence of monopoly and competition is an effective antidote to the notion that cartels are antagonistic to rationalization into large-scale production.

At the empirical level, a detailed study of the rhythm of amalgamation does not support Kirby's view. He finds that there were 26 amalgamations over the period 1926-30 (before the presence of the state cartel) and 32 over the longer period from 1930 to 1936. This is hardly a dramatic change, and the later period corresponds to the depths of the Great Depression which is hardly conducive to adventurous amalgamations. When the evidence is extended to include the next 2 years and is divided down into detail district by district, a rather different picture emerges, as is illustrated by the predominant pattern of zeros in table 4.3.

In most districts there are relatively few amalgamations either

Table 4.3 Amalgamations in the coal industry 1927–38: regional evidence

Region[a]	Number of schemes										
	1927–8	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
1	6	0	1	0	1	0	0	1	0	3	0
2	8	0	1	0	0	0	0	1	0	3	2
3	2	1	0	2	0	0	0	0	0	6	2
4	1	2	0	0	1	1	1	0	1	0	1
5	0	3	1	0	1	1	0	1	0	0	0
6	0	0	0	0	0	1	0	0	1	0	0
7	0	0	0	0	1	0	0	0	1	2	1
8	0	0	0	0	0	1	0	0	2	1	0
9	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	1	0	0	0
11	0	0	0	0	0	0	0	0	1	0	0
12	0	0	0	0	0	0	0	1	0	1	0
13	0	0	0	0	0	1	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	1	0	0	1	1	1	0	0
16	0	0	0	0	0	1	0	1	0	2	3
17	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	1	0	0	1

[a]Regional code: 1, S. Yorks; 2, S. Wales; 3, W. Yorkshire; 4, Northumberland; 5, Lancs and Cheshire; 6, N. Wales; 7, Durham; 8, N. Derby and Notts; 9, S. Derby; 10, North Staffs; 11, Cannock Chase; 12, Warwickshire and S. Staffs; 13, Leics; 14, Cumberland; 15, Ayrshire; 16, Lanarkshire; 17, Lothians; 18, Fife; 19, Somerset.
Source: Reports by the Board of Trade Under Section 12 on the Working of Part 1 of the Mining Industry Act 1926

before or after 1930, and those that there are tend to fall in the same districts (South and West Yorkshire and South Wales) in both 1927–8 and 1937–8. If Kirby's hypothesis were correct, it should apply equally to all districts, and this is clearly not the case. Reasons for limited rationalization have to be sought elsewhere.

4.9 A CRITIQUE OF TOTAL FACTOR PRODUCTIVITY

In the previous sections we have been primarily concerned with interrogating orthodox theory and empirical analysis from a perspec-

tive informed by Marxist theory. More generally, industrial studies in economics and economic history that employ econometrics have been dominated by the estimation of production functions. In this section, a critique is made of such a study for the industry prior to First World War and hopefully the analysis will be suggestive for critiques in the context of other case studies as accounts are settled with the orthodoxy. In particular, in running through the conditions (associated with perfect competition) which are necessary for the legitimate estimation of a production function, a way is opened for an alternative specification of the economic conditions within which capitalism operates.

The study to be criticized is drawn from an early article within the new economic history of cliometrics. McCloskey (1971) attempted to demonstrate that differences in productivity between the coal industries of the United States and the United Kingdom prior to the First World War can be explained by differences in natural or geological conditions. The method used by McCloskey is as follows: suppose that the United States and United Kingdom have the same production function for coal. Is it possible to explain different levels of labour productivity by the different per capita inputs used? If the answer is in the affirmative, then McCloskey deduces that there is no entrepreneurial failure, and the masters and men of UK coal-mining will have been unjustly accused even if they only achieve lower levels of productivity.

Even at this general level there are still problems. It is, of course, possible that both the US and the UK coal industries failed. The comparison would not reveal this. Equally, if the two countries did not share the same production function, then to draw conclusions on the basis that they do is extremely precarious. McCloskey is aware of this but is content to presume that imitation of technology – through whatever route – is sufficient to render the assumption a reasonable basis on which to proceed.

Here, a particularly narrow view of what constitutes the production function becomes clear. In principle, any factor that influences production could be included as an input affecting output (and the more that are included the lower is the unexplained residual that is 'explained' by technical progress). In practice these factors are to be limited precisely to those traditionally conceived inputs of labour, capital and land in the narrowest of technical senses. The particular relations between the classes that own these factor inputs are rendered irrelevant except in so far as they come to the market-place to sell what they own. Yet it is precisely such relations between classes that are the least mobile between countries, whatever the mobility generated

through the transfer of technology. This is the light in which we should place Lazonick's criticisms of the application of the factor productivity method to the cotton spinning industry. His emphasis is on differing industrial relations between the United Kingdom and the United States. These are no doubt of equal importance to the coal industries, but our focus will be on the role of landed property.[7]

Before proceeding to this, it is instructive to examine briefly other assumptions that are necessary to warrant the adoption of the factor productivity method.[8] The first of these is that there are constant returns to scale. These are necessary to guarantee that factor shares exactly exhaust output so that, in perfect competition, marginal products can be measured. For some, constant returns to scale must necessarily prevail if all inputs are exhaustively included. But this is unconvincing since we are always able in principle to duplicate what we have previously achieved and we may be able to do better. To the extent that large capital outlays are necessary to get to the coal even prior to working it, economies of scale appear to be endemic.[9]

Significantly, McCloskey avoids this problem by suggesting with minimal evidence that capital per worker may have been about the same in the two countries. In the United Kingdom, the capital – labour ratio may have been higher because of the difficulty of working coal, given its greater depth for example, but may also have been compensatingly lower because of a lower relative wage with a reduced incentive to substitute capital for labour. As it were, the United Kingdom substitutes capital for land and the United States substitutes capital for labour. With the now presumed equality of capital – labour ratios and constant returns to scale, this allows the role of capital to be set aside altogether. It is surely inadequate to lump together different types of mechanization, from haulage to coal cutting, as well as the infrastructure of the mines, and presume that they are being equally efficiently used when the weight of reported evidence, as noted by McCloskey, is to the contrary.

A second assumption required by McCloskey is that of perfect competition. This guarantees that marginal products are defined and are equal to factor rewards. But even a casual inspection of the pre-war coal industry suggests that economic conditions are otherwise (Taylor, 1961). Neither overall demand considerations nor class conflict, as a source of distribution, can be set aside.[10]

A third necessary assumption is that factor rewards measure corresponding contributions to output. This is a heroic assumption, even if constant returns and perfect competition are permissible. The Cambridge critique of capital theory implies that, beyond the hypothetical one-good world, the measurement of technological

performance by factor rewards confuses price (and distributional) changes with production changes. Changes in wages are the result of distributional conflict between capital and labour, and so measuring contributions to production by factor rewards will measure production change and distributional change as if they were one, i.e. the former (Fine, 1980). Crucially, however, the argument against the measurement of production functions in this way does not depend upon acceptance of the Cambridge view of the prior determination of distribution. Exactly the same considerations apply if the role played by demand is recognized. Moreover, general equilibrium theory informs us that price movements can be perverse in all but the most restrictive conditions (e.g. Bliss, 1975). For example, an increase of wages in the United States compared with the United Kingdom may very well make more capital-intensive industry efficient in the United Kingdom once all demand considerations are taken into account.

The conclusions to be drawn are simple and devastating. The production function methodology is logically unacceptable. It measures changes in supply and demand as if they were exclusively changes in supply. By doing so it will calculate effects not only of the wrong magnitude but even of the wrong sign. The method gives no accurate indication of what it purports to be measuring – entrepreneurial performance via factor rewards (Fine, 1980).

Even if these objections are put aside, the total factor productivity method is clearly facile for non-economic agencies such as the government. The government is not primarily a market institution even if it does have profound effects on the workings of the market. But, by the same token, the contribution of economic agents through the market is not entirely separate from non-market factors. The market performs its role in definite social, political and legal circumstances, and these have an effect that has to be determined. It also makes the job of the economic historian more interesting than that of an accountant of revenues.

These general remarks on the limitations of production function estimation are intended as a preface to a more specific consideration of the role of landed property in the US and UK coal industries. For the production function approach, the matter is simple enough. It is reduced to a question of geological conditions. The way in which the land is owned and the problems of ownership do not figure. Set this aside for the moment. McCloskey attempts to explain table 4.4 by differing mining conditions. He begins by estimating the supposed effect of available reserves, reckoning these to be five times greater per worker in the United States than in the United Kingdom. As the distributional share of land is approximately 8 per cent, this would explain a

Table 4.4 Yearly output per man employed (United Kingdom in 1907 and United States in 1909)

	Output (million, tons)	Employees (million)	Output/man per annum (tons)
UK	267	0.812	325
USA	408	0.667	613

productivity difference per worker of 8 per cent × 80 per cent, or 6.4 per cent, since the percentage difference in coal per worker is 80 per cent.

This is a most peculiar procedure. First, as is well known for most extraction industries, proven reserves are an endogenous variable which tends to keep well ahead of minerals being worked. As such, it is an inappropriate measure of the land factor input. Even so, the level of reserves per worker for the United Kingdom is in the region of 100,000 tonnes. Increasing this to 500,000 tonnes for the US worker can hardly be anticipated to increase productivity. Placing the land-to-worker ratio at a level of 0.205:1.000 for the United Kingdom to the United States, as McCloskey does, merely tends to conceal the massive reserves available to both countries irrespective of those yet to be discovered and/or counted.

These considerations are to be kept quite separate from the quality of the coal land available, which would be increased with proven reserves in general. McCloskey goes on to consider the effect of seam depth and thickness on labour productivity. He finds that the deeper thinner seams of the United Kingdom are sufficiently disadvantageous to explain the remaining productivity differences between the United States and the United Kingdom. Admittedly, the exercise is crude but, quite apart from the calculations, the question is: what does it demonstrate? The answer is that the UK mine-owners worked deeper and thinner seams with an estimated effect on productivity. Yet McCloskey himself observes that the seams worked are a matter of choice, with thicker seams compensating for greater depth. This skirts the issue of whether mine-owners worked the best seams that were available and did so in the most efficient manner. Since the seams worked are not purely a geological property and are subject to choice, the performance of the industry must be judged on the basis of those choices. On this McCloskey is silent, although there is perhaps the presumption that the market will have worked perfectly to make those choices efficient.

As previously argued, there is evidence that the system of landed property in the United Kingdom made these choices inefficient. In the United States the mine-owners in general owned large tracts of land over which they could conduct their business without impediment. Given the superior geological conditions, it is understandable that mines were shallower and smaller than in the United Kingdom. Here, although the same law applied to landed property, there was a separation of ownership between the minerals and the mines. Moreover the ownership of the coal royalties was extremely concentrated, reflecting the concentration of ownership of land in general. For example, in the four Scottish districts, the ten largest royalty owners accounted for 75 per cent, 70 per cent, 43 per cent and 70 per cent respectively of all potential coal upon nationalization of the royalties in 1938. For the country as a whole in 1918, a mere 100 royalty owners received almost 50 per cent of the royalty income and there were at most three or four thousand royalty owners altogether (Fine, 1990). This evidence alone is sufficient to cast doubt on the idea that perfect competition yields efficient choice of seams to be worked, particularly when the length of time for which a mine is worked and that it is heavily tied *in situ* are borne in mind.

But the decisive issue in distinguishing Marxist from neoclassical theory in this context is the difference between treating landed property as a condition of access to means of production rather than as a simple factor input amongst others. This can be illustrated by reference to the single issue of subsidence. British mines were becoming deeper and, for this to be cost effective, more widely spread. As a result, subsidence became a more serious problem and was no longer physically confined to the area immediately above the extracted seams as the mine's roof was allowed to collapse. Previously, the law concerning damage had been constructed on this basis of belief in damage confinement. The new conditions laid the mine-owners open to substantial claims for compensation. In the event, it took the railway companies, the mine-owners and the mineral owners (the main interested parties) 10 years to come to an agreement over the issue, and new legislation was embodied in the Mines (Working Facilities and Support) Act of 1923.

The Acquisition and Valuation of Land Committee, under the chairmanship of Sir Leslie Scott, which was the source for the Bill, listed 14 problems with the royalty system, the best known of which was that of barriers (the leaving of unextracted boundaries of coal to mark property rights underground). In this light, it can be seen that, until the nationalization of the royalties in 1938, the UK industry was

labouring under an inappropriate system of land law. The Act of 1923 was supposed to ameliorate the various problems without going to the extreme step of public ownership. But these problems were not so much the result of inefficiency in administration as a reflection of intensifying conflicts between the interested parties as a consequence of and with effects on the accumulation process.

It is these aspects of the system of landed property that render nonsensical McCloskey's view that

> the pattern of coal land tenure is a good example of the effect of economic conditions on legal arrangements. In the United Kingdom, apparently, land was expensive enough to overcome the high transaction costs of selling mineral rights and surface rights separately and to warrant more specialization between ownership of the rights and exploitation of the rights. (McCloskey, 1971, p.)

Here it is simply assumed that the patterns of specialization were in an efficient correspondence with economic conditions. It is true that the economic conditions initially dictated the legal condition of private ownership of the coal royalties (but this resolution of Elizabethan conflict between royalty and landowners is not what McCloskey has in mind). Subsequently, it is the legal conditions that affected the economic conditions, and adversely, rather than vice versa. In short, the orthodoxy simply assumes away the possible effects of landed property and even takes the separate ownership of coal royalties as empirically supportive.

4.10 CONCLUDING REMARKS

Within economic history, the application of quantitative methods in the form of econometrics is relatively new. The emerging/emerged area of cliometrics has been dominated by the orthodoxy, usually neoclassical for the firm/industry and monetarist/Keynesian for the economy as a whole (or some *ad hoc* mixture as in migration or population studies). In a recent assessment of the achievements of cliometrics, Crafts (1987) chooses a number of issues to cover, but only in the case of investigation of the Habbakuk thesis (concerning UK agricultural productivity) does the use of production function estimation appear to be prominent (as opposed to study of interwar unemployment, heights as a measure of welfare, the demographic transition and the general equilibrium modelling of the Kuznets curve). However, this perhaps represents a preference for variety rather than for representativeness for, especially in industrial studies

and certainly for the sources of growth of national income, measurement of total factor productivity has been most prominent. Accordingly, the discussion in this paper may serve as a guide on how to combat the associated reduction of economic and social relations to a matter of factor inputs and distributional shares.

Such a neoclassical prospect for economic history is far from impossible even though econometrics has not established so central a presence as it has within economics despite a sustained assault which seems momentarily to have been halted, leaving it at the frontiers if not the core of historical research. There may be a number of reasons for this difference between economics and economic history. First, the availability and reliability of data are a restriction on the scope of application of formal methods of statistical enquiry as far as economic history is concerned. Second, historians have a training and inclination which admits of qualitative arguments that are recognizably difficult both to quantify and to reduce to formal mathematical terms. They are concerned with class and social movements and with institutions etc. Whether this is a strong point or not depends on the content with which they are endowed, but it does act as an obstacle to the use of econometrics. Third, historians have a well-established tradition of archival research as the tool of the trade, like the laboratory work of the natural scientist. This is not, however, necessarily antagonistic to the application of econometric techniques in so far as it leads to the creation of a large data set.

These reasons apart, the stumble in the path of cliometrics within economic history may be precisely that. It is early times as yet and new generations of students with computer keyboard skills are liable to be the pathfinders in future economic history. It is important to recognize that its own means of production also affect the production of knowledge, and that the new and rapid growth of powerful personal computers is liable to affect the development of each and every social science (in a way in which the typewriter did not). This will be different in each discipline according to its own internal dynamic and its objects of enquiry and their connection with the outside world. In short, computers will not only inevitably increase the amount of data collection and statistical methods of investigation that take place, but they will also affect thereby the sort of theory that is produced.

Some 15 years ago I was, possibly unduly, optimistic about the future path of economics. It seemed as if the presence of a radical tradition and the overwhelming disparity between the emerging global economic crisis and the theoretical assumptions of the orthodoxy were inevitably going to lead to some empirical re-evaluation of these presuppositions. It was all too easy to look beyond the external

pressures on, and the apologetics of, the profession as rational expectations allowed monetarists and Keynesians to resume their long-standing debate (or, more exactly, compromise), and any esoteric notion surrounding the informational or motivational content of microeconomic behaviour became the cause of a paper or even a stream of papers in economic theory. Less predictable, however, was the extent to which the general availability of greater and cheaper data sets and computing power enabled the empirical reassessment of the economy to be sidestepped, perversely by a boom in empirical enquiry in the form of econometrics.

Such developments as these, however much deplored, cannot simply be wished away and quantitative methods dismissed as beyond the ambit of Marxism or the independent Marxist alternative constructed in its place. Rather, the growth of quantitative methods across the social sciences is a terrain of discourse in which Marxists must engage. For otherwise, to the extent that economic history has economics as its *de te fabula narratur*, Marxism will be rendered ineffective by its perceived unsophisticated level of 'rhetoric'.

NOTES

1   For the bringing together of my research on the British coal industry, see Fine (1989). Some of the results reported here are covered in a forthcoming contribution to the *Economic History Review*.

2   For consideration of Marx's theory of agricultural rent see Fine (1979) and the debate with Ball (1980).

3   For Marx, raw materials were defined to be the means of production created under capitalist relations of production and further worked up to form the bodies of commodities, i.e. a part of constant capital (unlike naturally available means of production such as minerals). For this reason, he considered mining to be akin in part to transportation, since neither entirely involves the transformation of raw materials. Interestingly, Marshall also considered that mining was like transportation, but this was derived from a degree of similarity between the two industries in terms of the shifting of minerals from underground to the surface.

4   The term 'royalty' has gone through an inversion of meaning, originally involving a payment to the Crown by the subject and now implying a payment to the individual.

5   Thus, Supple (1986) considers the history of the coal industry in the twentieth century as the problem of reconciling labour to the inevitable closure of uneconomic pits and sectoral decline. For a critique, see O'Donnell (1988).

6   Greasley (1982) also considers mechanization as a diffusion process but he does so in terms of the speed of adjustment to optimum cost conditions, implying an underlying production function.

7   See, for example, Lazonick (1981). In later work, Lazonick (1983) also emphasizes vertical integration into weaving, and other management factors.

8   The arguments here complement many of those of Nicholas (1982).

9   See Church (1986) for an overview of the industry prior to the First World War. For Church, 'the overwhelming importance of fixed capital, however defined, is indisputable' (p. 116).

10 In this context an even more inappropriate application of production function estimation is made by Jones (1983) for the South African coal industry. In the competition between producers there is monopolization through the 'group system', in the goods market there are state-fixed prices in the domestic market, tied markets to power stations with guaranteed profits and higher prices for exports which are quota allocated, and in the labour market there is the apartheid compound system, for which wage differentials between blacks and whites have narrowed from 20:1 to 6:1 over a ten year period (hardly suggesting a competitive labour market for which wages measure marginal product). Severe doubts must exist over what total factor productivity is actually measuring. See Fine (1989) for an extended critique.

5

National Accounts in Value Terms: The Social Wage and Profit Rate in Britain 1950-1986

ALAN FREEMAN

5.1 INTRODUCTION AND AIMS

Over 100 years ago Engels published Marx's celebrated reproduction schemas in Capital, vol. II. They addressed a problem first posed by Adam Smith: how can a commodity economy reproduce regularly without being regulated? How can value, which is produced privately, reproduce socially? To put it at its simplest: how does the market work?

Marx ascribed the highest importance to what he termed the 'circulation process of capital as a whole'. Defending the physiocrats' Tableau Economique, the first attempt to describe economic reproduction as a whole, he wrote: '. . . this was an extremely brilliant conception, incontestably the most brilliant for which political economy had up to then been responsible.' (*Theories of Surplus Value*, 1969, p. 344). The schemas have proved one of his most influential contributions to non-Marxist economics. Above all this is seen in the NIAs which, through the work of the Keynesians under wartime planning and subsequently the welfare state, have transformed the technology of economics, raising it from academic obscurity to a respected profession. The accounts are an unchallenged data source, not just for economic but also for political argument, because they are the only place to find out what happens to what society produces – the exact subject of Marx's enquiry. Elections have been won and lost on NIA figures, and despite attacks on Keynesian economics they remain the basis of the vast bulk of economic planning and forecasting.

The most contentious debates in Marxist theory have all turned in

one way or another on problems posed by social reproduction. It is ironic that these debates rage on the terrain of pure and often exotic theory while the NIAs, descended from Marx's own thinking, have produced the very data against which to test them. It is doubly ironic because marxism is above all empirically valid. Its predictions on crisis, profits and underdevelopment are borne out every day.

In this chapter we shall show that this is as unnecessary as it is unacceptable. We can now measure what Marx only described: annual nationally produced value and surplus value and its distribution among workers, rentiers, merchants and manufacturers. We can lay bare how value circulates. This is not to claim that the task is straightforward. There are numerous problems but, as we shall see, there are also practical solutions. In the next section we discuss the problems involved in using the NIAs, and in section 5.3 we consider the general problems of using price data. This is followed in section 5.4 by a brief outline of the adjustments required to create measures of value categories. The next four sections provide more detail on the adjustments, and the adjusted data are presented and analysed in the final section.

5.2 USING THE NATIONAL INCOME ACCOUNTS

There are various problems in attempting to use the NIAs as they stand as an accurate, or at least adequate, record of value quantities (e.g. Glyn and Sutcliffe, 1972; Weisskopf, 1979). While factor income from wages can be read as aggregate variable capital, factor income from profits as surplus value and so on, the raw data embody preconceptions which obscure or distort the results, for example assessing 'households' as a single group and so confusing consumption by wage-earners with that by property-owners. Moreover, the accounts fail to distinguish the costs of capitalist production from social costs in general. Prices include many components which have nothing to do with production: taxes, mark-ups, financial charges and so on.[1] To extract variable and constant capital from price data, we must know how much value has been consumed in production itself, eliminating all incidental costs which do not add value to the final product, essential though they may be to the reproduction of capitalist social relations.

Despite the attention which individual enterprises devote to such matters, the NIAs do not give this information. They net out intermediate material costs and measure all transactions in price terms

without asking which components of price derive from the cost of private production and which from elsewhere.[2] However, they can be transformed according to a definite procedure grounded in value theory to bring them closer to Marxist categories. This approach is regarded with suspicion by many Marxists who consider that value quantities are abstract and unquantifiable by nature, so that the taint of empiricism surrounds all attempts at quantification (e.g. Althusser and Balibar, 1970; Latouche, 1975; Gill, 1976; Benetti et al., (1979). But 'empirical' work is not 'empiricist' if its techniques of measurement are based on theoretical principles. Sharpe (1982) provides a detailed discussion of these issues and an account of historical attempts to measure value quantities.

We do not want to understate the real technical problems involved in such a project. Not only are there practical difficulties, but also those arising from the social conditions of capitalism cast doubt on the accuracy of the accounts even in their own terms. Companies lie about their assets and conceal their returns. They lie differently to banks and to tax collectors. However, there are limits to falsification because the statistics and the economy bow down to the same reality and at the end of the day the books have to balance. Moreover, value quantities are by definition and nature both objective and measurable – unlike neoclassical quantities such as 'marginal utility' – and so in principle it should actually be easier to produce meaningful value accounts.

We could indeed argue that value transformation is the only way to make sense of the accounts. It is strange for Marxists of all people to take issue with statisticians on the grounds that the 'true' data of the economy are not measurable. On the contrary, the real issue is: 'what do the national accounts actually measure?' As they stand, the accounts measure only the surface appearance of economic activity. Our task is to measure what is going on underneath. The end result should be superior to the national accounts because it is grounded in a better understanding of the process of reproduction.

5.3 USING PRICE DATA

Many Marxists, such as the *Monthly Review* school, would accept that value is measurable but regard national income statistics as inherently unusable because prices deviate systematically from values. In our view it is possible to work backward from price to value data precisely because prices are determined by values.

We can start from a principle of value analysis, which is that price is ultimately a form of value: one commodity measured in terms of another. This is above all true for aggregate price data. The total price of all commodities in circulation expresses the total number of hours of abstract labour which went into their production.[3] This is invariant with respect to relative price changes. If one price falls and another rises, ultimately it can only transfer value from the owners of one commodity to the owners of another. If we normalize the price of aggregate annual production by dividing by the number of hours worked each year, then the price of, say, the commodities consumed by wage-earners will contain two components: the 'true' untransformed value of these commodities plus or minus some value appropriated in circulation. The deviation of price from value represents a transfer of value from commodities appropriated by some other class. The aggregate price of any group of commodities is, as it stands, a measure of the social labour appropriated by its ultimate consumers.

Moreover, although there are many different sources of deviation of price from value, attention has concentrated on only one – the process of profit rate equalization. Because this is particularly difficult to correct for, many Marxists shy away from price data. But research by Shaikh (1984), and Petrovich (1987), and particularly by Ochoa (1984), suggests that this distortion is far smaller than is often believed.[4] More serious distortions are introduced by other factors which are in fact easier to correct for. In particular, taxes, interest, rent and the commercial sector distort the accounts because they modify prices but make no contribution to value. Whenever the accounts record a payment we cannot just assume that the value received is accurately measured by the payment: where it is not, we must apply a correction.

State intervention is the most significant. Value is transferred in one direction as taxes and in the other as benefits, without the form of exchange at all. Taxes are an arbitrary and forced deduction from money income for which no direct equivalent in value is received, while benefits are allocated on political criteria. But both are recorded in the accounts. Interest is another case. When you pay interest you receive nothing in return. There is no exchange of equivalents. It is a one-way transfer of value. Again, this as we shall see is recognized and quantified in the accounts. Our main aim is to use this recorded information to address and correct for the distortions to which they relate. In the rest of this paper we concern ourselves with the details of the adjustments.

5.4 OUTLINE OF THE TRANSFORMATION PROCEDURE

Our aim is to bring into the open four subsidiary circuits of value: state taxes and revenue, interest payments, rent payments and the non-value-producing activities of circulation. Because we make corrections for productive and unproductive labour with which some Marxists may disagree, these corrections are carried out last.

We start from gross national product (GNP) at market prices. This is divided into 'gross' (unadjusted) profits and gross wages. Gross labour income is the gross wage bill of society (factor income from wages) plus employers' national insurance contributions. Gross property income is gross trading profits of both private and state companies plus net foreign property income plus gross rent receipts plus the income of the self-employed.[5] In outline, the procedure is then as follows:

1   correct for the treatment of rentier income and rent, and convert gross to net profit by deducting the depreciation of productive equipment (section 5.5);
2   correct for the state and taxation (section 5.6);
3   adjust the wage bill for unproductive labour costs (section 5.7);
4   correct for the national accounts' treatment of the banking and retail sectors (section 5.8);

This gives us a measure of the true wage bill of those capitalists engaged in producing commodities, which corresponds to variable capital V. Adjusted gross property income now corresponds to surplus value S. $V + S$ represents the total capitalistically produced new value, and S/V represents the (corrected) rate of exploitation.

The calculation method allows us to do more. In effect we can chart the reproductive cycle of the economy as a whole, including unproductive labour and consumption, and including value accounts for the distribution of income. Profits can be disaggregated to show their distribution amongst various fractions of the capitalist class: finance capital, profit of enterprise, merchant capital and rentier capital. Gross profits are adjusted to take account of consumed fixed capital, using the CSO estimates of capital consumption in the absence of any better data. Unproductive workers' wages can be divided into state labour consumed by workers (sometimes referred to as the 'social wage' and sometimes as the 'collective consumption' of the working class'), state labour consumed by capitalists and the unproductive

labour of circulation. Owing to data limitations we were unable to adjust for supervisory workers, as Moseley (1985) did for the United States.

Finally, we can make an attempt at measuring the rate of profit itself. This is a controversial area because of the difficulties of measuring capital stock. In the time available, we simply used the national income statistics figures for net capital stock without any adjustments. However, we did attempt to account for the circulating constant capital deployed in production, which should be included in the capitalists' outlay as it enters the equalization of the rate of profit. The next four sections deal with the issues and practical problems that arise in trying to use the procedure outlined above.

5.5 NON-EXCHANGE TRANSFERS OF VALUE

Beginning from Marx's fundamental definitions of variable capital and constant capital, we consider the annual wage to be the total exchange value appropriated by wage-labourers during the year. Constant capital is the total exchange value directly consumed in ·capitalist production during the year; variable capital, by analogy, is that part of the annual wage consumed by workers engaged in capitalist production. To measure the annual wage in value terms we must correct for all forms of what we shall term 'pseudo-exchange' in which money (i.e. value in its money form) changes hands without an exchange of equivalents. These are interest, rent, taxes and benefits.

Interest and rent are critical to any serious study of the United Kingdom accounts. In 1986 dividend and interest receipts in the United Kingdom totalled £131,711 million – equal to nearly half the GDP – and personal sector interest receipts alone were £30,058 million. United Kingdom interest income from foreign property, as a percentage of corporate profits, is the largest in the world. However, all such payments are transfers of profit generated in production, which appear fetishized as payments for a 'service' provided by owners of property, interest and rent. On the same basis they are seen as a cost to the purchaser, an expense or a trading income. Therefore we have to disentangle these transfers from the mystified treatment they obtain in both company and national accounts.

First we have to deal with interest and rate payments and receipts by private individuals. The personal sector accounts, we recall, treat all consumers as equivalent. But in fact most consumers live off wages, and a smaller number off property income. The property-owners receive either rent or interest on debt. In short, they receive distributed

profits. Everyone else *pays* interest and rent, a fact which vanishes from the accounts. The commercial banks and above all the building societies (mortgage companies) borrow from people with money and lend to people with debts. They charge interest – a financial tax – on debtors, take a cut and pass the rest on to the lenders.

Payments of interest by the personal sector, the vast bulk of it mortgage interest payments, are therefore a missing element of gross profit. This is an extra element of surplus value which derives solely from usury. Although received by wage-earners in money form, they never receive a value equivalent for it. We use the term secondary exploitation for this.[6]

The personal sector accounts record net interest receipts, which means that the interest paid by the debt-ridden members of the public is written off against the interest received by the rest. This income should be deducted from the gross income of the wage-earners. It is not a payment in return for value. Rent, the third of Marx's 'Holy Trinity', is more complex. In the United Kingdom it is now almost exclusively a charge on building land. Rent on farming land in 1980 amounted to £122 million, around 0.02 per cent of total rent.

Most of the remainder (around 70 per cent) consists of rent on housing land, and in 1980 over 50 per cent of this was owned by municipal authorities. This is in sharp decline, however, because of the Conservative Government policy of forcing authorities to sell their houses. Rent represents around 10 per cent of average household expenditure according to the national accounts and, like interest, it is in reality derived from surplus value, but is presented in the accounts as an income deriving from the ownership of land. Rent figures directly as a factor share of income in the United Kingdom accounts, and so we treat it as a component of profit. This leads to two problems: how to deal with imputed rents, and what interpretation to give to the rent payments of wage-earners.

First, the accounts record a fictitious or imputed rent for house-owners. This is supposed to represent the value that they receive from owning a house.[7] The argument behind this is not wholly specious. As tenants buy their homes, there will be an apparent fall in national income because rental income will drop whereas ownership as such does not generate income. However, there has been no decline in actual economic activity, and so it is argued that the figures have to be corrected.

The problem in our view is that rent payments should not be treated as payment for an economic activity in the first place. Rent is transferred property income, not a payment for value received. When people buy a home they used to rent they do not just became richer by

one home: they also become poorer by one mortgage. Interest payments, a form of transferred property income, replace rent payments, another transferred property income.

A second argument is that durable goods, such as houses, are not consumed with purchase; they transfer value to a consumer over time. But a 'market rent' bears no relation to the cost of housing; imputing confuses the genuine cost of house construction and maintenance with ground rent. Moreover, with imputed rent a new owner is awarded the same value once for buying the house and once for living in it.[8] If we did include imputed rent in income, we should also exclude any capital formation by wage-earners.

We therefore treat imputed rent as a wholly fictitious element of GDP and discard it from gross profits and hence from annually produced new value. However, we must also deal with real money (i.e. non-imputed) rent payments. The ground rent component is redistributed profit which figures nowhere else in the accounts and should be deducted from wages and added into profits. But part of the rent receipts in the national accounts does represent a payment for real value – the value of housing consumed by tenants. Hence, ideally, we should estimate the true cost of wage-earners' housing and add it back onto their gross income.

This can be done for municipal housing because the accounts record separately the rent payments of tenants and the council's housing expenditure, which can be taken as an accurate measure of the value of housing services received by tenants. For the private sector this procedure was beyond our means. Therefore no adjustment was made to gross labour income for the ground rent element of rent on dwellings.

5.6 THE STATE

We now come to the most substantive part of our calculation, namely the net tax calculation. Our aim is to estimate the transfer of value between wage-earners and property-owners resulting from the activity of the state. This is equal to the difference between what each class pays to the state in taxes and the value it receives in services and revenues. Following Shaikh (1984) and Tonak (1987), we term this difference, which is a measure of the effect of the state on exploitation, 'net tax'.

All state expenditure on final demand is allocated to one or other of these classes. In particular, this means making a distinction between that part of state expenditure which contributes to the reproduction of the labour force, wage-earners, and that part which contributes to the

reproduction of capital and capitalists, property-owners. These adjustments give an estimate of income of wage-earners and income of capital which takes into account the redistributive effect of the state and which separates the specifically wage-earning component of household income.

The capitalist state engages in transfers of value in its relations to the outside world. It is therefore different from domestic labour, the unpaid production of use-values for direct consumption. It collects taxes in money form and buys commodities including labour power. Those who are educated by the state, nursed by the state, or defended by the state therefore receive exchange value. The state receives no rent in kind, does not requisition or commandeer and makes no calls on labour service except in wartime. This makes it profoundly different from, say, a feudal state. It is not just used or owned by capital, but regulated by it. Its function is regulated by value. It is not external to the market but a distinct circuit of exchange value within it.

But though the state lies on a circuit of value, it is clearly different in some sense from a capitalist enterprise. Its most distinctive economic feature is that it makes no profit – it does not sell its services on the market as a commodity. Though it can change the form of the value at its command, it cannot expand it. This makes it a fundamentally different organism from any profit-making body, and the difference is recognized in the accounts.

Civil servants' wages appear as an item of consumption in the national accounts, as part of expenditure on final demand. The population as a whole is considered to consume the labour of the state employee. No other labour power is treated this way. State workers are also unique in the income-based accounts. Theirs is the only labour income which generates no corresponding profit income. The state's raw material purchases are also unique, being considered part of final demand without being netted out as an intermediate part of the consumption of any other sector.

In our view this corresponds very closely to Marx's concept of unproductive labour, i.e. all labour that does not produce value. Paid unproductive labourers transfer value without creating it. According to Marx (*Theories of Surplus Value*, 1969, vol. 1, pp. 159, 170), they provide those they serve with value equal to their wages. They produce no surplus value, and in fact no new value, but they conserve the value of their wages in the same way as a beast of burden would. Government spending on final demand is therefore a real measure of value received by the targets of this spending.

Moving on to consider state deductions from income, we can classify state revenues under five main headings

1 taxes on income;
2 taxes on expenditure;
3 national insurance contributions;
4 rent receipts of the state;
5 interest receipts of the state.

There is a small additional trading surplus or loss from trading activities not included in the public corporations, which we include in gross profits.

Our approach was to divide all receipts into two portions:

1 taxes paid out of wage income;
2 taxes paid out of property income.

To do this we concentrate on deciding which taxes are deducted from wage-earners. The residual is then the state's receipts from property income. We have already deducted interest payments from workers' income, and state rent income is treated as a levy on wages. The only tax component of government income which falls on labour is income tax, which has to be separated out into taxes on earned income (including taxes on social security benefits) and taxes on property income. The published accounts make this separation and so the allocation of this part of state revenues is relatively simple.

Indirect taxes, which are a large and growing component of state income, present a much more complex problem. Over the period of study, the ratio of direct to indirect taxation on wage-earners has varied by a factor of 500 per cent; any results will therefore be very sensitive to the method chosen to allocate these taxes.

The difficulty is that indirect taxes are added onto the price of retail goods, so that the expenditure measure of GDP differs from the income measure by an amount equal to the total of indirect taxes. We deal with these issues by treating market price as the price of production plus an arbitrary monetary increment which the state can impose as a result of its special position.[9] Consumers who purchase goods at these prices receive less than the value embodied in them. This means that we have to determine the deviation of price from value resulting from this government intervention, and from this determine the deviation of money income from the value income of each class.

There is a voluminous literature on tax incidence. We chose to use the NIA figures on tax incidence, which allocate indirect taxes between final consumption and intermediate demand.[10] The taxes on intermediate demand are treated as a hidden component of profit appropriated by the state before redistribution. Taxes on final

consumption are further divided between taxes on the consumption of workers and taxes on the consumption of property-owners. This means that our final 'market price' correction is in general smaller than that applied by the national accounts. We therefore end up with a figure for total output which lies between the 'factor income' and 'market price' estimates of the national accounts.

As regards state spending, there is no set of ledgers in which we can find the amount of service that each group of consumers has had from the state in the same way that we can ascertain how much tax they have paid. To allocate state spending to one or another class we begin from the specific character of state unproductive labour, accurately described by Rubin (1972, p. 264):

> This labour . . . is organized on the principles of public law, and not in the form of private capitalist enterprises. A postal employee is not a productive worker, but if the post were organized in the form of a private capitalist enterprise which charges money for the delivery of letters and parcels, wage labourers in these enterprises would be productive labourers. (p. 264)

The benefits received from the state are not determined by what taxes have been paid but by the political decisions of the state. They take the form of value, but their method of allocation is a matter of politics, not of the market. We have to determine, by political criteria, which class is the main beneficiaries of each category of spending.

To do this we divide state expenditure and its separation into three broad categories:

1   spending exclusively benefiting property, such as state grants, military spending and also, we argue, spending on the police etc. whose function is the protection of property;
2   spending exclusively benefiting wage-earners, such as unemployment benefit;
3   state spending on the 'public as a whole'; such as health, education and transport; this transfers value to both classes, and we have to establish what proportion goes to which class.

Since this measure is absolutely critical to the estimationof net tax, there is a strong case for trying to estimate it as accurately as possible in future research. One method, suggested by Andrew Glyn, would be to make direct estimates of the proportions of the population living from waged and from property income.

The NIA data on property income is virtually meaningless. We

therefore began from the wage figure after adjustments for imputed rent and interest, and deducted this from a similarly corrected figure for total personal income to derive personal property income. Our calculations are, in fact, less sensitive to changes in labour share than might be imagined. This is because the share is used to derive two quantities which tend to balance out: the labour share of expenditure taxes, and the labour share of benefits to consumers in general. Nevertheless, we feel that it is unwise to draw strong conclusions about the absolute levels of net tax and tax ratio; more important are the conclusions that can be drawn concerning trend and comparison between countries.

Using our allocation of benefits we calculate benefits accruing to labour and benefits accruing to property. The latter, it should be noted, is simply state spending less labour benefits. However, it has to be divided into two components: unproductive consumption and productive consumption. A portion of state expenditure – for example, on research or on roads – represents productive expenses collectively shared by the capitalists and therefore cannot be considered part of surplus value.[12]

When wage and property income have been corrected, this completes the adjustment for the role of the state. This leaves the further corrections for productive and unproductive labour in the sphere of circulation.

5.7 PRODUCTIVE AND UNPRODUCTIVE LABOUR

We have already argued that the national accounts treatment of non-profit-making economic activity is identical with the Marxist concept of unproductive labour and consumption, in so far as it concerns the state. We must now assess which other sectors of the economy the concept applies to, and how it affects the system of accounts.

The term 'unproductive labour', inherited by Marx from Smith, has led to much confusion because it seems to imply a judgement on the social worth of the labour. This vulgar conception has been reinforced by Soviet economic theorists who have incorporated it into the material balance accounting system, where a distinction is made between 'material' production and services which are considered unproductive. This is not a Marxist but a Smithian conception. In *Theories of Surplus Value* Marx criticizes Smith, who argues that labour is productive when it produces a 'vendible object', replying that

the decisive issue is whether a capitalist comes between labourer and the purchaser. Productive labour is labour which produces surplus value for a capitalist. The distinction between productive and unproductive labour draws a line between capitalist production proper and all other forms of economic activity.

In our view this confusion has persisted because unproductive labour occurs in two different situations: on the one hand, from state and direct services which are additional to and even outside the normal circulation of commodiies; and on the other hand at the heart of circulation itself in commercial and financial capital. Therefore a teacher in a private school or a nurse in a private hospital are productive in Marx's sense, just as surely as a building worker employed by the municipal council is not.

But if one rests with the notion 'productive labour = labour hired by a capitalist; unproductive labour = labour hired by the user', then the discussion of the unproductive functions of circulation in *Capital*, vol. II, appears to make no sense. Here, Marx singles out what he terms the 'false costs' of circulaion such as retailing. He argues that workers who perform these functions contribute no new value, but only circulate it. He then makes a well-known but puzzling comment:

> If by a division of labour a function, unproductive in itself although a necessary element of production, is transformed from an incidental occupation of many into the exclusive occupation of a few, into their special business, the nature of this function itself is not changed. (*Capital*, vol. II, p. 134)

Hence merchants, who concern themselves exclusively with circulation, an unproductive function according to Marx, play an unproductive role – even though they are capitalists who hire labour. Marx appears to be saying that this labour is unproductive by virtue of its function, and not the social relations in which it is employed.

The difficulty goes deeper. What happens when a firm replaces its manual bookkeeping system with an automated one? The manual system was classically unproductive: pure labour of circulation. But the automatic system is sold on the market for a profit. Using the criterion of function, the labour of computer-makers is unproductive. Using the criterion of form, it is productive. The only consistent resolution of this contradiction is to say that the values of the materials consumed in circulation are not transferred to the products they circulate. An accounts computer is pseudo-constant capital, a deduction from surplus value, and not a cost. It is productively produced but unproductively consumed. Marx's distinction between productive and

unproductive function then retains its full force, but so does the definition of productive labour as that which produces a commodity for sale by a capitalist. The same applies to 'business services' such as management consultancy and marketing.

We have arrived at a category of social reproduction which has received little attention: the unproductive consumption of constant capital. Armed with this category we can complete our picture of the circulation of capital by including in it a circuit of unproductive consumption in circulation. This consists of all the expenses of circulation, both material and labour, and should be treated as a portion of surplus value diverted to meet the costs of finance and retailing activities. Consequently, these expenses are equal to the costs of the finance and retail sectors. We now set about estimating this.

5.8 INTEREST RECEIPTS OF THE BANKING SECTOR

Interest results from a secondary claim on a real exchange value. As already pointed out, no value is received in return for an interest payment. It is a tax imposed by bank capital on social capital as a whole, a levy on the use of money capital. In company accounts dividends are always paid out of profits: other interest payments, such as commercial credit, are nearly always treated as a cost. The UK national accounts treat all interest payments, correctly, as an appropriation from profits, and the CSO adjusts company returns when it thinks that interest has been wrongly allocated.

This has a peculiar effect on banking sector profits, however, as the interest receipts of the banking sector are not treated as the sale of a product and do not figure in its trading profit. The accounts therefore distinguish the banks' trading profits, which are negative, from their non-trading income, which is the difference between their interest receipts and payments. The CSO (S&M 7.62) argues that interest payments should not be considered part of GDP, i.e. they are not considered as adding value to any product.

This is commendably scientific but is inconsistent with the treatment of the state. While the accounts correctly recognize the costs of the banking sector as unproductive, they fail to recognize them as a component of final demand. Gross trading profits are reduced by the trading losses of the banks. In 1986, for example, the financial sector accounts record gross non-trading income from all sources of £46,473 billion. Yet the sector's contribution to the 'gross profits of the

company sector' was a loss of £6,687 billion. This endearingly self-effacing gesture understates gross profits by 10–15 per cent.

The only consistent solution is to place the entire costs of the banking system into expenditure on final demand. We have to go further, however, as we wish to correct not just for the interest receipts of the banking system but also for its trading receipts which, as labour of circulation, are unproductive even if they are appropriated through genuine trade.

This implies two adjustments. First, we have to correct for the underestimation of gross profits by adding the unproductive costs of the banking sector. Second, since factor incomes must equal expenditure on final demand, we must create an extra item of expenditure on final demand, the unproductive financial expenditure of the corporate sector. These costs are difficult to estimate, however, because the accounts, which do not record intermediate inputs, cannot tell us the capital consumption of the banks. Because of the importance of this figure, we estimated it using input–output tables to derive a capital–labour consumption ratio for the banking sector, inter-polating figures for years when tables were not published.

This brings us to our final and not uncontroversial correction for the activities of the commercial sector: retailing or selling, which we treat as unproductive, following Marx's argument that all activities which merely exchange titles to goods – 'pure' circulation – cannot add to their value. Retailers' or merchants' profit is a deduction from industrial profit which takes place through the equalization of the rate of profit.

This is difficult to establish, however, because in the circulation of commodities we do not find pseudo-exchange; goods are bought and goods are sold, money passes one way and value passes the other, setting aside straight fraud. It is even more difficult to estimate because the activities of circulation are always tied up with activities which add real value.

We spent some time trying to codify the Standard Industrial Classification activity groups as productive or unproductive or requiring a ratio to be applied estimating the proportion of productive and unproductive labourers. These ratios are difficult to calculate using the detailed occupational breakdowns of the labour force, however, and so in the time available we simply made a broad correction for the retail sector as such. Regular annual surveys of the retail sector produce figures for gross margin, i.e. the difference between sales and goods not consumed by the retailers. This gross margin represents costs plus profits, and so we can derive the unproductive costs of the retail sector by deducting the factor income from the

profits given in the value-added accounts for this sector. This will overestimate the quantity of unproductive labour in the retail sector and underestimate it everywhere else. Like the financial sector correction, therefore, this correction should be treated with caution.

Having discussed the adjustments made to the national accounts we now turn to the outcome of the procedure and analyse the estimates of the value categories.

5.9 RESULTS OF THE ADJUSTMENTS

Our results have been computed, for completeness, from 1946 through to 1987. The pre-1950 results, however, should be treated with caution, firstly because the statistics for state expenditure are sparse, and secondly because a systematic evaluation of capital stock and depreciation was undertaken only in 1955 (see Redfern, 1955) and published regularly only from 1956 onwards.

Figure 5.1 shows the values between 1946 and 1987 of the rate of exploitation before and after the corrections discussed in the text. For completeness a semi-corrected value is included, where the corrections for rent and interest payments and the state have been made but not those for banks and retailing. Figures 5.2 and 5.3 show the corrected and uncorrected values of the organic composition of capital (OCC) and the rate of profit over the same time period.

The most notable feature is that the corrected and uncorrected figures cast a different light on an important disputed issue in both Marxist and non-Marxist economics: what is the underlying cause of the long-term fall in the observed profit rate since the early 1960s? It is widely held that the rising share of wages in output is the chief cause. However, as figures 5.1 and 5.3 show, while this may be consistent with the uncorrected statistics, the corrected ones show a secular rising trend in the rate of surplus value from 1952 onwards, in particular for two long periods: 1955–73, and again from 1980 till the present. A rising rate of surplus value is therefore associated with a falling rate of profit (figure 5.3) for most of the period under study, with the reason being the rise in the organic composition of capital (figure 5.2). Comparing the late 1950s, when profits peaked, with the late 1970s, their lowest point, we find that a 25 per cent rise in the rate of exploitation has accompanied a 25 per cent fall in the rate of profit.

Figures 5.4 and 5.5 show the effect of the state on waged income from 1951 to 1987. Figure 5.4 shows the proportion of the tax burden which wage-earners have to bear, the proportion of benefits they receive and the ratio between the two, a quantity Tonak (1987) terms
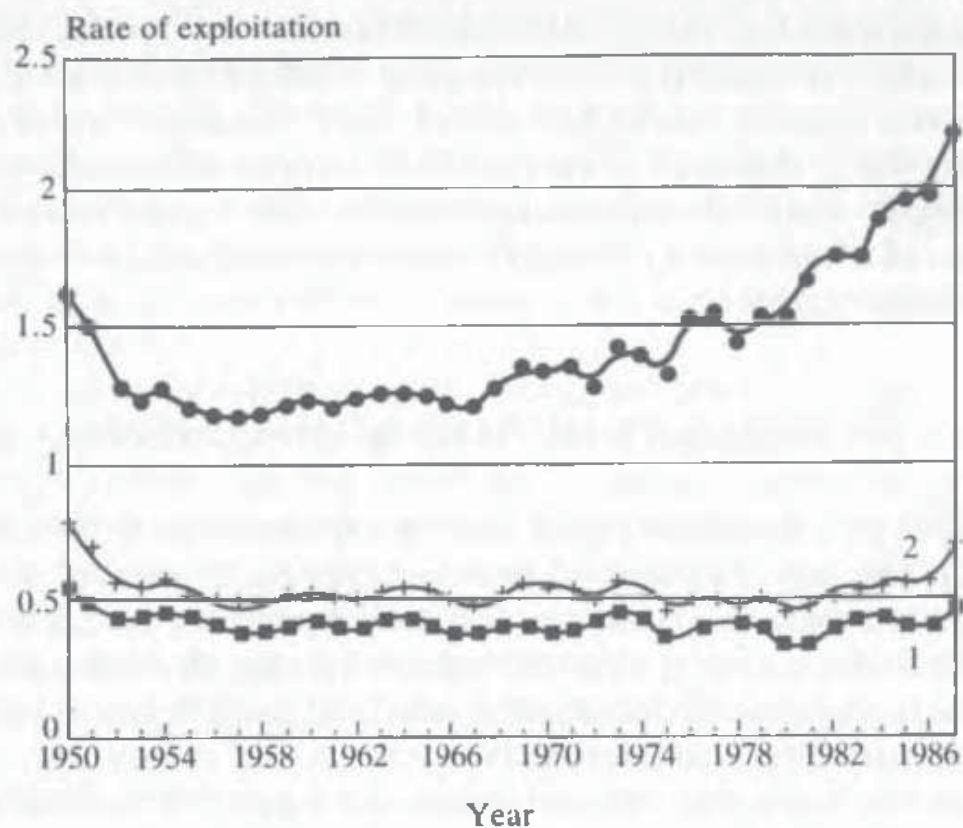
Figure 5.1 Rate of exploitation (corrected and uncorrected estimates): curve 1, NIA profits/wages; curve 2, corrected for taxes and benefits; curve 3 corrected for unproductive labour.
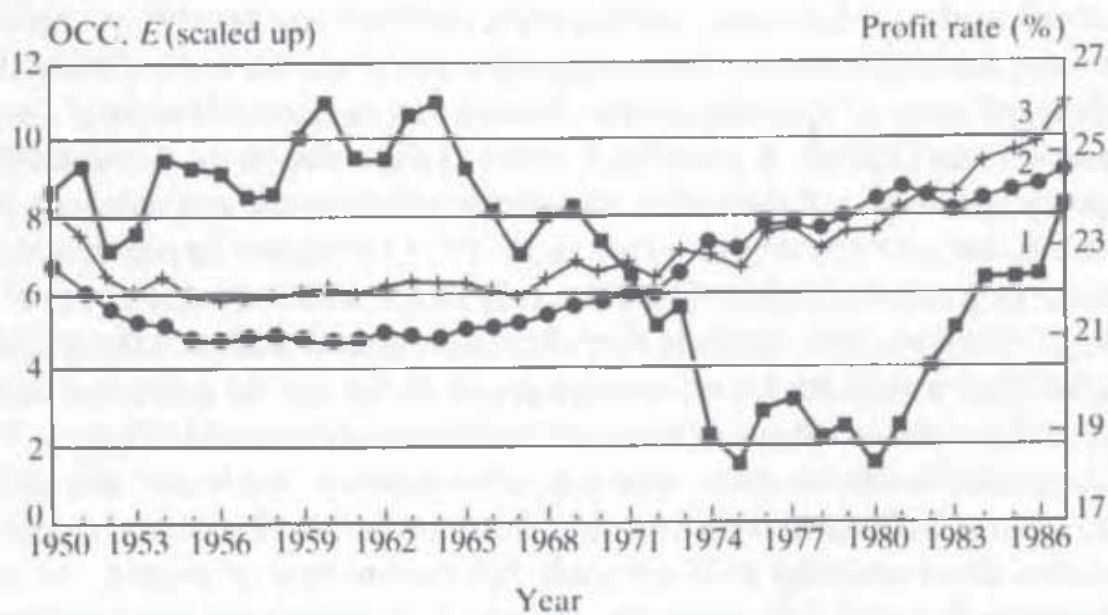

Figure 5.2 Corrected profit rate (curve 1). Organic Composition of Capital–OCC (curve 2) and Exploitation ($E = S/V$)(curve 3). The rate of exploitation E is scaled up by a factor of 5.
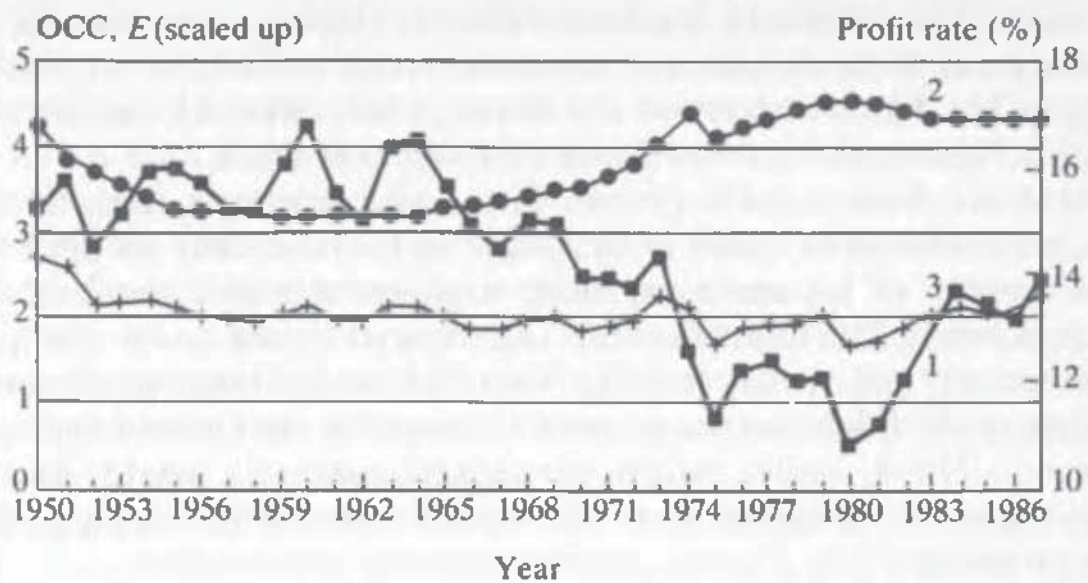
Figure 5.3 Uncorrected profit (curve 1), Organic Composition of Capital–OCC (curve 2) and Exploitation (E = S/V) (curve 3). The rate of exploitation E is scaled up by a factor of 5.
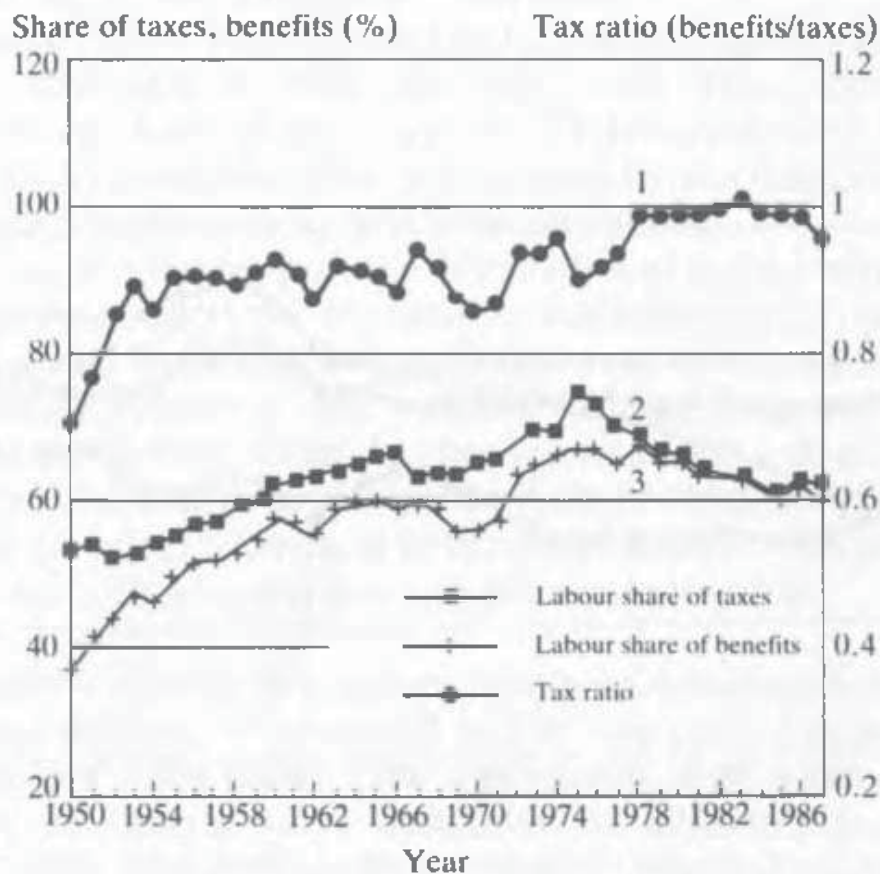

Figure 5.4 Tax ratio (curve 1) and labour share of taxes (curve 2) and benefits (curve 3).

the 'tax ratio' and which illustrates whether there is a net transfer of income away from or towards wage-earners as a result of the state's activity. The figure also shows the share of taxes in total output, and figure 5.5 shows the ratio of direct to indirect taxation.

There are three notable points. First, with one exception the tax ratio has always been below unity, implying that there has always been a net transfer of income away from wage-earners as a result of the state's activity. The high tax ratios of recent times are due to the high social security payments resulting from high unemployment. Second, the figures shed light on the economic impact of the Labour Government of 1974–9, under which the 'social contract' would, it was argued, provide wage-earners with social benefits in exchange for wage restraint.

The figures do in fact suggest that some gains were made in benefits after 1976, although most of this is accounted for by rising social security payments. However, as figure 5.4 shows, rises in the tax burden in that period fell almost exclusively on wage-earners, raising the proportion of taxes met from wages to its highest post-war level. In addition, as figure 5.5 shows, the bulk of this was raised by taxes on income. The ratio of income tax to expenditure tax rose by nearly 50 per cent between 1973 and 1976, an extraordinarily sharp increase.
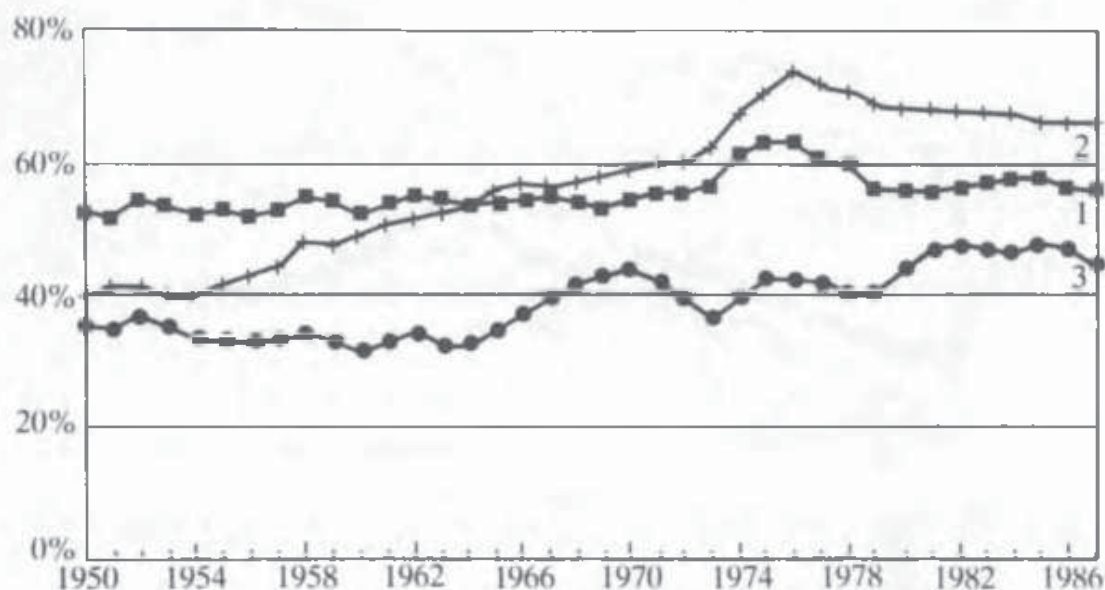

Figure 5.5   Direct and indirect tax. Income/expenditure tax,
whole population (curve 1). Income/expenditure tax, wage-earners
only (curve 2). Tax as a proportion of net output (curve 3).

The two great peaks of income taxation were the two periods of Labour government. The Conservative Government, contrary to its claims, has not reduced the general burden of taxation but has begun to shift it back from direct to indirect taxation, interestingly enough reducing the share of taxation borne by wage-earners, mainly by reducing the burden on high wage-earners. Thus Labour Governments financed a moderate social programme primarily by taxing *wage* incomes, a fact which explains both the winter of discontent and the broad perception of Labour as a 'high tax' party. The figures show very clearly that they effected no substantial transfer of income from property-owners to wage-earners.

As a final illustration of what can be achieved by this approach, table 5.1 presents an augmented schema of reproduction for the UK economy for the year 1984, the last year for which input–output data are available. This demonstrates the reproduction and circulation of value in the UK economy.

The schema supplements Marx's as follows.

1   An extra department, department 3, has been added to represent the costs of circulation. This is subdivided into retailing and finance. No surplus value is produced in this department and its output is entirely consumed in circulation.
2   Departments 2a (wage goods) and 2b (luxury goods) have both been subdivided to show state production which, like that of department 3, generates no surplus. Thus the output of 2a, state services to wage labourers, is consumed by workers in the form of state services such as education and health.
3   Four extra columns show the distribution of surplus between the main class fractions of capital: manufacturing, commerce, finance and landlords. The landlords' costs have not been shown separately because of lack of data. Reading down any column shows the form in which the class fraction consumes its share of surplus. Reading across shows the form in which the produce of any department is allocated to the class fractions. This allocation includes both personal and corporate consumption.

For simplicity imports and exports have been subsumed into the table by treating the 'rest of the world' as if it were part of department 1.

Overall, we have shown that with care it is possible to provide measures of Marx's value categories by adjusting the national accounts data. When estimates are made we have to be careful not to introduce bias or idiosyncrasies, or at least to understand how they are likely to affect the results. It is clear that using such an approach

Table 5.1 Reproduction scheme

Means of production	Constant capital: Total C (=C_f+C_c)	Fixed C_f	Circ C_c	Variable capital: V (=V_p+V_s)	Private V_p	State V_s	S	Output $C+V+S$	Surplus: $D1,2$ (S_m)	$D3c$ (S_c)	$D3f$ (S_f)	Rent (S_r)	Total	Replacement $(C+V)$
D1	423,218	19,458	403,760	75,819	59,923	15,896	139,629	638,665	9,119	2,036	5,184		16,339	622,326
Wage goods														
D2ap	96,744	4,448	92,296	12,721	10,054	2,667	23,427	132,891						132,891
D2as	14,766	3,869	10,897	20,486	16,191	4,395		35,251						35,251
Luxury goods														
D2bp	26,809	1,233	25,577	3,525	2,786	739	6,492	36,827	17,192	9,106	6,370	4,158	36,827	0
D2bs	14,506	3,801	10,705	20,126	15,907	4,219		34,633	16,168	8,563	5,991	3,911	34,633	0
Labour of circulation														
D3c	29,371	2,478	26,893	24,905	19,684	5,221		54,276	40,010	7,256	5,178	1,832	54,276	0
D3f	16,911	3,400	13,511	10,561	8,347	2,214		27,472	20,252	3,673	2,621	927	27,472	0
Total	622,326	38,686	583,640	168,143	132,891	35,251	169,547	960,016	102,741	30,633	25,344	10,828	169,547	790,469

produces data which can tell a very different story from the unadjusted price data. Future work will be able to refine procedure to create a Marxist set of value accounts with which to develop quantitative Marxism. It is also possible, using common procedures, to produce accounts for different countries which will allow comparative analyses to be made.

NOTES

This paper was the fruit of a collective research effort whose initial aim was to reproduce, in Europe, work done by Anwar Shaikh and Ertugrul B. Tonak on the social wage in the United States. Contributors included Paolo Giussani (Italy), Peter Bartelsheimer and Harald Wolf (FRG), Sungur Savran (Turkey), and Guido Herman (Belgium). Work on this project was supported by the Hamburg Institute for Social Research. Information on this project, more details on the procedures described in the paper, and the adjusted data are available from the author.

Throughout this text the UK National Income Accounts (HMSO, London) are called the NIAs or 'the accounts'. The Central Statistical Office which collates the statistics is called the CSO; and the main sourcebook describing the way that the UK National Accounts are prepared (*United Kingdom National Accounts: Sources and Methods*, London, 1985) is abbreviated to S&M.

1 The principal exception is the 'market price adjustment' for indirect prices. The fact that the statisticians have to make these distinctions points to the practical need for a value–price distinction. Input–output statistics also acknowledge the problem: 'transactions in the input–output tables are valued at producers' prices, as distinct from purchasers' prices. The difference between the two represents distribution margins and taxes which are added to the price of goods in getting them from the production unit to the purchaser.' (*Input–Output tables for the UK 1984*, CSO, p. 10).

2 Input-output tables, which for the British accounts are produced only every few years or so, give intermediate output and consumption. A halfway house appears as the 'commodity flow accounts' which used to be published along with the national income statistics as 'production accounts'. These show intermediate outputs but not intermediate inputs.

3 Throughout this chapter we make no attempt to correct for skilled or complex labour. In any complete analysis, above all in inter country comparisons, this would have to be done. Also, the total price of final demand may diverge from total annual new value because final demand is only a portion of total circulation, but only in so far as value is transferred by price movements from one period's production to another.

4 An even greater potential problem arises from unequal exchange in foreign trade, which we have not treated in this chapter.

5   If space permitted we would have tried to divide the income of the self-employed between wages and profits. The present interim solution follows Tonak's method.

6   We are indebted to P. Bartelsheimer for the term 'secondary exploitation'. The term may seem to contradict Marx's insistence that exploitation is confined to the sphere of production. Strictly speaking the problem is that the accounts do not correctly record the real value received by workers through the process of circulation: the process of circulation does not itself produce the exploitation.

7   They are considered to pay this rent as to themselves, although their rent receipts are not treated as business income as in the United States, but figure directly in the accounts aggregates in the figure for income from rent. See S&M Appendix, p. 247.

8   Underlying this is a fundamental choice in the treatment of wage-earners' income. The national accounts record a capital account for the entire personal sector, in line with the view that all property is capital and all 'citizens' participate without meaningful distinction in property ownership and wage income. We do not consider wage-earners as capital owners, because for us capital is not simply long-lived property, but property which is used to acquire new value – to exploit labour. Therefore we allocate income to wage-earners at the time of purchase, because their consumption of durable goods lies outside the sphere of the circulation of capital – unlike the consumption of productive goods. The only consistent alternative would be to use disposable personal income as the starting point for income calculations, instead of factor shares of wages.

9   We are indebted to Ernest Mandel for this suggestion.

10 This choice was influenced by the fact that the raw sources of the NIA statistics are tax returns in which taxes on intermediate consumption are correctly recorded separately. From 1976 these are published separately.

11 Strictly speaking it is a proxy for the share of private personal consumption generated by income from wages. Most people have *some* income deriving from property, even if only a few pence interest on a post office savings book. Conversely a substantial amount of profit income is distributed on a 'wage' basis – for example, director's salaries, which are really just a disbursement from profits and are even treated differently by the tax authorities. However, it is a myth to portray this situation as if there were an even distribution of wage and property income throughout the population. There is a very clear division between a large majority of people who have to work in order to live, and a small minority whose only work involves control of assets whose management they could, if they so desired, happily delegate to someone else, and which generate at least sufficient income to support them.

12 There has been considerable discussion on this among German statisticians: See Hake (1972), Grüske (1978) and Hanusch et al (1982).

6

Challenging Stock Market Efficiency
JERRY COAKLEY

6.1 INTRODUCTION

In contemporary mainstream economics Adam Smith's invisible hand has been staging a remarkable comeback. Nowhere is this more evident than in the literature on financial markets where the recovery originated some three decades ago. Here the testable version of the invisible hand has come to be known as the efficient markets hypothesis (EMH) or the stock market rationality hypothesis. The general failure to reject this hypothesis in repeated tests since the 1960s has inspired renewed faith in the ability of the market mechanism to price financial assets correctly and thereby ensure their efficient allocation economy-wide. Jensen et al. (1978) have echoed the sentiments of many mainstream economists by describing the EMH as one of the best established facts in economics. Some big names, including non-economists, have made important contributions to the efficient markets debate. They include the statistician Kendall (1953), the mathematician of fractals fame, Mandelbrot (1963), and Samuelson (1965). Less well-known individuals have also contributed. The first acknowledged input to the debate came from the French physicist Louis Bachelier in his Ph.D. thesis in 1900. As we shall see presently, Harry V. Roberts' unpublished seminar paper (Roberts, 1967) is the quoted source of the current classification of efficient markets.

In its simplest form the EMH states that financial asset prices embody all available information, including predictions about the future. This means that price changes between one period and the next can reflect only new unpredictable information. Thus asset price changes are seen as unpredictable or random. If they were not random, traders could take advantage of their systematic component

to make risk-free excess profits. The process of buying cheap and selling dear is known as arbitrage, and it serves as an equilbrating mechanism in removing the discrepancy between actual and fundamental prices.

The influence of the EMH is felt at both the theoretical and policy levels. In terms of theory it has become pervasive in the mainstream literature not just on stock markets but also on other financial and commodity markets. Moreover it forms one of the cornerstones of the financial sector of open economy macromodels. This is not widely recognized, for the EMH or its implications are frequently hidden in the underlying assumptions of models. Finally, developments in statistical theory such as unit root and variance ratio tests have in recent years been applied to stock market data series.

In the financial sector of international macromodels the EMH appears in the guise of of some form of an interest parity condition.[1] Equally, in the burgeoning literature on theories of the exchange rate the joint efficiency of both the money and the forward exchange markets is a feature of modern asset models of the exchange rate.[2] The EMH also implies the absence of arbitrage or risk-free excess profit opportunities, and in this context the EMH forms the basis of the huge literature on option pricing models.[3] Finally, the EMH plays a central role in the current debate on the term structure of interest rates.[4] Its policy attractiveness is based on the fact that intuitively it can account for some of the perversities of contemporary financial markets. A company's profits rise but its share price falls because the rise in profits was below market expectations. The EMH explains this by relating share price movements to unexpected events.

The logic behind this intuitive appeal is attractive to policy-makers in an epoch when financial asset price movements have been quite volatile. Most significantly perhaps the EMH has provided theoretical support in the 1980s for the advocates of deregulation and *laissez-faire* in financial markets. Since the hypothesis entails the rapid adjustment of asset prices to the latest information, financial markets have come to be seen as the epitome of the responsive market mechanism. Moreover, the fact that the EMH rules out excess profit opportunities makes financial markets appear not only efficient but also fair.

Since the late 1970s a small trickle of dissenting voices on the EMH has emerged largely from the ranks of Keynesian economists. The crash of 1987 has further bolstered the case of the dissenters and has induced scepticism about the naive version of the EMH even among some of its most ardent advocates.[5] In an era where faith in the market mechanism has reigned supreme and anti-statism has been fostered, the EMH has played a crucial ideological role. It implies that the

invisible hand is alive and kicking in financial and commodities markets, and thus goverr ents should leave well alone and not interfere. This has doveta ed into the ideology of the market as a panacea for the problems xperienced under modern capitalism.

To date the Left has largely ignored the debate on efficient markets. This is partly due to the general neglect of financial markets by the Left and its erstwhile reluctance to engage in econometric debate. The purpose of this chapter is to present a selective review of econometric and statistical critiques of the EMH as applied to the stock market. Thus it will have to neglect the literature on stock market anomalies (such as the January effect) and tests of the EMH in relation to the foreign exchange, bond, options, futures and commodities markets. The distinctive feature of this review is that it brings together for the first time a range of approaches critical of the efficiency of stock markets.

Although none of these critiques is advanced from a specifically Marxian perspective, it will be argued that in many respects they formalize Marxian, Keynesian and common-sense objections to the EMH. They are also consistent with both Marxian and post-Keynesian approaches to financial markets generally by their common emphasis on the instability and other shortcomings of such markets, their tendency towards periodic crisis and the role of both market power and speculation in affecting price changes.

In the first part of this chapter the different versions of the EMH are set out and their links to rational expectations are clarified. In the second part the critiques of the EMH are summarized and evaluated. Finally, some conclusions are drawn which link the debate to a Marxian perspective.

6.2 TESTING THE EFFICIENT MARKETS HYPOTHESIS

The EMH states that securities prices reflect the expected present value of future income streams and thus embody all available information in financial markets. That is, they reflect fundamental values as determined by the market mechanism of supply and demand. Any deviation from market fundamentals would present risk-free excess profit opportunities to arbitrageurs and would thereby be rapidly eliminated. The collective action of arbitrageurs serves swiftly to nudge prices back towards their equilibrium levels.

The arbitrage process has an intuitive and apparently logical appeal. For why should not profit-maximizing traders take advantage of

excess profit opportunities? One answer is that excess profit opportunities may not be readily apparent to such traders for a variety of reasons, some of which we return to later. For example one reason is based on the concept of noise trading which Black (1986) has elaborated. Briefly, the concept of noise in financial markets is employed in the sense of a large number of small unrelated events acting as a causal factor. Noise encourages trade in financial assets but at the same time can cause financial markets to be inefficient. On average, noise traders can expect to lose money since they conflate noise with information. In this respect noise and information are polar opposites.

Another problem with the notion of arbitrage is that it implicitly assumes a perfectly competitive framework in which no individual trader or group of traders can influence prices. This assumption has to be questionable in an era when a select group of conglomerates and arbitrageurs is beginning to dominate global financial markets. Finally, as Ross (1987) has argued, the basis for arbitrage in securities is the existence of perfect substitutes. At the international level this translates into perfect asset substitutability or uncovered interest parity. This introduces an element of circular reasoning into the basis for arbitrage at the international level.

In the arbitrage process the definition of information or, more normally, the information set plays a central role and forms the basis of the taxonomy of efficiency. Three forms of efficiency are distinguished according to the contents of the information set I_t at period t:

1   weak-form efficiency where information on past prices is included in the information set I_t;
2   semi-strong efficiency where I_t comprises all publicly available information;
3   strong-form efficiency where both private (insider) and public information are included.

The early literature on the EMH focused on weak-form efficiency. The attraction of the latter was that it had a readily testable implication – namely that security prices followed a random walk or that successive price changes were independent of one another. A large body of evidence appeared to support weak-form efficiency as reported by, for example, Fama (1970, 1976). At the other end of the spectrum, evidence was also adduced to support strong-form efficiency before the recent prosecutions of insider trading in the United States.

In this chapter we focus largely on the semi-strong form of efficiency since it is the form which most nearly corresponds to rational expectations.[6] Although the EMH and rational expectations literatures have different provenances and traditions, we argue here that the two have been converging in recent years. This is the approach adopted by Begg (1982), Sheffrin (1983) and Pesaran (1988a), rather than that followed by Minford and Peel (1983).

The EMH emerged in the late 1950s and early 1960s as an empirical observation. Security prices appeared to follow a random walk but the possible theoretical reasons for this were, at the time, unclear. The seminal papers by Mandelbrot (1963) and Samuelson (1965) provided the theoretical underpinning of martingale processes (see below). Since the late 1970s the theoretical framework for the EMH has been bolstered by insights and techniques garnered from the rational expectations literature and, more recently, from statistical and econometric advances, especially in the time series literature.

These developments present serious difficulties for any review of the literature. Many of the current issues pertaining to the EMH debate are of a highly technical and, at times, esoteric nature. This renders it difficult to present an accessible account of them within the space constraints of a chapter. Another difficulty is the problem of providing an interim evaluation of a literature which appears to be developing so rapidly and where authors are revising their previously published views.

The final and most general difficulty is that the notion of econometric tests of a theory in itself problematical. The traditional framework used in testing the EMH is the Neyman–Pearson statistical procedure which is controversial even within statistics. This procedure raises three questions. How do we formalize the null hypothesis of the EMH so that we can test it? How do we construct the test statistics which measure the deviations of the data from the predictions of the EMH? How powerful are these tests? In other words what is the probability of rejecting the null hypothesis when it is false?

As we shall see below tests of the EMH (and also tests of rational expectations) are beset by problems at each stage of the testing procedure. Consider for example the formulation of the null hypothesis for the EMH. This may appear to be a straightforward task but it is plagued by the problem of testing of joint hypotheses. Here the basic problem is that the specification of the null hypothesis of market efficiency requires the formulation of auxiliary assumptions and this poses problems of the interpretation of rejections of the null.

The minimal joint hypothesis underlying tests of the EMH includes the following.

1   The hypothesis of market clearing or an equilibrium market
    model. Here the two most popular candidates are the expected
    return or fair game and martingale models which are set out in
    equations (6.1) and (6.2) respectively:[7]

$$E(R_{t+1}|I_t) = R_t = r \qquad (6.1)$$

$$E(R_{t+1}|I_t) > 0 \qquad (6.2)$$

Equation (6.1) assumes that real expected returns are equal to a
constant r whilst the martingale assumes that they are positive. In
practice these models are often combined; expected returns are
assumed to be both constant and positive.

2   The rational expectations hypothesis or the efficiency of prices.
    The constant expected returns model implies that the price P_t of a
    security, is the present value of its expected future price and of its
    expected dividends or income D_t:

$$P = b[E(P_{t+1}|I_t) + E(D_t|I_t)] \qquad (6.3)$$

where P_t is a real share price, $b = (1+r)^{-1}$ represents the
discount factor, r is the constant real expected return and D_{t+1} is
the real dividend paid at the beginning of period $t+1$.
Henceforth all variables will be assumed to be real unless
otherwise specified. This equation could be rigorously derived
for the case of the risk-neutral agent who maximizes expected
utility of terminal wealth. For this we would require the
simplifying assumption that the marginal rate of substitution
between consumption this period and next period is equal to
unity.

Equation (6.3) is a simple first-order linear rational expectations
equation which can be recursively solved forward to yield

$$P_t = \sum_{k=0}^{n} b^k E(D_{t+k}) + b^n E(P_{t+n}) \qquad (6.4)$$

For equation (6.4) to have a unique stable solution we need to invoke
a transversality or terminal condition which ties down the
solution:

$$\lim_{t \to \infty} b^n E(P_{t+n}) = 0 \qquad (6.5)$$

If (5) holds, the solution does not explode or bubbles are ruled out and
the unique stable solution is

$$P_t = P_t^* = \sum_{k=1}^{\infty} b^k \, E(D_{t+k}) \tag{6.6}$$

where P^* represents the market fundamentals price of a security as the present value of the rational expectation or optimal forecast of its future income stream. Even then, as Pesaran (1988a) has pointed out, these models do not always yield a unique stable solution. In particular, we run into identification problems if we assume that securities prices follow a second- or higher-order autoregressive process. We return to this issue when we deal with the bubbles literature.

6.3 CHALLENGES TO THE EFFICIENT MARKETS HYPOTHESIS

At least three diferent means of criticizing the EMH can be envisaged. First, we could question the theoretical underpinnings of the major concepts associated with the EMH. Foremost among these would be the concepts of arbitrage and rational expectations. We have already pointed towards some of the weaknesses of the arbitrage concept and the reader could consult Pesaran (1988a) for a suitably sceptical account of rational expectations. Second, we could criticize the empiricist bias of all quantitative evidence favouring the EMH. Finally, ee could provide a critical evaluation of the existing econometric challenges to the EMH and examine whether their implications are consistent with a Marxian perspective.

The problem with the second approach is that it cedes the technical and quantitative ground to orthodoxy. This is despite the fact that the results of a substantial part of the recent econometric literature are not at all favourable towards the EMH. The third approach is adopted in this chapter.

Broadly speaking we can distinguish five major challenges to the EMH.

1 Low statistical power of regression tests. Regression tests look for predictability, given some information set. In other words the deviation of the present value of future dividends from the current share price should be independent of, or uncorrelated with, variables currently known. This critique suggests that these tests have little ability to distinguish between the null of market efficiency and plausible alternatives.

2   Excess volatility. This critique has compared variances of share prices and of their determinants and has suggested that share price movements have been more volatile than the EMH implies.

3   Mean reversion. This suggests that share prices tend to display positive serial correlation over the short run and negative serial correlation over the longer run as prices tend to return to their long-run mean equilibrium values.

4   Speculative bubbles. The basic idea here is that share price movements are not only influenced by fundamentals but also by non-fundamental factors which are described as bubbles.

5   Chaos models. This is a relatively new approach which implies that apparently random behaviour of share prices (amongst other economic variables) can be explained by deterministic non-linear difference equation models which are characterized by chaotic dynamics.

These five challenges are not completely separate, as will be become clear below. Each approach is now examined in turn.

6.4 LOW STATISTICAL POWER OF REGRESSION TESTS

One of the most telling critiques of the EMH in recent years has come from Summers (1986). At its simplest his methodological critique is that most econometric tests of the EMH have very low statistical power. In one brief paper Summers has managed to call into question a vast body of literature which had failed to reject the null hypothesis of market efficiency.[8]

Summers emphasizes the fact that failure to reject the null of market efficiency does not *per se* prove its validity, especially when tests fail to discriminate between the null and other formulations. He posits the alternative hypothesis that the price P_t of a security, has a persistent transitory element which can be represented by a first-order auto-regressive error term. The latter could be rationalized in terms of Keynes's notion of animal spirits or as an over-reaction to new information.

Now the weak form of market efficiency can be tested by checking the null hypothesis that the autocorrelation function of excess returns $R_t - r$, where the latter is constant, is zero. The problem here as demonstrated by Summers is that the data lack the power to reject the hypothesis of market efficiency even if we assumed deviations of as

much as 30 per cent from rational expectations prices. Using plausible assumptions about the values of the variances, Summers calculated that we would require over 5000 years of monthly data to have a 50 per cent chance of rejecting the null in this case.

What about the case of semi-strong efficiency? The issue here is whether excess returns are sufficiently large to be detectable. Summers' results indicate that, under plausible assumptions, there is a 50 per cent chance that the null of market efficiency would not be rejected at the 5 per cent level with an autocorrelation of $\alpha = 0.98$. In other words semi-strong-form tests perform no better than weak-form tests. Summers concludes that inefficiencies of the type highlighted in his paper are unlikely to be detected using standard tests. The weakness in the arbitrage concept is, he argues, that it does not explain how arbitrageurs become aware of excess profit opportunities. Noise makes the exploitation of valuation errors a risky activity. Summers' critique lends support to the Left's traditional scepticism about the use of quantitative methods in testing hypotheses. However, it is to the Left's disadvantage if it ignores such criticisms. Summers' critique of the low statistical power of tests employs a model which is similar to that used in the mean reversion critique, as we shall see below.

6.5 EXCESS VOLATILITY

This critique of the EMH is associated with the name of Robert Shiller and the series of papers that he has published since 1979.[9] The basic idea underlying his critique is that the movements in stock price indices appear to be too volatile to be attributed solely to objective new information on changes in fundamentals. A very obvious point is that stock markets fluctuate violently. Although these movements may be random, as predicted by the EMH, it is implausible that the fundamentals that are supposed to determine these prices whizz about so much. Shiller formalized and tested this idea by means of variance bounds tests.

The implication of excess volatility in financial markets is consistent with several critical views of financial markets. Among these we could cite Keynes's (1936) view of financial markets as casinos and Marx's theory of financial crisis based on excess speculation. In this context we could view a financial crisis as a particularly sharp instance of instability. Modern counterparts can be found in Minsky's (1978) financial instability hypothesis, Strange's (1986) concept of casino capitalism and Dornbusch's (1976) overshooting theory even if the latter is applied to the exchange rate.

The difficulty with the excess volatility approach is in measuring 'fundamentals', but the theory says that these are the present value of future dividends which *ex post* can be measured. From this it follows that the present share price P_t equals its optimal forecast or rational expectation P_t^* plus a random shock u_t:

$$P_t = P_t^* + u_t \tag{6.7}$$

Forecasts based on conditional expectations have lower variances or are less volatile than actual outcomes as should be clear from the following equation:

$$\operatorname{var}(P_t) = \operatorname{var}(P_t^*) + \operatorname{var}(u_t)$$

or

$$\operatorname{var}(P_t) > \operatorname{var}(P_t^*) \text{ given } \operatorname{var}(u_t) > 0 \tag{6.8}$$

A critical assumption underlying equation (6.8) is that the covariance of (P_t^*, u_t) is zero. The intuitive logic behind equation (6.8) is that the forecast price P^* is a long-run weighted moving average of dividends and moving averages tend to smooth the series averaged. This argument applies equally to long-term bond prices as well as to share prices since both are just optimal forecasts of discounted future income streams.

The excess volatility hypothesis pointed to inefficiencies in the stock market and its results have been widely accepted as evidenced by, for example, Ackley (1983), Mankiw, Romer and Shapiro (1985), Summers (1986) and West (1988a, b). However, they have not been accepted universally.

Two criticisms of the excess volatility approach have been advanced. The first and less serious concerned small-sample bias (e.g. Flavin, 1983; LeRoy, 1984; Kleidon, 1986). The second and potentially major criticism of Shiller's approach has centred on his assumption that the underlying data series is stationary (LeRoy and Parke 1987; Kleidon 1988a). The arguments here become quite technical and are continuing still (Kleidon, 1988b; Shiller 1988). We present them here at a fairly basic level.

One of the implications of rational expectations is that economic data series are random walks. In such cases the data are said to be characterized by the presence of a unit root. Since such a data series is stochastically non-stationary, the variance of its forecast error increases without bound as t tends to infinity. Now the prevailing wisdom in recent time series tests is that most macro and financial data series are indeed non-stationary, as first suggested by Nelson and Plosser (1982) and corroborated by Perron (1988) and Stock and Watson (1988). One of the difficulties encountered in this literature is

the statistical problem of testing for non-stationarity.[10] In this context recent work by DeJong et al. (1988) has cast doubt on the case for many financial (and macro) series following a random walk. The debate on the nature of financial time series seems likely to affect all tests of rational expectations and of market efficiency for some time. In any case the implication of non-stationarity in the data for excess volatility is that it reduces the extent of reported volatility only by an order of magnitude. According to West (1988b) Shiller's results still stand, albeit in less dramatic form.

6.6 MEAN REVERSION

This critique of the EMH is associated with the work of De Bondt and Thaler (1985, 1987, 1989), Fama and French (1988) and Poterba and Summers (1988). Here we focus on the contribution of Poterba and Summers since it includes evidence from a range of countries and not just the United States. Mean reversion of stock prices is not a new idea for it can be found in Keynes's *General Theory*. Stock prices are said to exhibit mean reversion when the divergences between actual market values and fundamental values are eliminated beyond a certain range or time horizon. This means that price changes are not random over a sufficiently long time horizon but instead show a systematic movement back to the mean.

   The implication of mean reversion is that stock prices should display positive serial correlation over short time horizons and negative serial correlation over longer time horizons. It can be explained in terms of a slowly decaying transitory component in stock prices implying an inefficient or irrational market (Poterba and Summers) or in terms of the rational preferences of investors for time-varying expected equilibrium returns (Fama and French). In both cases the implication is that stock prices are predictable. This result is supported in other work such as that of Campbell and Shiller (1987), French et al. (1987) and Lo and MacKinlay (1989).

   Poterba and Summers discuss three methods of testing mean reversion including variance ratio tests, regression of multi-period returns on lagged multi-period returns and tests using parametric time series models. They themselves use the first of these methods. The variance ratio test is based on the simple notion that the return variance should be proportional to the return horizon if the logarithm of the stock price (including cumulated dividends) follows a random walk.

The variance ratio (VR) statistic compares the variability of returns over different time periods with that over a standard time period, usually a year. In the case of monthly returns it is expressed as follows:

$$VR(k) = \frac{\text{var}(R_t^k)/k}{\text{var}(R^{12}_t)/12} \tag{6.9}$$

Here R_t denotes the return on a stock or stock market index in month t and $R_t^k = \sum_{i=0}^{k-1} R_{t-i}$, denotes cumulated returns. The VR statistic converges to unity if returns are serially uncorrelated over time. Poterba and Summers tested stock market indices from countries in the Organization for Economic Co-operation and Development (OECD). Their findings indicated that transitory price components account for more than half of the variance in monthly returns, whilst the results of Fama and French (1988) pointed to a somewhat lower figure of between 25 and 40 per cent. Both sets of results for stock market indices are corroborated by those of De Bondt and Thaler (1989) for the case of individual stocks. Poterba and Summers consider that the amount of variability in required returns needed to generate the degree of mean reversion that they observe is too great to be consistent with market efficiency. Moreover, time-varying returns do not explain the positive serial correlation observed over short time periods. Poterba and Summers attribute this to the activities of noise traders. The idea is that noise trading activity generates relatively sharp short-term price movements which then decay rather in the manner of price movements which Shiller (1984) argues are caused by changes in fashion or fads.

The power of the above variance ratio tests is critical in evaluating the significance of mean reversion. Lo and MacKinlay (1989) use Monte Carlo simulations to compare the power of variance ratio tests with that of the Dickey–Fuller t test and the Box–Pierce Q test under two null and three alternative hypotheses. They conclude that in all cases variance ratio tests are at least as powerful as, and in some cases more powerful than, the other two especially when the sampling intervals are not too long. Their results apply particularly in the case where the uncorrelatedness of returns is of interest.

Apart from the parallels with Keynes's ideas the mean reversion critique is also consistent with Marx's idea that speculators and financial markets are not always characterized by rational behaviour. The latter is the *sine qua non* of efficient markets. The role of speculation is also critical in the next critique of the EMH.

6.7 SPECULATIVE BUBBLES

Following the work of Blanchard (1979), Flood and Garber (1980), and Blanchard and Watson (1982), interest in the influence of rational speculative bubbles on stock price fluctuations has grown rapidly in the 1980s. Briefly, a rational bubble can be defined as a self-fulfilling belief that an asset's price depends, directly or indirectly, on variables that are not part of market fundamentals. House prices present an interesting parallel. In the mid-1980s everyone believed that house prices would rise, and this led to increased demand which fuelled further price rises and so on.

Testing for rational bubbles involves an identification problem, as pointed out by Flood and Garber (1980) and Hamilton and Whiteman (1985). This is the problem of distinguishing between the effects of rational bubbles on asset prices and the effects of unobservable variables on market fundamentals. For example, we could falsely conclude that bubbles exist by failing to note changes in expectations. The most popular method of testing for bubbles is the use of cointegration techniques and stationarity tests as exemplified by Diba and Grossman (1987) and West (1987, 1988b). Below we briefly summarize the Diba and Grossman model.

Their theoretical model is based on two modifications to our equation (6.3). The current stock price is related to an unobservable variable u_{t+1} (which the trader observes but the researcher does not), and a proportionality factor a, is added to dividends which values them relative to expected capital gains. By assuming that all expectations are conditioned on the information set I_t, we can write the model as follows:

$$P_t = (1+r)^{-1} E(P_{t+1} + aD_{t+1} + u_{t+1}) \qquad (6.3')$$

If we imposed the restrictions that $a = 1$ and $u_{t+1} = 0$ then we have equation (6.3) and the solution would be the same as equation (6.7), since the eigenvalue $1 + r$ is greater than unity. However, a convergent solution to (6.3') requires that $E(aD_{t+j} + u_{t+j})$ grows with j at a geometric rate which is less than $1 + r$. The general solution to (6.3') is

$$P_t = P_t^* + B_t \qquad (6.10)$$

where B_t represents the rational bubbles component and P_t^* is the market fundamentals component. B_t is the solution to the homogeneous expectations difference equation

$$E(B_{t+1}) - (1+r)B_t = 0 \qquad (6.11)$$

The solution to (6.11) is a random variable Y_{t+1} whose expected future values are zero since it represents an innovation. The presence of a rational bubble would imply a non-zero value of B_t.

The reasoning behind the stationarity tests is as follows. If we assume that D_t and u_t are first-difference stationary and that rational bubbles do not exist, then we can test the proposition that stock prices are non-stationary in levels but stationary in first differences. Diba and Grossman report results of Dickey–Fuller tests for unit roots which support the latter proposition. However, the results of their cointegration tests were less conclusive about the absence of rational bubbles. Moreover, the first differences of simulated time series of rational bubbles suggest strong signs of non-stationarity. Whilst these results are not conclusive by any means they do point to the presence of at least potential instability in stock markets because of the logical possibility of rational bubbles. In contrast West's (1987) results were more clear cut. When his test is applied to some annual US stock market series the data usually reject the null hypothesis of no bubbles. Although West (1988b) concludes that the results of his variance ratio tests are consistent with bubbles, he appears to have become more sceptical about their role. None the less, the possibility of explosive bubbles which Blanchard and Watson (1982) have outlined could prove a fruitful area for future research.

6.8 CHAOS MODELS

Chaos models have recently attracted a large amount of popular interest in a variety of disciplines, as is shown in the recent books by Gleick (1988) and Stewart (1989). In principle such models should be attractive to the Left for they appear to shun the basic linear static models of neoclassical economics. Moreover, a small group of Marxian economists, most notably Richard Goodwin and his followers, have been grappling with the problems of linear and non-linear dynamics for decades.[11] At the risk of gross oversimplification we could characterize chaos theory as implying that simple non-linear deterministic models are capable of producing extremely complex and apparently chaotic time paths. Baumol and Benhabib (1989) characterize them as follows:

their trajectory displays sharp qualitative changes;
the time path is very sensitive to tiny parameter changes;
the time path may never return to points it has previously traversed.

The implication is a move away from the predominant stable equilibrium approach of much of orthodox economics. The relevance for this review is that chaos models have a ready applicability in the field of economics and finance as is shown by Brock (1988), Brock and Sayers (1988), Frank and Stengos (1988a, b), Frank et al. (1988) and Kelsey (1988). Despite this, it should be noted that some of their advocates in the United States are *laissez-faire* economists. The following example from Frank and Stengos (1988a) illustrates the potential usefulness of the chaos theory approach in criticizing the EMH. Consider the following simple deterministic model of asset price determination where P_t is the share price and D_t is the dividend paid at the end of period t:

$$P_{t+1} = P_t + D_t - 0.5 \tag{6.12}$$

$$D_t = aD_t(1 - D_t) \tag{6.13}$$

Now choose the initial conditions $P_1 = 100$, $D_1 = 0.3$ and $a = 4$, and simulate the model to generate 1,000 observations. With this data set we could test for efficiency by regressing the change in asset prices on a constant and lagged changes in asset prices. Frank and Stengos report the following regression results:

$$dP_t = -0.0139 + 0.0135\,dP_{t-1} \qquad R^2 = 0.0002 \tag{6.14}$$
$$(0.0135) \quad (0.317)$$

where $dP_t = P_t - P_{t-1}$ and the standard errors are in parentheses.

The equation passes the usual tests for the absence of serial correlation and heteroscedasticity. Because neither the constant term nor the coefficient on lagged price differences is significant by these standard tests, this market is efficient! Clearly here speculators with a smattering of mathematics would recognize the underlying deterministic structure of price determination and make a killing!

Of all the critiques surveyed so far the chaos theory method would appear closest in spirit to a quantitative Marxist approach. Its inherent non-linearities are attractive as is its logical possibility of crisis. Finally it has provided some contrary evidence to the notion that most economic data series are stochastically non-stationary (Frank and Stengos, 1988a,b). Apparently, non-stationary series may have an underlying non-linear deterministic structure. As in the Marxian tradition we should not be taken in by surface appearances!

6.9 CONCLUSIONS

It is widely recognized that under modern capitalism financial and commodities markets are highly volatile. This is borne out by recent

shocks such as the floating rate note sector crisis of the Eurobond market at the end of 1986 and the stock market crash in October 1987. Yet the proponents of the EMH maintain that the efficiency of these markets is the epitome of the responsive market mechanism.

It is hoped that some of the critical evidence presented in this chapter will lead to a healthier scepticism about the pervasiveness of efficiency in financial markets. The policy implication of this is that much of the zeal for financial deregulation in the 1980s may have been misplaced. Although none of the critiques is explicitly Marxian in nature, it has been argued that most of them are consistent with Marxian and indeed post-Keynesian views of imperfect financial markets. These views emphasize the inherent instability of financial markets, their inbuilt tendency towards crisis and the role of market power in affecting prices.

Amongst the critiques of the EMH considered in this chapter only the chaos theory approach and, to a lesser extent, the speculative bubbles model appear to have the ability to capture these features within a quantitative framework. Marxian economists should take up these issues and begin to challenge the hegemony of orthodox theories of financial markets.

NOTES

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1   On the unit root literature see for example Perron (1988), Phillips (1988) and Phillips and Perron (1988).
2   See Hallwood and MacDonald (1986) and MacDonald (1988).
3   See Black and Scholes (1973) for the classic paper on option pricing.
4   See Mankiw (1986).
5   See Clive Wolmar, Efficient Market Theory Stumbles, *Financial Times*, 5 April 1988.
6   Throughout this chapter rational expectations is used in the sense of subjective expectations coinciding with conditional mathematical expectations. Pesaran (1988a) calls this the strong version of rational expectations. Weaker versions merely imply that market agents will not continue to be systematically wrong.
7   A submartingale can be defined by replacing the strong inequality sign in (6.2) by a weak inequality sign.
8   See Fama (1970, 1976) for a favourable review of the earlier literature on the EMH and Merton (1988) for a more recent review. See Tobin (1987) and West (1988b) for more sceptical views.
9   See Shiller (1979, 1981a,b, 1984); see also LeRoy and Porter (1981).
10   See Durlauf and Phillips (1988) and Phillips (1988).
11   See Goodwin (1982) and Goodwin & Punzo (1987).

The 'Reserve Army Hypothesis': a Survey of Empirical Applications

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7.1 INTRODUCTION: THE THEORY AND MODIFICATIONS

> But if a surplus population of workers is a necessary product of accumulation or of the development of wealth on a capitalist basis, this surplus population also becomes, conversely, the lever of capitalist accumulation, indeed it becomes a condition for the existence of the capitalist mode of production. It forms a disposable industrial reserve army, which belongs to capital just as absolutely as if the latter had bred it at its own cost.' (Marx, *Capital*, vol. I, p. 784)

The military metaphor abounds in much of Marx's writing, bringing out as it does the conflictual nature of capitalist social relations. Curiously, it also finds its way occasionally into the language of non-Marxist writers. Perhaps this reflects occasions when mass unemployment looms, the mix of competitive rivalry and work-place authority combined with the sheer numbers involved evoking the military image. Neoclassical economists Benjamin and Kochin (1979) speak of the 'army of the unemployed standing watch in Britain at the publication of the General Theory . . .'. In the information-theoretic model of Shapiro and Stiglitz (1985), who refer to the 'reserve army of the unemployed', the connection with Marx's model is further apparent in their conclusion that there must be an equilibrium level of unemployment in order to induce workers not to 'shirk'.[1] In general, however, when mainstream economists refer to those out of work they are happy simply to use the term 'unemployment', suitably defined. In

modern Marxist discourse, in contrast, it is common to use the more evocative phrase 'reserve army of labour'. Frequently the Marxian phrase is in effect synonymous with the mainstream one, and this may lead us to question the usefulness of the old metaphor. But in the discourse of Marxist economics and sociology the phrase 'reserve army' acquires specific meanings in relation to a particular theory of how capitalism operates.

The aim of this chapter is to explore and evaluate how Marx's theory of the reserve army has been and can be used to provide qualitative and quantitative empirical insights into the workings of modern capitalism. While there remains some controversy over its precise interpretation, for the purposes of this chapter I shall take the basic theory to be summarized as follows:

1   Unemployment, in the sense of a reserve army, is systemic. It cannot indefinitely be avoided in a capitalist society, which is prone to periodic crises and which needs a reserve army to provide room for bursts of rapid expansion. The reserve army is replenished both through economic crises[2] and through capital accumulation which raises the organic composition of capital and releases labour power which cannot immediately be reabsorbed in new branches of industry. Thus the average absolute mass of the reserve army rises along with capital accumulation.[3]

2   The reserve army functions by regulating wages and other benefits and conditions at work over the course of the cycle.[4] It either directly forces workers to accept jobs with lower pay or reduces the power of trade unions. It is used as a weapon of class struggle. At certain times and in certain sectors of industry the impact of this mechanism is attenuated.

3   In a closely related way, the reserve army helps to enforce the pace of work. When it is large in number, the active army (existing workers) is threatened with the loss of jobs. Again, the mechanism is uneven in its impact. Together with proposition 2 it can be said that the general function of the reserve army is to regulate the wage relation.

4   At different times and places certain groups occupy a prominent place in the reserve army. The theory can therefore offer an interpretation of the role played by such groups. Marx distinguished the 'floating', 'latent' and 'stagnant' forms of the reserve army, roughly according to how close each was to the active army, at his time of writing. The theory does not itself, however, encompass reasons why particular groups fall into the reserve

army. Thus evaluating whether a particular group seems to follow the various predictions of the theory does not constitute a test of the theory as a whole.

Propositions 1–3 constitute the three distinct yet interconnected aspects of Marx's analysis of labour market regulation. Henceforth in this chapter they are collectively referred to as the reserve army hypothesis (RAH). Before proceeding it is necessary, however, to note the ways in which the RAH in modern capitalism differs from the theory in Marx's day.

Since the mid-nineteenth-century capitalism has changed in a number of ways which modify its laws: in the twentieth century the state has played an increasing role, while at the same time capital has become more internationalized in several dimensions. Class relationships have altered along with the growth of labour movements in Europe, and labour markets have themselves been transformed. All these changes modify the interpretation due to the RAH when applied to the present day.

The onset of mass migration in the late nineteenth century and through many periods in the twentieth century have meant, first, that the reserve army has itself become internationalized. Although labour markets remain much less global than money markets in the 1980s, the relief supplied to capital through the power to call on, say, Mexican workers in the southern United States is a recurring modern theme. Moreover, the multi-national company's power to relocate in another country where wages are cheaper can pose real threats to modern work-forces. It raises the question as to whether the concept of a 'national' labour force continues to be viable.

The rise in the state's role in the economy affects the reserve army in both its formation and its function. Keynesian theory, which focused on the role of aggregate demand, has provided an alternative way of conceiving the proximate causes of unemployment, independent of technological unemployment.

At the same time Keynesian policies in the two post-war decades were said to have eliminated unemployment, thus apparently falsifying the central plank of the RAH that unemployment is necessary and unavoidable under capitalism; it was widely felt that the scourge of mass unemployment had been removed permanently. Although recent experience has meant an end to such optimism, the possibility of Keynesian macroeconomic interventions – rational expectations revolution notwithstanding – suggests at the least that reserve army mechanisms in the modern day are heavily mediated and sometimes obscured by the operation of state policy.

At the same time the rise of welfare states in Europe has helped to modify the function of the reserve army. By removing some of the distress of unemployment, some of the incentive to work hard and to accept lower wages is removed. Structural unemployment can also to some extent be controlled through microeconomic policies such as retraining programmes.

However, modern capitalist states have at times consciously acted to re-create a reserve army, either through macroeconomic restraints or through directly working on the labour supply such as in mass migration policies in Brazil (Holloway, 1978) or more recently in the European Gastarbeiter programmes. As early as 1942 Kalecki (1971) implicitly restated the RAH in a modern form that encompasses the actions of the state: big business, he argued, would press governments not to support persistent full employment since, although this would raise their profits in the short run, in the long run it would lead to an erosion of profits as it undermined their authority in production. It would thus be against their class interests. Thus the state can intervene at different times to reduce or increase the reserve army and can alter its effects and its forms, but it can never disband it altogether.

The rise of labour movements in Europe may also have served to modify the RAH. Unions develop the power to resist wage cuts during recessions, to temper the introduction of new production methods and to resist speed-ups in the pace of work. This power is itself, though, partly a function of the size of the reserve army. A larger reserve army may not be able to reduce the wages of the unionized sector immediately, but it raises the possibility for employers of defeating the unions and later reducing wages (Mandel, 1978, pp. 152-3).

Other transformations in the labour market can affect both the functioning and the form of the reserve army. The changing composition of national work-forces in the post-war period, especially the increasing proletarianization of women and the gender segregation of jobs, leads to new hypotheses about the forms taken by the reserve army. Meanwhile, the changing labour processes and accompanying segmentation of labour markets in the twentieth century have led to the development of apparently protected 'primary' sectors of the work-force existing alongside secondary sectors where workers are left to bear the full impact of the negative sanctions on hard work in times of high unemployment. In the primary sector, harsh disciplinary procedures in internal labour markets bring too high costs in disrupted production and alternative more positive methods of motivating workers are used (e.g. Weisskopf, 1987). The isolation of the reserve army is, however, a matter of degree. While Friedman (1977) writes that the reserve army function has in effect been suspended in many

areas in the twentieth century, others (e.g. Rosenberg, 1977; Bruno, 1979) have seen the secondary labour force as sometimes constituting the major part of the reserve army, able to move into primary jobs from time to time.

In sum, transformations in twentieth-century capitalism mean that the RAH must be generalized to apply to a global market, modified in the light of the Keynesian revolution, and in places attenuated as a result of labour struggles.

7.2 TESTS OF THE RESERVE ARMY HYPOTHESIS

Empirical usages of the RAH are not generally framed as tests aimed at confirming or falsifying it, and no doubt many would dismiss any such exercise as crude empiricism. The position taken in the following evaluation and survey is that no single test or application can allow of any conclusions, but that the usefulness of the reserve army concept can be evaluated through the ensemble of applications to which it gives rise.

Although the 'reserve army' is associated with 'unemployment', it is normal to view official unemployment figures in all countries as underestimating the reserve army. In advanced capitalist countries, there are hard-to-estimate numbers of 'discouraged workers' (the majority women), students and trainees who are only in school because of lack of jobs, part-time workers who would prefer full-time work, older workers unwillingly in retirement and so on; in developing countries there are also groups of under-employed agricultural workers. Estimates of the size of the reserve army, or 'true unemployment', have been put forward (e.g. Straussman, 1977). However, these have so far served only a normative purpose to show how governments sometimes hide unemployment. They are not used to analyse the reserve army's functions. Year to year changes in any constructed reserve army estimates are not (to my knowledge) available; hence empirical verification typically falls back on the official categories which sometimes at least have the merit of consistency of method over time.

(1)

The evidence as to whether unemployment is endemic to capitalism is really a matter of history. One problem of interpreting earlier

historical epochs is that the very notion of unemployment has itself evolved, and so no simple statistics can be relied on. That said, the verdict of historians is pretty well decisive. Marx himself, using official reports, documented the suffering that resulted from the unemployment of the relative surplus population, detailing the various layers of degradation into which certain groups had been forced (*Capital*, vol. I, pp. 802–76). Through the nineteenth century, mass pauperism traceable to mass unemployment has been a recurring theme; for example, see Keyssar (1986) for the United States and Thompson (1968) for the United Kingdom.

Prolonged full employment has been experienced on the whole in exceptional periods such as wartime. The two post-Second World War decades appeared to represent a refutation of the RAH, but the recent decade has brought back mass unemployment on a world scale. A few countries – Sweden, Norway, Japan, Switzerland and Austria – have managed to maintain full employment despite the modern economic crises, and it might be argued that they demonstrate the possibility of regulating a capitalist economy without unemployment. Therborn (1986) relates their success to conscious full-employment policies. Yet Switzerland maintained its low official unemployment at the expense of foreign workers who had to leave the country when redundant. It is possible that the success in avoiding mass unemployment in the other three European countries was in part a result of their 'social corporatism', whereby strong working class institutions have enforced a commitment to full employment from other classes in society (Glyn and Rowthorn, 1988b). However, with an international economy, it seems doubtful whether the experience of those countries can be replicated in all areas; certainly the evidence so far is that it has not. In fact most governments in recent times have repudiated the responsibility to maintain full employment. This is in accord with the RAH. With some prescience Mandel wrote in 1972:

> The main objective of bourgeois economic policy is no longer to dismantle social antagonisms but to unload the costs of improving the competitive struggle of each national capitalist industry onto the wage earners employed in it. The myth of permanent full employment fades away. What political integration and seduction have failed to achieve is now to be accomplished by the reconstruction of the industrial reserve army, and the cancellation of the democratic freedoms of the workers' movement (among other things, state repression of strikes and the right to strike). (Mandel, 1978, p. 472)

Marx's prediction of a secular increasing unemployment rate is difficult to assess, in part because as stated above there is good

theoretical reason to expect that this aspect of the RAH may not be valid in the twentieth century. It is hard to evaluate empirically because the internationalization of world markets and of the total reserve army means it would be difficult to measure the practical extent of the 'active' and 'reserve' armies worldwide; in many countries the data would not be available. Since the RAH as a whole does not hang on such an exercise, it is convenient to pass it by.

(2)

The reserve army's function as a regulator is a very general one. The presence of a large reserve army may help the ruling class to preserve property relations, or to modify them in its favour, for example through anti-union legislation. The Thatcherite period in the United Kingdom is an example of such a period. No single systematic evaluation of this most general aspect of the RAH exists, although it is implicit in some historical accounts. More concrete, and more amenable to quantitative testing, is the wage-regulating function attributed to the reserve army, studies of which we review here.

Marx himself adduces evidence of the effect of the reserve army on wages, when he discusses the process by which farmers reduced the demand for labour in the 1850s by substituting machinery for labour power (*Capital*, vol. I, p. 791). The general gist of the illustrations laid before us in his chapter 25, section 5, is that with the progress of capitalism, as wealth expands, the working classes became poorer. Most of his illustrations concern the 'worst paid part of the industrial proletariat and the agricultural labourers, who together form the majority of the working class'. The subsequent discussion of historians would support the view that in many of the early periods of industry in England the endemic unemployment brought low wages. Thompson, for example, writes:

> For the power-loom masters it was . . . a great convenience to have an auxiliary cheap labour force, as a stand-by in good times and as a means of keeping down the wages of the women and girls (8s. to 12s. Manchester, 1832) who minded the power-looms. (Thompson, 1968, p. 345)

But, of course, it was impossible for Marx as for others, given mid-nineteenth-century statistics, to show anything as clear as that when unemployment is high wages fall, when unemployment is low they rise. There is therefore not much in the way of detailed evidence of the relationship as far as the nineteenth century is concerned.[5] Friedman (1977), whose thesis is that the nineteenth century was the time when

the RAH held true, to be later modified in the present century with the rise of monopoly capitalism, attempts to show that the drying up of the latent reserve army from the 1850s to the 1870s was the cause of the rise in wages experienced in that time. This is, however, a faulty use of the RAH, since, as explained above, it applies properly to short-term movements of the wage rate, and not to movements over whole eras. Over the long term other sources of labour supply changes (let alone demand changes) have to be considered, and Friedman's own table shows that, although the latent reserve army probably fell in that period, the overall population in Britain and Ireland rose rapidly. Moreover, the latent reserve army had, according to Friedman's definition (agricultural, domestic service and self-employed workers), been falling in the decades previous to 1851, a disputed period as far as wages are concerned though it is probable that real wages fell for many if not most workers.

Mandel (1978) correctly interprets the reserve army as a regulator of wage fluctuations, but provides no clear-cut demonstrations even in the modern context. In Japan, for example, Mandel observes that the very slow wage growth during the 1950s is explained by the existence of a very large latent reserve army in the countryside, which could be rushed into the cities at relatively short notice to meet the extra-ordinary bursts of activity in Japanese industry (Mandel, 1978, p. 163). Yet even there any long-term explanation of wage movement has to bring in the fact that the Japanese population growth was also very high in those years. In the United States, Mandel tells us, wage growth from 1945 to the late 1950s was held back by the continual reconstitution of the reserve army through technical progress, but no actual estimates of the annual reserve army are used to back this up (Mandel, 1978, p. 177). While it is clear that the balance of supply and demand forces over those years did result in some limited secular real wage growth, nothing can really be proved here about the reserve army and short-term fluctuations. In Germany the wage share in national income fell from 1929 to the 1950s, but this is correctly interpreted as being due in part to the heavy hand of fascism upon the working class and hence on the value of labour power.

Such observations fail to illustrate the RAH directly, not only because of the lack of data on the reserve army but also because the process is never intended to be automatic. Its functioning is conditioned by, and conditions, the class struggle. Therefore it is possible for the short-term regulatory function to be substantially eroded by worker resistance (or by modern institutional forms that reflect past conflicts). Hence, as Mandel observes, the Phillips curve is incorrect if it is interpreted in too mechanical a way (Mandel, 1978,

pp. 151–5). A sophisticated approach which respects this has been applied to the specific case of Italy in the 1960s (Bruno, 1979). Reasonable estimates there suggest that an increase in the size of the reserve army (though not of official unemployment) after 1963 was accompanied by an increase in the strength of workers, particularly in the unionized sector, and continually rising wages. The reserve army function was attenuated because of the extreme isolation of the primary sector of the labour market from the secondary sector.

Yet if we accept the short-run Phillips curve as at least a mediated reflection of a relation between the reserve army and real wage growth (which involves taking official unemployment as something of a proxy for the underlying reserve army), there remains abundant modern evidence at a macroeconomic level consistent with the RAH. Bean et al. (1987), for example, find that the unemployment rate reduces real wage growth in their two-equation models of labour markets in all the main OECD countries except Italy. The coefficient estimate was highly significant and negative in most cases. Meanwhile Schor (1985) found pro-cyclical movements in real wages in all of nine advanced capitalist countries investigated, consistent both with the RAH and with certain neoclassical and Keynesian models. However, the sensitivity of real wage inflation to unemployment had significantly diminished in the 1970s compared with previous decades. Recent wage equations for the United Kingdom and elsewhere in Europe are of particular interest in showing little or no impact of the long-term unemployed on wages. The reserve army is thus no more homogeneous in modern times than it was in Marx's day.[6]

In summary, despite the strong plausibility of the thesis that the reserve army regulates wages, there are not many close detailed analyses of the effect, including examination of cases where it is attenuated through institutional and class conflict. As second best we resort to mainstream empirical studies relating wage fluctuations to unemployment. These are successful in the majority of cases, suggesting that the reserve army remains potent in the twentieth century. It must be remembered, however, that as they stand such studies are also consistent with an individualistic Walrasian analysis of labour markets, where the price of labour power, just as that of any other commodity, falls and rises with excess supply and excess demand.

(3)

Just as the terms of the exchange are influenced by the reserve army, so too the RAH incorporates the idea that people actually work harder

when under the threat of unemployment – sometimes referred to as the 'worker-discipline effect'. But for the same reason that the intensity of work is inherently difficult to gauge by the boss so, too, reliable measures are almost impossible to come by for purposes of economic analysis. Hence intensity must be judged indirectly. Historians may typically turn to accident statistics, fluctuation in which may plausibly be said to reflect changes in intensity (Hobshawm, 1968, p. 137). Alternatively, they may point to times of no special technical progress when output expanded much faster than the number of workers, accompanied by increases in shift lengths, suggesting that these must have been times when the labour force was worked increasingly hard. A third index is the level of absenteeism, which in coal-mining had a pronounced cyclical movement. However, these methods have not been widely used to search for a systematic correlation between intensity and unemployment in the nineteenth century.

Yet the RAH underlies a number of recent studies using modern econometrics and time series production data. The determinants of the relationship between output and labour input are examined, including variables which proxy for the disciplinary threat of the reserve army. Thus, Weisskopf et al. (1983) use a standard aggregate production function approach to analyse labour productivity growth in the post-war United States, adding as a determinant the 'cost of job loss' which itself is determined by expected duration of unemployment and the expected loss of weekly income due to unemployment. This variable proved a significant positive determinant of productivity and hence, by assumption, of work intensity. Stern and Friedman (1980) also used an aggregate labour productivity equation to show, in their case, the significance (in the United States) of a variable defined as the ratio of lay-offs to total worker separations. They argued that this variable proxied the fluctuating strength of the disciplinary threat.

Not surprisingly, the worker-discipline effect appears to be far from ubiquitous in the modern day. Weisskopf (1987) has found, using unemployment as proxy for the reserve army, that the effect is strong in the United States and present to some degree in the United Kingdom and Italy, but he found no significant effect in Canada, France, the Federal Republic of Germany, Sweden and Japan. Meanwhile Rebitzer (1987) has used the same productivity equation framework but at a partially disaggregated level to show that even in the United States the effect is strong and significant only in those industries where there are few 'long-term employment relations'; in those industries it must be presumed that alternative forms of worker motivation are

prevalent, in addition to the naked threat of the sack. This is entirely consistent with Friedman's argument that the action of the reserve army, at least in this respect, is suspended by the growth of 'responsible autonomy' and internal labour markets in the twentieth century (Friedman, 1977, p. 70).

A similar variation across industry is found using instead an employment function approach with labour hours as the dependent variable.[7] Oster (1980) includes the unemployment rate in addition to the conventional regressors, on the assumption that an increase in the intensity of work arising from a larger reserve army will result in a decrease in the demand for labour power, given the output to be produced and the available capital stock and technology. He finds that the 'unemployment effect' is highly significant in 14 out of 20 US two-digit industries. Operating with the same framework, but with three-digit industries, Green and Weisskopf (1988) show that either a measure of unemployment or a measure of the cost of job loss affects work intensity in the majority of cases. The worker-discipline effect is strongest where working conditions are hard and dangerous and there is therefore less chance for managers to use a positive motivating strategy; the effect also tends to be strong in 'secondary' industries and weak or non-existent in heavily unionized 'primary' industries.

These studies have approached the RAH with a relatively rare methodology for Marxist research, implicitly assuming that qualitative conflictual relations can be captured using quantitative techniques. There are obvious limitations to such a task, as indeed there are to testing other aspects of the RAH in the same way (such as through wage equations). Case studies of particular companies or industries, or of particular episodes in the economy which incorporate radical institutional changes (such as the era of Thatcherism in the United Kingdom), including legal changes, can unearth qualitative factors in the class struggle that could only be proxied using formal techniques, even if the data were available. Nevertheless formal studies can also analyse economy-wide effects that are impossible to prove or even detect in case studies. Formal and informal studies should therefore be viewed as complementary inputs to the debate.

It is worth mentioning, finally, a formal study based on a quite different principle for measuring work intensity. The 'percentage utilization of labour' index (PUL) is derived from the basic measurements of work study engineers in a large number of co-operating companies in Britain. A standard time that each detailed task should take is decided upon and by comparing this with measurements of the actual time taken, the index implicitly measures how hard each person is working. Since standard times are altered whenever technical

changes are made, the index claims to net out the effects of technical change (e.g. Smith-Gavine and Bennett (1988). This unique index has not yet been subject to prolonged scrutiny by economists, and so it cannot be said with complete confidence that it is measuring exactly what we might mean by work intensity. Yet it is certainly closer than any other data that exist.

Notably the index rose several percentage points in the early years of the first Thatcher government. Schor (1988) has attempted to explain the evolution of the PUL over time, and has shown that the cost of job loss is a significant positive determinant: clearly, apart from any changes in employment legislation, the mere fact of three million unemployed was enough to induce greater effort, at least in the short term.

(4)

For any particular identifiable group to be termed a reserve army of workers, and therefore to illuminate the RAH, it must first be shown to be politically and socially available for work, and yet expendable and disposable above the average for the rest of the proletariat. Second, it should be possible to see concretely how it performs the functions of the reserve army within the whole economic system. This means that its disposability is regulating the wages and conditions not only of the group itself but also of other workers. If there is no substitutability at all between the group and other workers, the reserve army function is seriously impaired. Third, if we are at the same time to illuminate with the RAH the special structural position of that group, we must also show why it becomes the reserve army or a major component of it. This implies a historical analysis which naturally introduces a secular aspect to reserve army debates even though the RAH is itself a short-run mechanism. It must also use a dialectical approach for we should expect historical developments often to undermine the ability of any group to function perpetually as the reserve army.

(a) In the nineteenth century the clearest identifiable group functioning as a reserve army was the rural proletariat or semi-proletariat emerging out of the incursions of capitalist relations on the farm. Displaced 'family workers' and peasants migrated to the towns and could for a while return to the countryside and the protections of the rural family when industrial conditions deteriorated. Later the links between town and country were severed, and the latent reserve army turned into open unemployment. The *locus classicus* for this

group is Marx's discussion of the latent reserve army in *Capital*, vol. I, pp. 795–6. The suggestive evidence consists of the deterioration in agricultural wages and conditions despite massive increases in output from the mid-eighteenth century onwards (*Capital*, vol. I, pp. 828–53), and the large inflows into the towns at times of high industrial labour demand. The fact that the pre-capitalist economy is predominantly agricultural meant, quite simply, that when rapid technical advance took hold on the farm, with no possibility of an adequate increase in demand, structural change of the most fundamental kind was certain to lead to the concentration of a major component of the reserve army in this group. This is a fact of all countries at a certain stage in their development.

Turning to the present century, the post-Second World War structure of the labour market differed widely across nations, depending on the maturity of their development. We can compare the numbers of 'unpaid family workers' with those of 'salaried and wage labourers' (these are International Labour Organization (ILO) definitions): in Japan the ratio of the former to the latter in 1955 was 66 per cent, whereas in the United Kingdom the same ratio in 1951 was about 0.26 per cent and in Italy it was 29 per cent.[8] Although there are many other factors involved, including the growth of total population, such large contrasts help to illuminate the possibilities for rapid accumulation accompanied by regulated wages in these countries.

(b) Closely related to the above case, but with the additional elements of chauvinism and racism, are the cases where the identified reserve army is a foreign rural semi-proletariat. Holloway (1978), for example, records the immigration programme set in motion in the late nineteenth century to provide workers for the coffee plantations on the western plateau of São Paolo. This was a state-subsidized programme initially explicitly used to keep wages down, following the gradual diminution of slavery after 1880 and the expansion of the coffee market.

In the modern period the clearest examples are the 'Gastarbeiter' programmes in Europe (Castles and Kosack, 1972; Ward, 1975) and in America the development of a vast transnational working class in the southwestern United States and across the borders in Mexico (Dixon et al., 1983). In such cases the state is never very far away, either actively encouraging immigration, or as often seeming to discourage it by legislating against it and then deliberately not enforcing the legislation, thus furthering the power of employers over their workers, since to be fired is then to be deported also. These groups of workers have traditionally suffered most unemployment during recessions; their use

to keep down wages in industry has sometimes been explicit.

In many cases migrant workers continue to be denied basic political rights, and remain in or develop further their role as reserve army. For example, the labour power of the commuting West Bank Arabs helps to keep down the wages of the poorer Israeli workers (Portugali, 1986).

Other groups, particularly some of the less underprivileged immigrant peoples in Europe, have gained various political and citizenship rights and, just like the rural latent reserve army that Marx identified, have gradually become integrated with the rest of the proletariat. They would serve no special function, if it were not for the additional element of racism, which is partly a legacy of these programmes that extends well after the time when the groups acted as a mere latent reserve. In Europe, as in the United States, black people typically continue to suffer open or institutional forms of discrimination, one aspect of which means that they continue to act as a reserve army for capital as a whole. Their above-average disposability and the associated function of wage regulation has been well documented.[9]

(c)   On occasions migrating groups have been predominantly female (Towner, 1977). While many issues are the same here as for other migrating groups, some special factors arise when the RAH is used to illuminate the effects of the internal transformation of the social structure, whereby the extended family of pre-capitalist and early capitalist formations is gradually transformed to the modern nuclear family, and capitalist relations penetrate within the household. Through these economic and ideological changes there arose in the twentieth century a vast latent reserve army of potential female wage workers (Power, 1983). How that latent reserve has been used by capital is a major element in modern debates as to how to characterize women's contemporary role in the economy.

Whether women are, or have been, a particularly disposable sector of the work-force has been examined in a number of empirical studies. Recent ones include those by Humphries (1988) and Rubery and Tarling (1988), which regress the change in female employment on the change in total employment and sometimes also a time trend. These show that in some sectors of both the US and the UK economies women's employment is more volatile than men's but in other sectors it is not. The 'buffer' hypothesis, as it is called, is interacting with two other trends: a secular substitution of women's for men's labour because of women's lower wages, and the segregation of women in certain industrial sectors some of which are more and some less volatile than those held exclusively by men. The empirical validity of

the buffer hypothesis appears to be changing, a process which, according to Humphries, is to be expected given the gradual proletarianization of women through the substitution process.[10]

To complete the picture, though, we should examine whether both the secular growth and, where it exists, the excessive fluctuation of women's employment have had the function of eroding the wages of other sections of the work-force. In so far as relative wages are institutionally determined and immune to supply and demand, at least in the short term, the reserve army function is likely to be limited. Yet, to take one example, it is arguable that the substitution of women's labour for that of young males may at present be helping to bring about a government-assisted reduction in youth pay in the United Kingdom via the plethora of training schemes. Little research appears to have been done on this question, and more would seem to be called for if the reserve army function is to be further elucidated.

Characterizing women as a reserve army may at first have seemed appropriate within socialist–feminist discourse in the 1970s. Women may form an especially flexible labour force for standard neoclassical and institutionalist reasons: they may have lower levels of general and specific skills, because of their remaining attachments to the household, and so employers retain their more highly skilled workers, who happen to be men, in bad times; in addition there is the supply-side flexibility summed up in the 'discouraged-worker hypothesis'. Underlying these are the fundamental sexist ideologies and practices of modern social life.

Subsequent conceptual development and empirical analysis of the reserve army approach has shown it to be a considerable over-simplification of the complex and changing structures of female employment and unemployment, to the point where there is some doubt as to whether the concept is of any use at all. These ideas are considered in detail by, for example, Beechey and Perkins (1987) and Humphries (1988).

Thus Anthias (1980) has questioned whether Marx's reserve army can correctly be applied to women since it gives no specific logic as to why women, or for that matter any other particular group, should perform this function. The RAH asserts that capitalism needs a reserve army, not that it needs women to be that reserve. It cannot therefore explain the role of women in the economy. While this is true, we can still attempt to use the RAH as one amongst other complementary approaches which illuminate the role of women's paid labour at a particular conjuncture; it is one of a number of ways of illustrating the hypothesis. It remains the case of course that the contradictory development of women's employment, the secular formation and

erosion of the 'latent reserve' and the processes of assimilation and exclusion are outside the domain of applicability of the RAH itself.

7.3 CONCLUSION

The 'reserve army of labour' is the Marxian concept of unemployment. However, the case for continuing to use the phrase rests not on the power of the metaphor itself but on the wider theoretical and empirical scope which the RAH projects.[11] This implies that unemployment is endemic to the process of capital accumulation. It ascribes broad regulatory functions to the reserve army, which not only controls wages but also imparts factory discipline and a general political discipline. Moreover, it views these regulatory functions in class terms that are not reducible to individualistic conflict.

In this paper I have argued that the RAH functions essentially as a permanently existing short-run control mechanism. But neither is it a mechanistic theory nor should it be applied dogmatically as if there had been no transformations in capitalism since Marx's day. The RAH should be modified but not fundamentally altered in its application to modern capitalism.

There are no major controversial points of principle in concretizing the RAH in either quantitative or qualitative ways. Yet in practice we do not have estimates of the reserve army in different countries and over time. Consistent data would be hard to construct, particularly in the light of the international character of the reserve army. Therefore typically writers are forced to use standard unemployment and labour force data, adapting and interpreting them appropriately. None the less, the evidence for and range of use of the RAH remains impressive. It would be hard to come away from a historical overview without endorsing the view of mass unemployment as somehow endemic to capitalism. There is a surprisingly large if unsystematic body of evidence that the reserve army performs a range of regulatory functions. Much of this evidence uses conventional data, however, and the problem that there has been little attempt to distinguish some of the RAH mechanisms from conventional 'market forces' as conceptualized in neoclassical economics stems partly from this.

Overall, the evidence that the RAH has a regulatory function which works differently from the Walrasian function is decidedly patchy. The main reason for this is that writers have not really tried to make the appropriate distinctions. Yet it is possible to do so: what is necessary is to examine the mechanisms whereby wages are controlled, as well as whether in fact they are controlled largely by individual

supply and demand, or whether by an institutionally determined supply and demand involving class forces. The evidence on work intensity effects goes beyond the standard neoclassical notion of market forces, but here, too, the modern information-theoretic approach is entirely consistent with all these tests, and so additional work needs to be done to understand the mechanisms and to substantiate the class nature of the conflicts and pressures that control the pace of work. Thus, while the RAH provides a general framework of analysis within which there is great potential for future applied research, it will require theoretical and conceptual development as well as the continued development of quantitative analyses.

NOTES

I should like to thank Ben Fine and Subrata Ghatak for their perceptive comments and suggestions on an earlier draft.

1   Other non-Marxist authors making reference to the metaphor include Beveridge (1909), who writes of the 'reserve of labour' and the Massachusetts Bureau of Statistics of Labor, which reported in 1911 about the ' "reserve army" of the unemployed' (Keyssar, 1986, p. 72.) The term is echoed in Roosevelt's famous confrontation with the 'Bonus Army', unemployed veterans whose protest was rudely and violently dispersed on the President's orders in 1932. More recently there has been talk of the 'phantom army of the unemployed' (Santoni, 1985) and of a 'conscript army' (Field, 1977), though in these last two cases, as with Benjamin and Kochin (1979), there is barely any connection at all with the theoretical spirit of Marx's concept.

2   This was Engels' contribution (Engels, 1962).

3   Marx also argued that the reserve army would rise relative to the active army. The textual evidence for this is to be found in *Capital*, vol. I, pp. 783, 798. This interpretation is, however, controversial. In view of the fact that Marx does not corroborate the argument elsewhere and the great difficulty of evaluating such a claim empirically in the modern world market, little or no emphasis should be attached to the possible relative rise of the reserve army, and in this paper it will not be regarded as part of the reserve army hypothesis.

4   Some writers have claimed a long-term secular aspect to the reserve army hypothesis, whereby the real wage trend over decades is affected. I have shown elsewhere (Green, 1988) that a theory of long-run real wage trends is neither to be found in Marx's writings on the reserve army hypothesis nor logically deducible from it.

5   Boyer (1979) claims to show a relationship between the rate of change of money wages and variations in industrial production volume, but the evidence is not strong.

6   Mainstream economics confronts this anomaly with respect to conventional Phillips curve analysis by introducing the concept of hysteresis, whereby unemployment depends in part upon its own history (e.g. Cross, 1988).

7   An 'employment function' takes output and non-labour inputs as exogenous and estimates both the 'optimal' demand for labour and the speed of adjustment towards the optimal labour usage.

8   Figures from the *International Labour Office Yearbook of Statistics*, 1960.

9   For a recent breakdown of unemployment rates among ethnic groups in the United Kingdom, see *Employment Gazette*, March 1988, pp. 164–78.

10 This gives rise to the question as to whether this process is likely to become complete and irreversible; this is not something that the RAH can say anything relevant about, but it remains possible that even if women's participation in the labour force reaches equality with men's the buffer hypothesis will remain partially applicable as long as work-place discrimination persists.

11 Modern purely theoretical usage stems largely from Goodwin (1967).

8

International Trends in Profitability

ANDREW GLYN

8.1 INTRODUCTION

In the course of the long post-war boom of the 1950s and 1960s profitability played a very minor role in mainstream discussion of macroeconomic trends. Data on aggregate profits were calculated in the national accounts of most of the advanced capitalist countries, but there was no systematic attempt in any of them to present official series for the profit rate. The same lack of concern with profits was manifested in neoclassical growth theory where the profit rate is simply an indicator of the relative scarcity of capital, with no independent role in determining the course of capital accumulation.

All that has changed now. The OECD now presents data for the profit rate and profit shares in its *National Accounts* publications and analyses them in its influential *Economic Outlook*. This wider availability of data, together with the growing appreciation in the 1970s that there was a profitability 'problem', generated a large number of academic studies of profitability published from differing theoretical positions and covering a range of countries (Glyn and Sutcliffe, 1972; Flemming et al., 1976; Feldstein and Summers, 1977; Weisskopf, 1979; Armstrong et al., 1984; Sutch and Chan Lee, 1985; Bowles et al., 1986; Erixon, 1987; Carlin, 1987).

An attempt to evaluate this very substantial body of work would be a major task. Our purpose in the present chapter is much more modest: to present the data on profitability in the three major capitalist blocks (United States, Japan and Europe) from 1960 to the early 1980s and to 'decompose' these trends in a way which illuminates the processes at work. Such an analysis cannot validate one or other of the contending views as to the causes of the decline of profitability, but

it does present a fuller picture of the facts which such theories must seek to explain.

8.2 THE SIMPLEST DECOMPOSITION

The profit rate on capital employed can be most simply decomposed into the profit share of output and the output–capital ratio according to the formula

$$\frac{R}{K} = \frac{R}{Y} \times \frac{Y}{K}$$

where R is aggregate profits, K is the capital stock and Y is the output, all at current prices.

Marx was the first to analyse the rate of profit in this general way, with R/Y in our formula playing the role of his rate of exploitation and Y/K the organic composition of capital;[1] to our knowledge Feinstein (1968) was the first to use such a decomposition systematically in empirical work.

The extent of the profitability decline since the mid-1960s is summarized in tables 8.1 and 8.2 which deal respectively with the period up to 1973 and the most recent year covered by our comprehensive data set, 1983.[2] The series are for the net rate of profit as a percentage of the net capital stock, which is considered to be a superior measure of the underlying economic return to the gross rate (Armstrong et al., 1984, data appendix). Data are presented for the business sector as a whole, and for manufacturing. Lack of data forces us to use pre-tax series; in our opinion these show most clearly the underlying forces on profitability (but see Sargent (1982), however), but a full analysis should obviously include an assessment of the changing burden of taxation.

The data in table 8.1 suggest that in each of the major blocks the rate of profit on capital employed was around a quarter to a third less in 1973 than it had been at its previous peak. This applies broadly to both manufacturing and business. Declines in both the profit share R/Y and the output–capital ratio Y/K contributed to falling profitability. Whilst of remarkably similar orders of magnitudes in the three blocks, the declines in profitability took place at different speeds – over three cycles beginning around 1960 in Europe, over two cycles since 1966 in the United States and over just one cycle since 1970 in Japan. The combination of these trends (with changing weights and patterns) was that the aggregate profit rate for the seven advanced capitalist countries (ACCs) as a whole began to fall after 1968, and had fallen by

Table 8.1 Profit rates 1960–1973

	Percentage			
	ACCs	*USA*	*Europe*	*Japan*
Business				
Peak	16.2	19.8	16.3	32.0
1973	12.9	13.1	11.4	19.6
1973/peak	0.8	0.7	0.7	0.6
Manufacturing				
Peak	24.0	35.5	20.4	46.8
1973	19.2	21.8	12.4	33.5
1973/peak	0.8	0.6	0.6	0.7
Profit shares				
Business				
Peak	23.5	22.5	25.5	38.4
1973	20.2	16.7	19.4	30.4
1973/peak	0.9	0.7	0.8	0.8
Manufacturing				
Peak	23.7	23.0	24.7	40.7
1973	20.1	17.4	17.2	32.9
1973/peak	0.9	0.8	0.7	0.8
Output–capital ratio				
Business				
Peak	0.68	0.88	0.64	0.83
1973	0.64	0.78	0.59	0.64
1973/peak	0.94	0.89	0.92	0.77
Manufacturing				
Peak	1.01	1.54	0.83	1.15
1973	0.95	1.26	0.72	1.02
1973/peak	0.94	0.82	0.87	0.89

ACCs, advanced capitalist countries.
Peak year for ratio is the year before a sustained decline in profitability.
Peak years are 1968, 1966, 1960 and 1970 respectively.
Source: Armstrong and Glyn, 1986

around a fifth by 1973, with the profit squeeze contributing around three-quarters of the decline and the falling output–capital ratio one-quarter.

That the aggregate fall began in 1968 is of some symbolic significance, as 1968 was the year of the May events in France which most graphically demonstrated the problems being faced by the advanced countries at the end of the long boom. That the profit rate

Table 8.2 Profit rates 1973–1983

	Percentage			
	ACCs	*USA*	*Europe*	*Japan*
Business				
1973	12.9	13.1	11.4	19.6
1983	9.5	9.8	8.6	12.9
1983/peak	0.6	0.5	0.5	0.4
Manufacturing				
1973	19.2	21.8	12.4	33.5
1983	8.7	8.3	7.6	12.8
1983/peak	0.4	0.2	0.4	0.3
Profit shares				
Business				
1973	20.2	16.7	19.4	30.4
1983	18.4	16.0	17.0	25.8
1983/peak	0.8	0.7	0.7	0.7
Manufacturing				
1973	20.1	17.4	17.2	32.9
1983	11.8	10.0	10.8	17.3
1983/peak	0.5	0.4	0.4	0.4
Output–capital ratio				
Business				
1973	0.64	0.78	0.59	0.64
1983	0.52	0.61	0.51	0.50
1983/peak	0.76	0.69	0.80	0.60
Manufacturing				
1973	0.95	1.26	0.72	1.02
1983	0.74	0.83	0.70	0.74
1983/peak	0.73	0.54	0.84	0.64

ACCs, advanced capitalist countries.
Peak year for ratio is the year before a sustained decline in profitability.
Peak years are 1968, 1966, 1960 and 1970 respectively.
Source: Armstrong and Glyn, 1986

had fallen substantially by 1973 (the peak year before the first oil shock) is important as well, as it confirms that the Golden Age pattern of growth was running into severe difficulties before the oil shock of 1974 (see Glyn et al. (1988) for a more comprehensive discussion).

Table 8.2 carries the story forward until 1983. In that year the rate of profit in business was half or less of the level of the peak during the boom years in each block, whilst in manufacturing it was a third or

less. By 1983 the relative importance of the fall in the output–capital ratio had increased, and was of similar importance to the profit squeeze in business, although rather less than that in manufacturing. Whilst the years since 1983 have seen some recovery in profitability, in some cases (most notably the United Kingdom) back to the level of 1973, the profit rate is generally still well below the levels of the Golden Age.

8.3 PROFITABILITY TRENDS UP TO 1973

Decomposition of the profit share

Further information on the nature of the profit squeeze can be gained from decomposing the profit share. It is simplest to see this in terms of the wage share ($W/Y = 1 - R/Y$). The wage share in value added can be broken down into product wages (money wages deflated by the price index for the gross output of the sector), productivity (real value added per person employed) and the price of gross output relative to that of value added (reflecting the behaviour of materials and other input costs relative to the factor incomes of wages and profits which comprise value added).[3] Thus

$$\frac{W}{Y} = \frac{W}{E.P_q} \times \frac{P_y.E}{Y} \times \frac{P_q}{P_y}$$

where E is employment, P_y is the price index of value added and P_q is the price index of gross output.

This decomposition allows a change in the wage share to be seen as reflecting the growth of product wages, the growth of productivity and changes in the relative price of gross output and value added. If there is no change in P_q/P_y, the wage share will rise or fall depending on whether product wages rise faster or slower than labour productivity. Product wages represent the real cost of employing labour from the employers' point of view, i.e. the gross wage (including all social security contributions) deflated by the price index of gross output. This is different from the real wage in terms of what workers can buy which has to be deflated by consumer goods prices (and from which direct taxation should be subtracted). The balance between product wages and productivity is a crucial determinant of the profit share, which fluctuates with opposite sign and greater amplitude, given that it is much smaller in absolute terms than the wage share.

We have deliberately measured product wages in terms of product prices (rather than value-added prices) in order to isolate the effect of

Table 8.3 Manufacturing profit shares and rates: advanced capitalist countries and Europe

Percentage change per annum

	ACCs				Europe			
	A	B	C	D	A	B	C	D
1 Hourly productivity		5.4	4.7	5.6		6.2	6.3	6.0
2 Effect of input cost		0.3	0.3	−1.3		0.0	0.3	0.7
3 Real factor incomes (1 + 2)		5.7	5.1	4.3		6.2	6.5	6.7
4 Product wages		5.5	5.7	5.2		6.8	6.8	7.6
5 Wage share (4–3)		−0.2	0.6	0.9		0.6	0.3	0.9
6 Profit share		0.7	−2.1	−3.4		−2.2	−0.9	−3.9
7 Real output/capital (O/K)		1.7	−0.4	0.0		−0.1	0.9	−0.7
8 Effects capital costs		0.3	−1.0	−2.1		−2.3	0.8	−0.8
9 Current-price O/K (7 + 8)		2.0	−1.4	−2.1		−2.4	1.7	−1.5
10 Profit rate (6 + 9)		2.6	−3.4	−5.3		−4.3	0.6	−5.5
Memorandum items								
(a) Weekly hours worked		−0.2	−0.6	−0.7		−0.8	−0.6	−1.4
(b) Relative consumer price		1.9	1.6	0.4		1.7	0.6	−0.1
(c) Real weekly wages (4 + (a) − (b))		4.1	4.0	4.6		5.2	6.0	6.8
(d) Real direct costs		3.3	3.2	4.1		4.1	3.7	4.2
(e) Relative capital prices		1.0	1.4	0.7		1.0	0.6	1.0
(f) Output prices		1.1	2.4	5.4		1.9	2.6	6.7

End of period levels

(g) Profit share	23.7	24.7	22.5	19.9	23.9	21.4	20.6	17.9
(h) Profit rate	24.7	28.8	24.7	20.4	19.1	15.3	15.7	12.9

A, late 1950s; B, early 1960s; C, late 1960s; D, early 1970s

1 Real value added per worker.

2 Effect of relative price of inputs (estimated as excess of rise in wholesale prices of manufactures over value-added prices) and of capital consumption (rise in share of value added) in reducing growth rate of real profits and wages (in terms of manufacturing output).

3 Money wages per hour deflated by the price of manufacturing (estimated as 3 + 5).

5 Income from employment, corrected for self-employment, as a percentage of net value added.

6 Net operating surplus (adjusted for self-employment) as a percentage of net value added.

7 Real value added divided by real gross fixed capital stock.

8 Effect of relative prices of capital stock, output etc. on net output capital ratio (see text).

9 Net value added divided by net capital stock (current prices).

10 Net operating surplus divided by net capital stock.

(b) Relative price of consumer goods and manufacturing output.

(d) Weighted average (60%:40%) of product wages and real input costs. The latter estimated from output and value added prices by assuming that output is two-thirds value added and one-third inputs, and so real input costs are 2(VAP – WPI).

(e) Relative prices of capital stock and manufacturing output.

(f) Manufacturing output prices – wholesale prices.

(g) As for 6.

(h) As for 10.

Table 8.4 Manufacturing profit shares and rates: Japan and United States

	Percentage change per annum							
	Japan				United States			
	A	B	C	D	A	B	C	D
1 Hourly productivity		8.6	11.4	9.5		3.9	1.6	4.2
2 Effect of input cost		2.2	2.0	-1.3		-0.1	-0.1	-2.7
3 Real factor incomes (1 + 2)		0.8	13.4	8.2		3.8	1.5	1.5
4 Product wages		14.0	12.6	12.4		2.7	3.5	1.9
5 Wage share (4−3)		3.2	-0.8	4.2		-1.1	2.0	0.4
6 Profit share		-4.6	1.3	-6.9		4.6	-7.3	-1.3
7 Real output/capital (O/K)		-3.4	0.5	-2.4		4.5	-1.6	1.3
8 Effects capital costs		0.6	1.5	-1.5		-1.6	-3.2	-2.6
9 Current-price O/K (7 + 8)		-2.8	2.0	-3.9		2.9	-4.8	-1.3
10 Profit rate (6 + 9)		-7.1	3.3	-10.5		7.7	-11.7	-2.8
Memorandum items								
(a) Weekly hours worked		-1.3	-0.7	-1.0		0.6	-0.5	0.0
(b) Relative consumer price		6.4	4.2	2.6		0.6	1.5	0.2
(c) Real weekly wages (4 + (a) − (b))		6.3	7.7	8.8		2.7	1.5	1.7
(d) Real direct costs		6.3	6.1	6.7		1.9	1.9	3.2
(e) Relative capital prices		0.2	0.9	0.4		1.2	2.2	0.6
(f) Output prices		-0.3	1.5	4.8		0.9	2.6	4.7
End of period levels								
(g) Profit share	43.4	37.7	40.7	32.9	17.5	23.0	18.3	17.4
(h) Profit rate	43.9	38.5	46.8	33.5	22.8	35.5	24.4	21.8

See footnotes to table 8.3.

input costs.⁴ When input prices rise faster than output prices this imposes a squeeze on value added so that factor incomes, in real product terms, have to rise less rapidly than productivity. If product wages do not adjust to what is sometimes described as a slower 'warranted' growth, then it is the share of profits in value added which feels the pinch. In this respect a rise in real cost of inputs acts in a similar way to a decline in productivity in reducing the 'room' for wage increases. Thus it is the balance between product wages on the one hand, and productivity adjusted for changes in the relative prices of gross output and value added on the other, which determines the trend in the wage share (and thus the profit share).

The first six lines of tables 8.3 and 8.4 perform such a decomposition for the wage, and thus the profit share, for the manufacturing sectors of the advanced capitalist countries (ACCs) as a whole, using a weighted averages of the three main blocks (a weighted average of the largest four countries in Europe, the United States and Japan) for the period 1960–73. The first three periods (the early 1960s, the late 1960s and the early 1970s) represent the three pre-slowdown cycles. We concentrate on the manufacturing sector here both because of greater data availability (for output prices in particular) and because it bore the brunt of the decline in profitability as we have already seen.

In Europe the profit squeeze was already discernible in the early 1960s (table 8.3); the wage share grew by 0.6 per cent per annum (line 5) as product wages (line 4) grew that much faster than what was available for wages and profits, described in the table as real factor incomes (line 3). The growth rate of real factor incomes was the same as the rise in hourly productivity (line 1) as output prices were growing at the same rate as value-added prices (line 2). This in turn reflected a similar rise in input costs as in factor incomes. At the end of the 1960s the rate of squeeze eased slightly, but the early 1970s saw a sharp intensification as the growth of product wages rose quite markedly and the favourable trend in input costs was swallowed up by a slight decline in productivity growth. Figure 8.1 presents the faster growth in the wage share in the early 1970s by charting the change in the growth rates of productivity, effect of input costs and thus real incomes, and finally product wages and thus wage share. The shifts in the growth rates are quite small (in keeping with the slow and persistent profit squeeze in Europe on average), but highlight the importance of accelerating product wage growth.

In the United States the profit squeeze took place in the late 1960s as productivity slowed down sharply and product wages maintained substantial growth (figure 8.2); in the early 1970s the squeeze was much less marked as productivity recovered and product wages
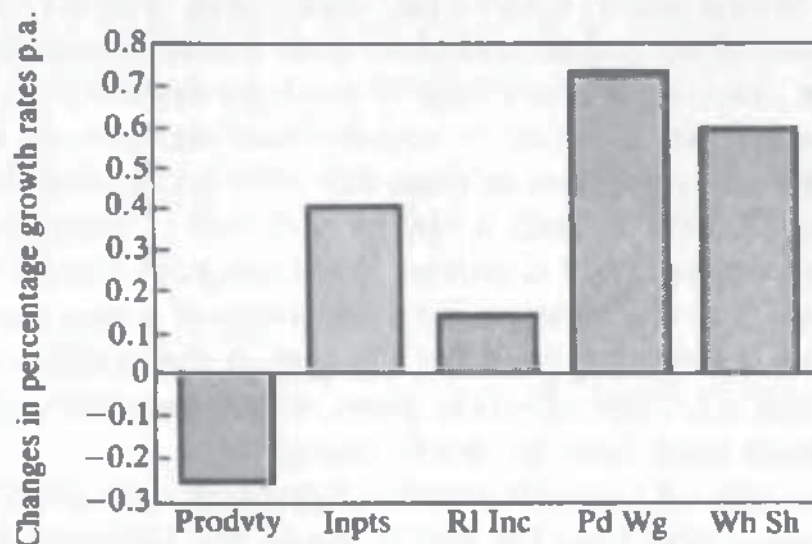
Figure 8.1   Europe profit squeeze: early 1970s compared with late
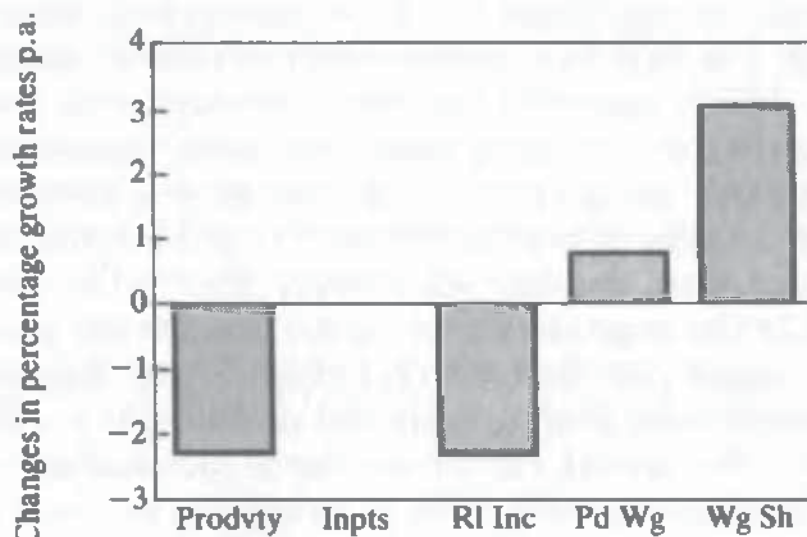1960s.

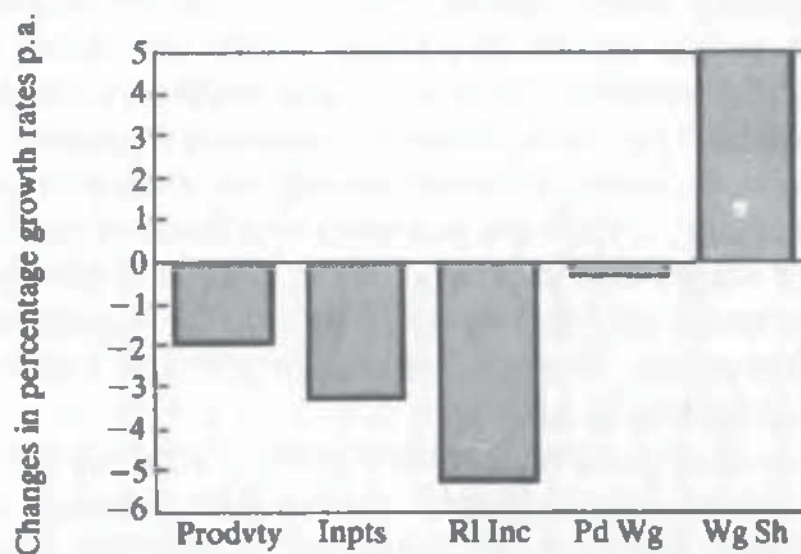Figure 8.2   US profit squeeze: late 1960s compared with early 1960s.

Figure 8.3   Japan profit squeeze: early 1970s compared with late
1960s.

absorbed most of the sharp rise in relative input costs which cut the growth of real factor incomes by some two-thirds (table 8.4).

In Japan the profit squeeze in the early 1970s was very severe (table 8.4). Productivity growth slipped back from the very high rates recorded in the late 1960s, but the shift in the trend of real input costs from boosting real factor incomes to reducing them below productivity growth was as important (figure 8.3). Product wage growth was maintained despite the sharp fall in real factor incomes and thus the wage share increased sharply.

Thus the periods of profit squeeze (Europe and Japan in the early 1970s; United States in the late 1960s) display some common characteristics. Product wage growth was maintained and/or slightly increased in the face of the slower growth of real factor incomes; this slower growth in turn reflected a decline in productivity growth and/or deterioration in the trend of real input costs. The fact that the profit squeezes were not attributable simply to a faster growth of wages does not reduce the importance of wages in the whole process. A failure of wage increases to slow down when the 'room' for them declines is just as significant, and demands just as much explanation as does an acceleration not 'warranted' by a faster growth of factor incomes.

Even though the profit squeezes did not involve large accelerations in product wages it is still interesting to see whether the more militant wage bargaining characteristic of the period realized a faster growth of real wages in terms of workers' purchasing power. Memorandum lines (a) – (c) translate the growth of hourly product wages into weekly real wages. Faster reductions in hours of work were noticeable (line (a)) in the United States in the late 1960s and Europe in the early 1970s, further indications of labour's enhanced bargaining strength. But there was also a sharp decline in the relatively fast increase of consumer goods prices (line (b)). Japan is the most striking example, for whereas consumer goods prices were rising more than 6 per cent faster per year than manufacturing prices in the early 1960s, by the early 1970s the differential was less than 3 per cent. Such shifts play an important role in the relationship between real wages and productivity. A possible explanation for these shifts might be decreasing importance in consumption baskets of food which tend to have a faster rate of inflation than manufactured goods. The net effect was to allow a much sharper acceleration in real wages than in product wages; we may speculate that this eased the pressure on manufacturers' profitability since a given rise in the rate of growth of product wages (relevant for manufacturers' costs) implied a faster acceleration of real wages (relevant to workers' living standards).

It must be emphasized that any such 'accounting' for the profit squeeze in terms of which variables (or their growth rates) shifted cannot establish causation. For example, a slowing down of productivity growth, or an adverse movement in real input costs, only leads to a profit squeeze if product wages do not absorb the slowdown. If the profit mark-up on costs was maintained then workers would automatically bear their share of any reduction in the growth of real factor incomes and thus allow the profit share to be maintained. That this did not happen suggests that profit margins were under pressure from a number of directions – workers' bargaining position had been strengthened which allowed them to maintain or increase the growth rate of real wages, despite adverse movements in real input costs and/or productivity; secondly, product market pressures prevented firms from fully passing on these cost pressures in the form of higher prices. Manufacturing prices were rising by about 5 per cent per year in the early 1970s as compared with 1 per cent per year in the early 1960s, but this was insufficient to maintain profit margins.

The components of the explanation for the pre-1974 profit squeeze seem fairly clear from the data we have presented. Product wage growth was maintained or increased in circumstances where profit margins were already under pressure from faster growth of input costs and/or some slippage in labour productivity growth.

The behaviour of wages is most plausibly explained by the labour shortage, which increased markedly at different times in the various blocks (early 1960s in Europe, mid-1960s in the United States and early 1970s in Japan). Such a pattern is confirmed by vacancy statistics and (in Continental Europe and Japan) by the speed of decline of agricultural employment. To an extent therefore, the faster growth of product wages (or more broadly, direct costs of production[5]) played a necessary role in ensuring the faster scrapping of old vintages of equipment rendered redundant by the labour shortage. However, the growth of wages went further than this; the stronger bargaining position for workers implied by tighter labour markets also formed the economic backdrop to the wage explosions of the late 1960s, which forced money wages far above the levels necessary to ensure scrapping at existing inflation rates (Soskice, 1978). This set of factors was analysed by Armstrong et al. (1984, ch. 11) under the term 'over-accumulation'; Sargent (1982) similarly emphasizes the role of an unsustainable rate of accumulation in reducing profitability.

The concept of over-accumulation has been extended by Itoh (1980) to embrace the idea of excess demand for raw materials and other inputs leading to rapid price increases in the early 1970s. That firms were not able to pass on these cost increases in higher prices must

reflect heightened competition. Glyn and Sutcliffe (1972) argued that this intensified competition derived from international competition as trade barriers fell. There is some confirmation of the role of international competitiveness in the econometric work of Weisskopf (1985a), Sutch and Chan-Lee (1985) and Carlin (1987), with the additional emphasis that changes in competitiveness have been strongly influenced by fluctuations in nominal exchange rates.

Two competing explanations for the fall-off in productivity growth prior to 1974 would focus on the one hand on 'social' factors (worker resistance to work reorganization and new technology) and on the other on 'technical' factors (weakening of the impact of post-war technologies as countries caught up with 'best-practice' production systems and the development of equally productive new technologies faltered). Glyn et al. (1988) suggest that the 'social' explanation may have been the more important in the years before 1973 (see also the discussion of the output – capital ratio below).

The relative importance of the individual elements of this complex of factors is only hinted at by our decomposition of movements in the profit share. To try and be more precise would require a full econometric model and a bold use of counterfactual simulations (see Bowles et al. (1986) for a pioneering attempt).

Decomposition of the output–capital ratio

As already pointed out, there was some decline in the output capital ratio before 1974 which contributed to the decline in the profit rate. The main purpose of our decomposition is to stress the importance of various sets of relative prices (notably between capital stock and output and between output and value added) which affect the trend in the current-price out put – capital ratio. Many discussions focus almost exclusively on the constant-price ratio alone which, as we shall see, is only part of the story.

The net output–capital ratio can be written as follows:

$$\frac{Y_n}{K_n} = \frac{q}{k} \times \frac{P_q}{P_k} \times \frac{y}{q} \times \frac{P_y}{P_q} \times \frac{k}{k_n} \times \frac{y_n}{y}$$

where Y_n and y_n are value added net of capital consumption at current and constant prices respectively, K_n and k_n are net capital stock at current and constant prices, q is gross output at constant prices, k is gross capital stock at constant prices, y is gross value added at constant prices, and P_q P_k and P_y are price indices for gross output, net capital stock and net value added respectively.

The first term is the ratio of gross output–capital; when multiplied by the third term (the ratio of value added to gross output at constant prices) this yields the inverse of the familiar capital – output ratio as conventionally measured.[6] The first relative price term is the ratio of the price of gross output to the price of capital goods (the terms of trade between the manufacturing sector and the suppliers of capital goods, some of which are overseas and some in the non-manufacturing sector of the country concerned). The second is the ratio of the price of value added to the price of output; as explained in the discussion of the profit share this reflects the relative price of inputs compared with gross output. Additional elements in the decomposition are the ratio of gross to net capital stock (reflecting the age composition of the capital stock) and the ratio of net to gross value added (measuring the weight of capital consumption and thus reflecting all the factors which affect the size and composition of the capital stock at current prices).

Lines 7–9 of tables 8.5 and 8.6 show the trends in the real output–capital ratio, with the relative price and the other terms lumped together as the 'effect of capital costs'. The sum of these two changes generates the current-price output–capital ratio.

The three blocks show a rather common pattern of adverse trends in both the real output–capital ratio and in the effect of capital costs. Averaging the data for the ACCs (table 8.5) shows a steady real output–capital ratio in the early 1970s, whilst the trend of capital costs was pushing the ratio down by about 2 per cent per year. In the early 1960s, however, both factors had been favourable. Memorandum item (e) shows capital goods prices rising rather steadily at about 1 per cent faster per year than manufacturing output prices. Therefore the main explanation for the deteriorating trend in capital costs lies in the slow rise of value-added prices in relation to gross output prices in the early 1970s, which again reflects the inability of manufacturers to pass on all the cost increases. This is clearly visible in table 8.4, for example, where the sharp adverse movement of input costs in Japan in the early 1970s (line 2) also pushed up capital costs (line 8).

The fact that a rapid rise in materials costs reduces the output–capital ratio (value added, current prices) deserves reiteration. It is not often noticed that rising real input costs which contribute to the profit squeeze are also reflected in a declining output–capital ratio. The rising weight of capital consumption (not shown as a separate item in the tables) also contributes to the declining net value added to capital stock ratio. Lastly, we should also note that the measured deterioration in the trend of the real output–capital ratio will exaggerate the underlying movement if the period saw accelerated

Table 8.5 Manufacturing profit shares and rates: advanced capitalist countries and Europe

Percentage change per annum

	ACCs				Europe			
	A	B	C	D	A	B	C	D
1 Hourly productivity	1.6	3.7	2.9	4.7	2.5	4.3	2.5	4.5
2 Effect of input cost	−3.4	−1.0	−4.0	−0.5	−2.4	0.3	−1.2	−0.6
3 Real factor incomes (1 + 2)	−1.7	2.7	−1.0	4.2	0.1	4.5	1.3	3.9
4 Product wages	2.0	2.3	0.9	3.6	4.7	3.6	3.7	2.6
5 Wage share (4–3)	3.7	−0.4	1.9	−0.6	4.6	−0.9	2.4	−1.3
6 Profit share	−16.4	2.1	−11.6	4.2	−24.9	7.1	−17.8	11.3
7 Real output/capital (O/K)	−8.1	−4.7	−4.4	1.0	1.1	−5.8	0.1	0.6
8 Effects capital costs	−0.1	−1.5	−0.3	−1.3	0.6	1.5	3.0	0.7
9 Current-price O/K (7 + 8)	−8.2	0.6	−4.7	−0.3	−5.0	2.6	−2.8	
10 Profit rate (6 + 9)	−23.6	2.6	−15.2	3.7	−28.5	9.8	−20.3	11.7
Memorandum items								
(a) Weekly hours worked	−2.1	0.4	−0.8	0.4	−2.7	0.1	−1.3	−0.3
(b) Relative consumer price	−1.6	0.9	0.6	0.8	−1.5	0.7	1.5	0.1
(c) Real weekly wages (4 + (a) − (b))	1.7	2.1	−0.4	3.3	4.0	3.3	1.3	2.4
(d) Real direct costs	2.7	2.4	3.3	2.0	3.3	2.3	2.8	1.3
(e) Relative capital prices	−0.1	0.1	−2.7	0.6	0.5	0.3	−2.2	−0.3
(f) Output prices	14.2	7.4	10.7	2.8	15.4	9.2	10.9	6.9

End of period levels

	ACCs					Europe				
	1973	1975	1979	1981	1985	1973	1975	1979	1981	1985
(g) Profit share	19.9	13.9	15.1	11.8	13.9	17.9	10.1	13.3	9.0	13.8
(h) Profit rate	20.4	11.9	13.2	9.5	11.0	12.9	6.6	9.6	6.1	9.5

A, 1973–5; B, 1975–9; C, 1979–81; D, 1981–5.
Rest as for table 8.3.

Table 8.6 Manufacturing profit shares and rates: Japan and United States 1973–1985

Percentage change per annum

	Japan				USA			
	A	B	C	D	A	B	C	D
1 Hourly productivity	4.9	7.8	7.6	6.9	0.0	2.0	1.8	4.1
2 Effect of input cost	−8.2	−2.4	−9.0	−2.0	−2.6	−1.4	−4.4	0.1
3 Real factor incomes (1 + 2)	−3.3	5.4	−1.4	4.9	−2.6	0.6	−2.6	4.2
4 Product wages	9.0	4.4	−1.0	4.2	−1.9	0.9	−0.7	4.2
5 Wage share (3−4)	12.3	−1.0	0.4	−0.7	0.7	0.3	1.9	0.0
6 Profit share	−33.0	−6.0	−1.6	3.3	−3.5	−1.7	−16.0	0.0
7 Real output/capital (O/K)	−10.9	4.6	1.4	2.0	−9.1	2.1	−5.1	1.4
8 Effects capital costs	−7.5	−2.5	−2.1	−1.7	−1.8	−1.4	−1.4	−1.3
9 Current-price O/K (7 + 8)	−8.4	2.1	−0.7	0.3	−10.9	0.7	−6.5	0.1
10 Profit rate (6 + 9)	−44.3	8.1	−2.5	3.7	−13.8	−1.1	−17.0	0.0
Memorandum items								
(a) Weekly hours worked	−3.5	1.3	−0.3	0.3	−1.3	0.4	−0.6	1.0
(b) Relative consumer price	2.8	3.2	−1.8	1.3	−2.9	0.3	0.6	1.2
(c) Real weekly wages (4 + (a) − (b))	2.7	2.5	0.5	3.2	−0.3	1.0	−1.9	4.0
(d) Real direct costs	9.6	4.8	6.8	4.1	0.1	1.7	2.5	1.8
(e) Relative capital prices	0.4	−0.4	−3.9	−0.3	−0.7	0.1	−2.7	1.6
(f) Output prices	14.9	3.0	8.2	−0.2	13.0	7.4	11.3	0.7

End of period levels

	1973	1975	1979	1981	1985	1973	1975	1979	1981	1985
(g) Profit share	43.4	15.2	19.2	18.6	20.8	13.0	16.2	15.1	11.8	11.8
(h) Profit rate	43.9	10.4	14.2	13.5	15.3		16.2	15.5	10.7	10.7

A, 1973–5; B, 1975–9; C, 1979–81; D, 1981–5.
Rest as for table 8.3.

scrapping of plant because of the acceleration in the growth of real direct costs of production, for such accelerated scrapping is not captured in the capital stock figures which are based on conventional assumptions about asset lives.

Thus the falling output–capital ratio was a subsidiary component of the fall in the profit rate in the early 1970s (table 8.3 lines 6 and 9, shows it having about two-thirds of the impact of the profit squeeze). Such a decreasing 'productivity of investment' owed more to firms' inability to pass on input, depreciation and wage costs into final prices than to the slackening of the trend in real output per unit of capital. Similarly, while slackening of labour productivity growth contributes to the pressure on the profit share, what has to be explained is the inability of employers to pass this adverse trend, together with the very important rise in input costs, into a rate of price increase which would ensure that profitability was maintained.

The decline in the profit rate prior to 1973 reflected a combination of pressures – indications of a slackening of labour productivity growth and of the 'real' output–capital ratio and rising wage and input costs – which collided with effective constraints on firms simply offloading these pressures in sufficiently accelerating inflation.

8.4 PROFITABILITY TRENDS SINCE 1973

The main interest in decomposing the profitability trends since 1973 is to compare the two periods of 'shock' (OPEC I in 1973–5 and OPEC II in 1979–81) and the two periods of 'recovery' (1975–9 and 1981–5). Tables 8.5 and 8.6 present the post-1973 data in the same form as before. Rather than working through them sequentially, we shall simply comment on the main highlights.

Figures 8.4–8.6 compare the two post-OPEC periods in each block. Japan stands out as having coped with OPEC II with virtually no profit squeeze (or change in the wage share), despite terrific pressure from input costs which meant that real factor incomes were falling. Wages bore the brunt in 1979–81, whilst they continued to rise very rapidly (in product terms especially) in 1973–5 (figure 8.4). The behaviour of the real output–capital ratio was also much more favourable in 1979–81 (table 8.6, line 7) and the latter effect was enhanced (line 8) by falling relative prices of capital goods (line (e)).

In Europe the squeeze was rather less powerful during OPEC II (figure 8.5). This reflected both slower product (and real wage (table 8.5, line (c)) growth and rather less pressure from input costs (line 2). Capital costs were also increasing less sharply. It is likely that the much
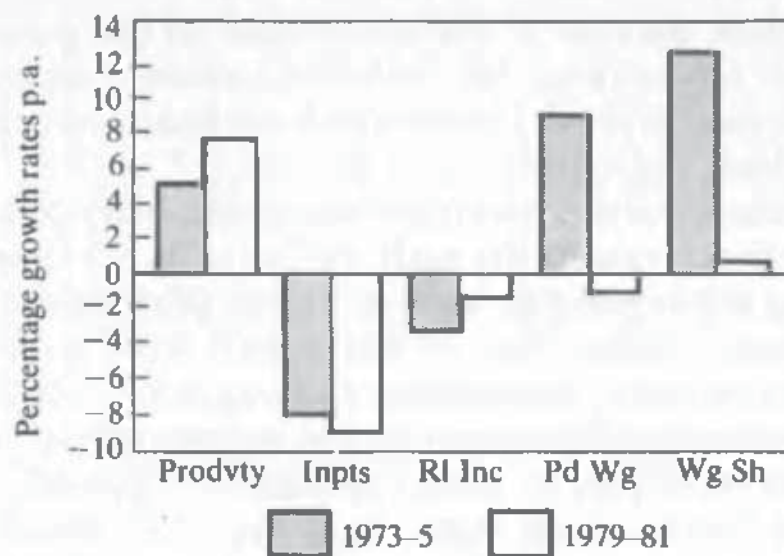
A. GLYN

Figure 8.4   Japan profits and OPEC shocks: comparison of 1973–5
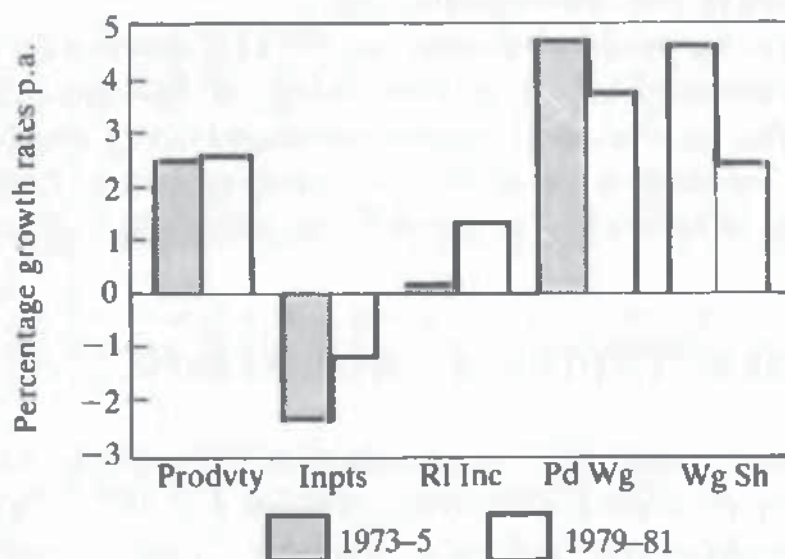and 1979–81.

Figure 8.5   Europe profits and OPEC shocks: comparison of 1973–5
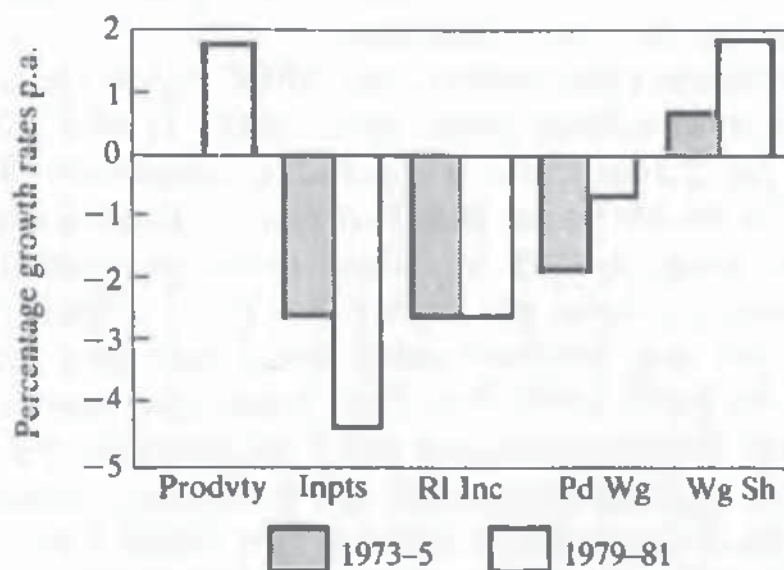and 1979–81.

Figure 8.6   US profits and OPEC shocks: comparison of 1973–5 and
1979–81.

higher level of unemployment was responsible for the less aggressive wage bargaining, and that this outweighed the product market pressures on profits which derived from the much more deflationary stance of demand management than after OPEC I.

The United States weathered OPEC II rather worse than OPEC I (figure 8.6). Despite the fact that productivity growth was maintained, the pressure of input costs was greater and the fall of product wages less (although real wages fell considerably faster (table 8.6 line (c)), reflecting a much less favourable pattern of relative prices).

Just as the fall in profitability was generally less during OPEC II, so the recovery in profits was rather greater after 1981 than after 1975. In Europe productivity growth was rather similar during the two recoveries, and despite a less favourable pattern of input costs the slower rise in product wages displayed during OPEC II carried on into the recovery period. In the United States productivity growth was much faster during 1981-5, but most of this was swallowed up by a faster growth of product wages than during 1975-9 and the profit rate simply stabilized. Only in Japan was the recovery in profitability a little weaker after 1981.

The final point to note is that the post-1973 'recoveries' had not, by 1985, taken the manufacturing profit rate back to the 1973 level. Indeed in both Japan and the United States it remained around half the 1973 level; surprisingly, it was Europe where the fall between 1973 and 1985 was least, about a quarter.

8.5 CONCLUSION

As we have repeatedly emphasized, decomposing shifts in the profit rate is a way of pointing up the contributory factors whose trends then have to be explained (productivity slowdown, wage pressures, constraints on firms passing on cost increases, relative prices of inputs and outputs). Despite being no more than an overture to a comprehensive analysis, such exercises do point forward in a helpful way to the themes which have to be elaborated.

NOTES

1   Marx's actual formula of course was $R/K = (R/W) \times (W/K)$ where W is the wage bill ($R + W = Y$), R/W is the rate of exploitation (expressed in money rather than labour values) and W/K is the money expression of Marx's organic composition. As well as being measured in money rather than values (which may make little difference quantitatively (see Petrovic 1987)), the calculations in money terms based on national accounts statistics ignore the role of unproductive labour. According to one line of argument the wages of unproductive labour should be subtracted from W and added to R (e.g. Moseley, 1985). This latter issue will not be discussed further, although if it is felt that the role of unproductive labour should be isolated, there is nothing to stop the decomposition presented here from being extended to show the influence of shifts in the share of unproductive labour in affecting the profit rate in money terms.

2   The data set represents an updating and reworking of that used by Armstrong et al. (1984). It is presented in detail and described by Armstrong and Glyn (1986). The decompositions for manufacturing profitability later in the paper take the story up to 1985 by linking on the most recent data to our basic set.

3   Such decompositions of the profit share have a long history. Ricardo's discussion of the effect of increasing real cost of producing workers' subsistence in reducing profits is implicitly based on a decomposition of the wage share into real wages and productivity in the wage goods sector.

4   This distinguishes the method of decomposition used here from that of Weisskopf (1979, 1985) who uses value-added prices.

5   Line (d) of our tables shows estimates of the growth of real direct costs (a weighted average of input and wages both deflated by manufacturing output prices). In each of the three blocks the growth of product wages was as fast or faster in the early 1970s than in earlier cycles which is consistent with there having been pressure from over-accumulation.

6   We are forced to assume that the real ratio of value added to gross output is constant (constant 'materials productivity') for lack of any data.

9

Marxian Crisis Theory and the Rate of Profit in the UK Economy 1957–1985

DAVID MORETON

9.1 INTRODUCTION

The question of what influences the average rate of profit in a modern capitalist economy is an important one. Where investment is financed by, and undertaken in order to make, current and future profits, abnormally low rates of profit are almost certain to limit and/or discourage new investment and hence adversely affect the rates of growth of aggregate output and employment. Consequently, falling rates of profit are identified in Marxian theory as the single most important explanation of capitalist economic crises.

The objective of this chapter is to identify the influences on the rate of profit in the UK economy from 1957 to 1985 using annual time series data. The econometric specification used is based on a framework for analysis developed by Weisskopf (1979) to identify the contributions made to declines in the US rate of profit by its component parts. Weisskopf's work has most recently been updated for the United States by Henley (1987), while a recent empirical study of influences on the profitability of the UK manufacturing sector by Funke (1986) is based on Weisskopf's approach.

By using identities to evaluate the validity of three different variants of Marxian crisis theory empirically, Weisskopf demonstrates the primary contribution to declines in the US rate of profit for the period 1949–75 to have been made by declines in the profit share, while Henley shows how declining capacity utilization rates have been of primary importance for the period 1975–82. Although Weisskopf presents data which indicate an empirical relationship between tighter labour markets and a declining profit share, the use of regression analysis to identify and/or substantiate other possible causes of a declining profit share and rate is beyond the scope of his (and

Henley's) study. In this respect, Funke extends Weisskopf but does not employ regression analysis in such a way as to be able to identify both the effects and potential counter-effects of particular variables as they influence the rate of profit via their separate effects on its component parts. This is the primary motivation for the present study.

In section 9.2 we present the econometric specification and set out the hypotheses advanced by two variants of Marxian crisis theory (the 'rising strength of labour' and the 'rising organic composition of capital' variants) which determine the choice of regressors. In section 9.3, having briefly explained how statistical measures of the dependent and independent variables were constructed, we present and analyse the results, while in section 9.4 we summarize the main findings and indicate comparisons with other results.

9.2 THEORY

Following Weisskopf (1979), the rate of profit can be expressed as the product of the share of profits in national income and the output – capital ratio,[1] i.e.

$$R = \frac{P}{K} = \frac{P}{Y} \frac{Y}{K} = SZ \tag{9.1}$$

where R, S and Z are the rate of profit, the profit share and the output – capital ratio respectively. The logarithmic transformation $r = s + z$ (lower case letters denote logarithms throughout this chapter) suggests the following econometric specification:

$$s_t = a'x_t + e_{1t} + z_t = b'x_t + e_{2t} = r_t = c'x_t + e_{3t} \tag{9.2}$$

where x_t is a $k \times 1$ vector of (as yet unspecified) regressors; a, b and c are all $k \times 1$ vectors of regression coefficients, and the e_{it}, $i = 1, \ldots, 3$ are white noise error terms.[2] Within this framework, we can both identify the influences on the profit share and the output – capital ratio and how these separate effects combine to affect the rate of profit overall.

Weisskopf's characterization of the 'rising strength of labour' variant suggests three variables which can affect the rate of profit via their effect on the profit share. These are the rate of unemployment, the level of trade union density and the share of imports in national income. In addition, I include the tax rate on wage income. The rate of unemployment represents the (short-run) hypothesis that the depletion of the reserve army of labour improves the bargaining position of workers relative to capitalists, and this enables workers to bargain

more successfully for higher wages (and thus a higher wage share) and to resist more successfully attempts made by firms to increase labour productivity by increasing work intensity. The level of trade union density represents the (longer-run) hypothesis that greater trade union power enables workers to raise the wage share and consequently reduce the profit share. The share of the value of imports in national income represents the (Glyn and Sutcliffe) hypothesis that the greater is the degree of international competition in product markets faced by domestic firms, the lesser is the ability of those firms to offset the negative effect on the profit share of higher money wages and lower labour productivity by raising output prices. The tax rate on wage income is included since the higher is the product wage (share), the lower should be the profit share.

Two further regressors are included in the model: a time trend, to reflect the hypothesis that a rising organic composition of capital, and thus a falling output–capital ratio, [3] might be explained as a result of technical progress, and the rate of economic growth to represent the general influence of cyclical factors. The expected signs of the long-run elasticities of each variable within each equation (a, b and c) are given in table 9.1.

Potential counteracting (or 'cross-equation') effects are the influences of the time trend on the profit share, and those of unemployment, trade union power, international competition and the tax rate on the output–capital ratio. The expected time trend is negative if, over time, the balance of political-economic power shifts in favour of workers, enabling them to raise the wage share. Unemployment may have either a positive or a negative effect on the output–capital ratio: either higher unemployment or lower unemployment (which forces capital-intensive accumulation) raises the real capital–labour ratio and thus the organic composition of capital[4] to reduce the output–capital ratio. Both greater trade union power and a

Table 9.1 *A priori* expected signs of the long-run elasticities

Hypothesis	Dependent variable		
	s_t	z_t	r_t
Unemployment	+	±	±
Trade union power	−	−	−
International competition	−	−	−
Tax rate on wage income	−	−	−
Rate of economic growth	±	±	±
Time trend	−	−	−

higher tax rate on wage income are expected to have a negative effect on the output–capital ratio by motivating the substitution of labour for capital which raises the organic composition of capital. By stimulating technical progress and so raising the real capital–labour ratio, import penetration (increasing international competition) is expected to have a negative effect on the output–capital ratio. Growth may have a negative effect on the profit share – by depleting the reserve army of labour – or a positive effect as expanding product markets facilitate output price rises which raise the profit share. Depending on whether the higher investment induced by a higher rate of economic growth is capital or labour augmenting, growth has a negative or a positive effect on the output–capital ratio by raising or lowering respectively the real capital–labour ratio.

9.3 RESULTS AND ANALYSIS

The rate of profit $R = P/K$ is measured as the ratio of gross trading profits to net capital stock, the profit share $S = P/Y$ is the share of profits in the value of gross output and the output–capital ratio $Z = Y/K$ is the ratio of gross output to net capital stock. The behaviour of each of these series is illustrated in figure 9.1 which shows steady declines in each over the sample period 1955–85, and that each is generally lower in the period after 1973 (the end of the long post-war boom).
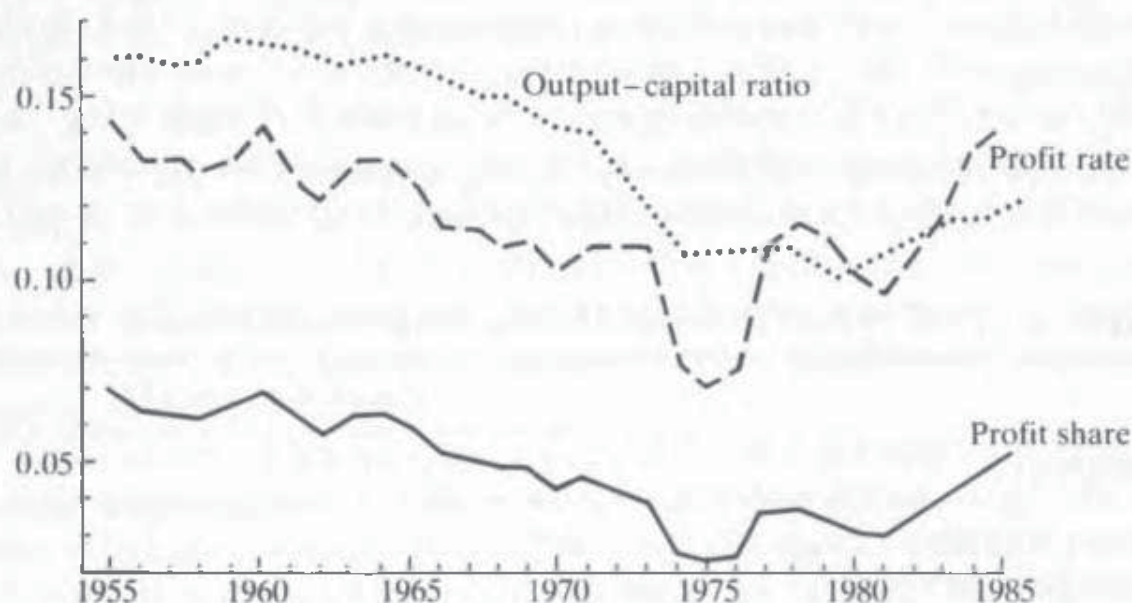

Figure 9.1   Output–capital ratio, profit share and profit rate over the period 1955–85. The output–capital ratio is scaled by a factor of 1/3.

Source: ETAS (1987), tables 8 and 168, UK National Accounts, various

Statistical measures of the independent variables are defined as follows: the rate of unemployment is defined as the proportion of the working population unemployed. The level of trade union density is the share of trade union membership in total employment. The import share is the share of the value of imports in gross output. The tax rate is

Table 9.2 Estimation results

	Dependent variable		
	s_t	z_t	r_t
Constant	− 3.580* (1.580)	− 0.002 (0.290)	− 4.060* (1.640)
Time trend	0.036 (0.019)	− 0.005 (0.004)	0.036 (0.020)
u_{t-1}	0.018 (0.074)	0.100* (0.017)	0.098 (0.077)
u_{t-2}	0.160* (0.078)	0.027 (0.021)	0.190* (0.081)
tr_t	− 1.890* (0.510)	0.430* (0.110)	− 1.590* (0.530)
tr_{t-1}	0.850* (0.310)	− 0.320* (0.085)	0.500 (0.330)
$(m-y)_t$	− 0.600 (0.380)	− 0.420* (0.100)	− 1.020* (0.390)
$(pm-py)_t$	0.066 (0.220)	− 0.150* (0.061)	− 0.078 (0.230)
$(pm-py)_{t-1}$	0.440 (0.230)	0.110 (0.061)	0.580* (0.240)
s_{t-1}	− 0.051 (0.200)		
z_{t-1}	1.360* (0.360)	0.890* (0.074)	2.480* (0.540)
r_{t-1}		− 0.130 (0.210)	
SER	0.053	0.015	0.055
R^2	0.945	0.995	0.981
$\bar{R}^2$	0.915	0.993	0.971
Durbin–Watson	2.320	2.505	2.331

Equations were estimated using ordinary least squares regression for the sample period 1957–85. Standard errors are in parentheses. Coefficients significantly different from zero at the 5 per cent level are marked with an asterisk.

tax revenues as a proportion of taxable income. The first difference in logarithms is used as an approximation of the growth rate of real output, and the time trend variable took a value of 1 in 1955, 2 in 1956 and 31 in 1985. The regression results and the long-run elasticities and steady state coefficients derived from the results are presented in tables 9.2 and 9.3.

During the specification search, the growth rate and trade union density regressors were eliminated from the model since neither was found to be significant in any regression. The current value of the unemployment rate variable was similarly eliminated. The import share measured in nominal terms can be decomposed into its price and quantity components, being equal to $(pm - py) + (m - y)$ where $pm - py$ is the price of imports relative to domestic output prices and $m - y$ is the real import share, which allows price and quantity effects to be considered separately. Lagged dependent variables were included to correct for serial correlation of the residuals. As a consequence of the inclusion of different lagged dependent variables in each equation, the model only approximately preserves 'adding-up' $(a + b = c)$. The model is well defined, having passed mis-specification tests for independence in the systematic and non-systematic components, linearity, homoscedasticity and normality. According to Chow's second test for coefficient and variance equality, the model for the subperiod 1957–73 predicts the period 1974–85, and likewise the model for the subperiod 1957–82 predicts the subsequent period 1983–5. The mis-specification testing results are reported in table 9.4.

Support for the 'rising strength of labour' hypothesis that lower unemployment implies a lower profit share and rate is provided by the positive sign of the long-run elasticity of u in s and r. Moreover, unemployment lagged twice has a significantly positive effect on both the profit share and the profit rate.[5] Since the long-run elasticity of the rate of unemployment with respect to the output–capital ratio is also positive, there is no evidence of any counteracting effect of unemploy-

Table 9.3 Long-run elasticities

	Dependent variable		
	s	z	r
u	0.169	1.155	0.225
$(m - y)$	− 0.571	− 3.818	− 1.153
$(pm - py)$	0.481	− 0.364	0.567
tr	− 0.990	1.000	− 0.965

Table 9.4 Tests

	Dependent variable		
	s_t	z_t	r_t
Independence	1.88	0.94	1.93
	(3.02)	(3.11)	(3.02)
Autocorrelation	2.50	2.07	1.30
	(3.48)	(3.36)	(3.48)
Predictiveness	3.22	0.79	2.20
(57:73, 74:85)	(4.00)	(3.57)	(4.00)
Linearity	0.06	0.05	0.11
	(2.07)	(2.07)	(2.07)
Homoscedasticity	0.09	1.29	0.64
	(2.07)	(2.07)	(2.07)
Normality	1.57	0.07	0.62
	(5.99)	(5.99)	(5.99)
Predictiveness	0.95	0.76	1.59
(57:82, 83:85)	(3.29)	(3.24)	(3.29)

See appendix for description of tests.
Table entries are the calculated value of the test statistic appropriate to the statistical assumption being considered, with the critical value given in parentheses. The size of each test was set at 5 per cent. A value of the test statistic lower than the critical value indicates that the statistical assumption being considered is valid.

ment on the organic composition of capital. The significant effect of unemployment lagged once in the equation for the output–capital ratio is not sufficient to affect the rate of profit.

The 'rising strength of labour' hypothesis that the greater the degree of international competition faced by domestic firms, the lower the profit share and rate, is lent support by the negative sign of the long-run elasticity of the real import share variable $m - y$ with respect to s and r. However, contrary to the expectation of the theory, the significance of the current value of the real import share variable in the rate of profit equation derives from its significance in the output–capital ratio equation and not its significance in the profit share equation. Thus import penetration seems not to influence the rate of profit by way of its influence on the ability of domestic firms to raise output prices, but may do so by lowering employment, raising the real capital–labour ratio and consequently lowering the output–capital ratio.

A possible explanation for the positive sign of the long-run elasticity of the relative import price variable *pm* − *py* with respect to the profit share and the rate of profit is that the variable represents a competitiveness effect. That is, the higher the price of imported finished goods relative to their domestically produced substitutes, the higher is the domestic demand for the latter which boosts exports and raises the profit share and rate. However, as the negative long-run effect of the variable on the output–capital ratio suggests, the cost of increased competitiveness may be a lower output–capital ratio, which is achieved through innovation which raises the real capital–labour ratio. Competitiveness only has a significant effect on the rate of profit with a 1 year lag, suggesting that competitiveness is only significant if not transitory.

There is evidence in the long-run elasticities that the relative import price effect counteracts the real import share effect on the profit share and the rate of profit. A possible explanation is that higher imports depreciate the exchange rate to improve competitiveness by raising the relative price of imported finished goods. Evidence of such a counteracting influence is quite apparent in the profit share equation and less so in the rate of profit equation.

As expected, the long-run elasticity of the tax rate on wage income with respect to the profit share and the rate of profit is negative: the money wages paid by firms rise with the tax rate. However, there is also evidence of a counteracting effect of higher taxes on the output–capital ratio. A possible explanation is suggested by the following identity which expresses the price analogue of the organic composition of capital as

$$J = \frac{K}{W} = P(k)\frac{\overline{K/L}}{P(w)\overline{w}} \tag{9.3}$$

This suggests, *ceteris paribus*, that a rise in the tax rate on wage income increases the real product wage to lower the organic composition of capital in price terms and raise the output–capital ratio.

As a final observation, the fact that the time trend is not significantly different from zero in any equation suggests constancy rather than any tendency for the profit share, the output–capital ratio and the rate of profit to fall over time.

9.4 CONCLUSION

The objective of this chapter has been to identify the influences on the rate of profit in the UK economy between 1957 and 1985. Particular

attention has been paid to how separate effects on the profit share and the output–capital ratio might combine to affect the rate of profit overall. Effects and counter-effects have been identified. Some possibilities suggested by the data are as follows. First, while innovation can raise the profit share by improving competitiveness, it may reduce the output–capital ratio by raising the organic composition of capital. Second, higher import penetration may reduce profitability by lowering employment, raising the organic composition of capital and lowering the output–capital ratio, but, by depreciating the exchange rate, may raise the relative price of imported finished goods and raise the profit share by improving competitiveness. By way of comparison, Funke finds international competiveness to be insignificant with respect to the rate of profit, but does not consider price and quantity effects separately. Third, higher taxes lower the profit share but raise the output–capital ratio. Other findings are some support for the 'reserve army of labour' hypothesis (as Weisskopf found for the United States) and that, over time, the rate of profit appears to be constant. In contrast, Funke finds a significantly negative time trend (with a different set of explanatory variables) for the profit share and profit rate. The data provide no evidence to support the hypothesis that trade union power has any significant effect on the rate of profit, and this compares with Funke who finds the differential between union and non-union wages mostly insignificant with respect to the profit share and rate.

NOTES

1 Weisskopf expresses the rate of profit as the product of the profit share, the rate of capacity utilization and the capacity output–capital ratio. The rate of capacity utilization is included in order to identify the 'realization failure' variant of Marxian crisis theory. For simplicity, I decided not to identify this variant.

2 In equation (9.2) using ordinary least squares and the same independent variables within each equation, the property of 'adding-up' is satisfied (i.e. $a + b = c$).

3 Given a constant wage share (as is assumed under the 'rising organic composition of capital variant' of Marxian crisis theory), a rise in the organic composition of capital is reflected in a fall in the output–capital ratio, as is illustrated by the following identity:

$$Z = \frac{Y}{K} = \frac{Y}{W} \frac{W}{K} = \frac{1}{W/Y} \frac{1}{K/W}$$

where W/Y is the wage share and K/W is the price analogue of the organic composition of capital (K is the net capital stock and W is the wage bill).

4   A rise in the real capital – labour ratio is associated with a rise in the organic composition of capital since

$$J = \frac{K}{W} = \frac{K}{wL} = \frac{P(k)\bar{K}}{P(w)\bar{w}L} = \frac{P(k)(\bar{K}/L)}{P(w)\bar{w}}$$

where J is the price analogue of the organic composition of capital and K/L is the real capital-to-labour ratio.

5   The coefficient on the unemployment variable with a two year lag was on the margin of significance (at the 5 per cent level) in the profit share equation–registering a t statistic of 2.05 as against a critical value of 2.10.

APPENDIX

Description of mis-specification tests. The individual tests reported in table 9.4 were as follows.

1   Independence: unrestricted model = model + tr_{t-2}, $(pm - py)_{t-2}$, $(m - y)_{t-2}$

s_{t-2}, z_{t-2} (in s_t)

z_{t-2} (in z_t)

z_{t-2}, r_{t-2} (in r_t)

2   Autocorrelation: F test of first-, second-, third-and fourth-order lagged residual equal to zero.

3   Predictiveness: Chow's second test for coefficient and variance equality between periods.

4   Linearity: 'RESET' test. The table entry is the absolute value of the t statistic on the square of the fitted values.

5   Homoscedasticity: tested by running $e_t^2 = a + be_{t-1}^2$. The table entry is the absolute value of the t statistic on the square of the first-order lagged residuals.

6   Normality: skewness–kurtosis (Jarques–Bera test).

10

Macroeconometric Models: a Critical Introduction

PAUL DUNNE

10.1 INTRODUCTION

Large econometric models are an important tool in policy debate. They are used with varying degrees of conviction to support or oppose economic policies and to forecast the future path of the economy. Model predictions and simulations provide weight to arguments in favour of, or against, particular policies. They occupy a rather uneasy position on the boundary between academics, who have provided much of the modelling input and innovations, and the 'real' world of government and industry, who are the users and providers of funding. Modellers thus come under heavy commercial and political pressure, and some rather cynically adjust their work to reflect these interests and to find the answers that their customers or funders want rather than attempting any investigative academic research. As practical tools they serve their purpose reasonably well in general but tend to be oversold and used for political point scoring.

Despite their importance in policy debate there is often little information on the structure of the models, leading to a mystification and 'black-box' approach to their use and interpretation. This probably strengthens their influence, as their limitations are not considered and there is an implied ideological neutrality in their structure and use. In fact there are many serious limitations to the use of such models, and many of the differences between them reflect political interests and judgemental *ad hoc* adjustments to results.

The Left has tended to take a cynical and dismissive attitude to macroeconometric models, despite some promptings to the contrary, such as that of Neuberger (1983). This remains an unfortunate attitude as it inhibits a critical input by the Left into policy debates. It is important to have some understanding of the models and their

structure, background and limitations to provide critiques of policy. Whatever their limitations, the models are important because they are the tools with which policy debate is conducted.

Existing models can be used in a different way, reinterpreting or restructuring them. Indeed, with the development of personal computing power it is possible to democratize the use of such models. It is also possible to take a more positive line and produce models that can be used to develop and to support Left policies. Such developments have the potential for providing powerful tools for the Left in policy construction and debate.

This chapter provides an introduction to the available models of the UK economy. It is aimed at those who have little knowledge of the models other than references to them made in the press. The intention is to explain what the models are, how they are constructed, and how they are used. The context of the models is important; they have to be seen as the product of a group of economists open to numerous pressures, both direct and indirect. Thus we consider how the groups operate, who pays for them and the dynamics of forecasting and policy analysis. The problems of undertaking these tasks are discussed, and it is shown that the fabled 'scientific' nature of the models, which is implied when they are used to criticize or to back up policy proposals, hides numerous difficulties and *ad hoc* procedures.

10.2 MACROECONOMETRIC MODELS

Macroeconometric models are simply a set of equations describing identities and behavioural relationships between economic variables. There are two types of variables: exogenous variables such as the growth or level of world trade historically and in the future, the values of which are determined outside the model, and endogenous variables such as output and employment, which are determined within the model. For each of the endogenous variables there will be an equation, which makes it some function of the exogenous variables and some endogenous variables which are determined in other equations.

These equations are usually structural models based upon theory, estimated separately using econometric methods. The estimation techniques can vary, and sometimes equations are calibrated using more *ad hoc* methods. Once the individual relationships have been estimated the model can be solved, i.e. a set of values for the endogenous variables is found which is consistent with all the estimated equations, identities and exogenous variable values. However, the final outcome will depend on how the team makes

adjustments, by choice of equations, by alterations to estimated parameters in equations and by making residual adjustments to individual equations.

These interrelations and identities provide an accounting framework which allows feedbacks to be taken into account, which a more partial analysis, just looking at a single equation, could not do. The models are thus intended to provide a consistent framework within which economic analysis can be undertaken. The simultaneity and dynamics require a formal representation of the equations which could not be adequately achieved by *ad hoc* methods. This means that the models can model the economy as a system rather than simply focus on one individual part.

Time series techniques provide an alternative to the use of estimated structural models for forecasting. These techniques are often univariate and simply forecast the future values of a variable from its past values. In the short run such extrapolative procedures can be accurate, but are less likely to be useful for the longer term and do not allow the likely effects of policy changes to be evaluated. In some instances there may be no alternative to such methods.

The major practical roles of macroeconomic models are to provide policy prescriptions and economic forecasts in the short and medium term, to evaluate the effect and timing of macroeconomic policies and shocks to the economy, and so to aid economic planning.

Although much of the work on macromodelling has been developed from the work of the Keynesians, as discussed in chapter one, recent developments have tended to try to cast doubt on the Keynesian underpinning of the models, putting forward alternative views of the way the world works which are more akin to the pre-Keynesian neoclassicals. In fact, although the models are based on Keynes work, this does not mean that Keynes would have been impressed. His critiques of early econometric modelling are rather cutting (Pesaran and Smith, 1985).

10.3 MODELS OF THE UK ECONOMY

There are a number of models of the UK economy which differ in their purpose, theoretical underpinnings, empirical estimates and source of funds. The actual technical differences between the models are often less pronounced than would be expected from their stated policy prescriptions. It is therefore important to consider the political and ideological position of the models and the role of external pressures. We shall consider the models briefly here. Kenway (1989) provides a

more detailed survey of the UK macroeconometric models and their historical development.

The academically supported models are as follows from right to left.

Liverpool   Despite the economic conditions in Liverpool, Patrick Minford manages to be the most right-wing and strongest supporter of government policies. For example, he considers that unemployment results from benefits being too high. The model is small, annual and very monetarist, and it assumes instantaneous market clearing with rational expectations playing a fundamental role. Minford obtains a lot of media coverage and exposure for his right-wing ideas, but there is evidence that the equations are rejected by the data. The forecasting record of the group is generally poor for the real economy, although they have been more successful in forecasting inflation (Wallis et al., 1987).

City University Business School (CUBS)   The driving force behind this model was Michael Beenstock. He originally moved from the London Business School and has recently left CUBS, causing the demise of the model. The model was a small supply-side one which performed very badly in comparative exercises. Its Economic and Social Research Council (ESRC) funding was reduced and the model died at the end of the funding. It was always a 'preliminary version' when performing badly in comparative exercises, but this did not inhibit its use in policy analysis.

London Business School (LBS)   The LBS model constructed by Ball and Burns in the mid-1960s was the first of the modern models of the UK economy to be used for forecasting and policy analysis. The model is a quarterly one based on income expenditure framework. Initially it had a traditional Keynesian structure, but was reconstructed in the mid-1970s along international monetarist lines. In 1979 Burns became Mrs Thatcher's chief economic adviser, and Budd became responsible for the model. There was a change of stance with Burns's departure, with the group no longer being confirmed monetarists and the model becoming a more eclectic Keynesian one, although with rational expectations used in some parts such as the financial sector and the foreign exchange markets. Budd recently left and is being replaced by David Currie, moving it further away from the monetarist line.

National Institute for Economic and Social Research (NIESR) Directed by Andrew Britton, and used to be the place where out of favour civil servants were exiled. Indeed, it was often referred to as the 'Treasury in exile'. The model is a standard Keynesian demand-side quarterly one which over recent years it has come under attack as the

Treasury policy stance changed, including pressure from the ESRC consortium to become more like the LBS. Although still demand orientated, parts of the model have been revised to take on board rational expectations, which is now more widespread than in the LBS model, and supply-side properties such as the natural rate hypothesis.

Cambridge Growth Project (CGP) Director Terry Barker. Funding removed by the ESRC Consortium in 1987. Cambridge Econometrics, a private consultancy, markets the forecasts. It is rather different to the other models, having a Keynesian demand-side with an input–output structure embedded in a set of macroeconomic equations. It provides a bottom-up industrial aggregation, moving from the individual industries to the aggregate economic variables. It was started by Richard Stone to provide an economic planning model and provides industrial level analysis and forecasts. In common with the Cambridge Economic Policy Group, it provided pessimistic medium-term forecasts which were unpopular but generally accurate.

Cambridge Economic Policy Group (CEPG) Funding withdrawn by the ESRC Consortium in 1982. Director Wynne Godley, ex-Treasury. This was an annual model used mainly for medium-term forecasts. It produced pessimistic forecasts in the 1970s which were extremely unpopular, forecasting the balance of payments deficits in the 1970s and the high unemployment of the 1980s, and being attacked for this. The model was fairly standard Keynesian, but with the new Keynesian features in the treatment of private demand. The group advocated import controls and reflation as a macroeconomic strategy to help tackle British economic problems in the 1970s.

There are also a number of models supported by government departments and used for policy analysis. Old versions of them are usually accessible but they are continually under development, often being changed to reflect government and Treasury views. The Treasury model is a very large, though recently slimmed down, model which is Keynesian in origin and has a highly developed financial and public sector. The ITEM group uses a version of the model to provide publicly available forecasts. The Bank of England also has a model which started life as an LBS model but has developed separately. It has a well-developed international sector.

There are also a number of private models, for example, Phillips amd Drew, Henley Centre for Economic Forecasting, Oxford Economic Forecasting, DRI and Chase Econometrics, but there is little information available on how they work.

The surviving academic models are used by the groups who maintain and develop them to provide regular forecasts, usually

including some policy analysis. Since 1983 versions of the models have been deposited at the Macroeconomic Modelling Bureau at the University of Warwick, which allows academic users access to the models. The Bureau also produces reviews of the models comparing their properties and forecasts, and making comparative asessments of sectors of the models. In addition to the ESRC supported models, they have versions of the Treasury and Bank of England models (see, for example, Wallis et al., 1987). This provides extremely useful information on the models and any changes that have been made to them. The Bureau's evaluation of the models is delivered in measured technical terms, so that the criticisms they make are often only apparent to experts. One has to read between the lines for the damning indictments of the CUBS and Liverpool models.

There are large structural and theoretical difference between the models and they differ in their policy implications. This is not to say, however, that the policy stance actually matches the model. On a number of occasions anti-Keynesian views have been advocated on the basis of what is in essence a Keynesian model. There are also pressures to conform, both by the fact that reference is made to what the other modelling teams are saying and by the clear positive correlation between critical stance and removal of funding.

10.4 FORECASTING AND POLICY ANALYSIS

The two main uses of the models are for forecasting and policy analysis. Using a model to make a forecast is not a straightforward task. Briefly, the procedure is as follows.

- The version of the model is finalized, in the sense that the estimated relationships are chosen and tested to make sure that they have sensible properties.
- The exogenous variable values are agreed upon, using various sources of information.
- A solution is tried; if it does not solve further adjustments are made. The model is then used to forecast the future. Residual adjustments are made to ensure consistency with most recent data and to make sure that the forecast is sensible and internally consistent.
- The results are considered and adjustments are made where necessary.
- The process is repeated until it iterates to a sensible and acceptable forecast.

The model is important in providing a consistent accounting framework. Changes made to one part of the model will affect other parts, meaning that the modelling team cannot simply decide on the outcome at the start. The model is not used mechanically, as the team will fix up equations, overriding estimated parameters, exogenizing variables and making residual adjustments, and put in *ad hoc* rules. They use 'type one' and 'type two' adjustments. The former is an adjustment made directly to a particular variable, while the latter is an indirect adjustment made to a particular variable which is achieved by adjusting one or more other variables in the model that have an effect on the variable of interest. These off and on model adjustments and the assumptions made about the exogenous variables can have a dominant effect on the forecast. See Keating (1985) for a discussion of the forecasting process, as practised at the LBS. Also, Hesselman (1986) considers the issues involved in the construction of long-run forecasts, with reference to the CGP model.

Simulations can be undertaken where the model is 'shocked' by a change in one or more exogenous variables and the new values compared with the base forecast. This procedure provides information on the properties of the model, showing how it responds to changes in individual variables and allowing the modelling team to see if the model has sensible properties. It can also be used to analyse the likely impact of alternative policies (Turner et al., 1988), although one should bear in mind that the results may be adjusted off model.

Another approach, which we call scenario setting, is where changes are made to the values of variables and possibly some model relationships to show a particular type of world, for example, one with a high oil price. This can then be compared with a base forecast or with another scenario, such as a world with a low oil price.

These two approaches are often confused in that it is sometimes not clear what the modellers have done in setting up the changes to the model. It is also important to be careful that the result of policy analysis is not in fact assumed in the model, and that the model can in fact answer the question being asked. Often the form of the model restricts the policy questions on which it can shed light, and this is sometimes not made clear in the published studies.

10.5 THE STRUCTURE OF THE MODELS

The common lineage in Keynesian economics allows a number of similarities to be found in the structure of the models, although the model properties may differ because of variation in the specification and

estimation of important equations, such as the wage or exchange rate equations.

All the models have some demand side in consumption and investment. These are mainly from the Keynesian background, although there are often expectational terms representing the influence of monetarist and new classical economics. In recent years there has been an increasing emphasis on the supply side of models. This can be an input – output structure, an aggregate production function, a labour supply relationship, a formalization of incentive effects or some combination of these. In fact there is often nothing. The labour market is usually represented by some form of wage equation and some form of labour demand function.

In most models the government sector is exogenous, although attempts are sometimes made to introduce government reaction functions, i.e. to make government expenditures respond to various economic indicators or some *ad hoc* policy rules. Most models have a foreign sector of some form. A crucial difference between models is usually whether or not they have an endogenous exchange rate. Most exchange rate equations are not particularly satisfactory, and the exchange rate has to be exogenized when the model is used for forecasting purposes. The modelling teams generally do not attempt to model the rest of the world except in a very partial sense, although there are now separate models which forecast the reat of the world, for example the global economic model (GEM) at the NIESR. The modelling of the financial sector has been a recurrent problem and has recently received more attention, although financial models are not highly developed except in the Treasury and LBS models.

There will always be parts of the models which have to be made exogenous as it is not possible to estimate equations for them. These will vary between models but not by a great deal. It is also worth noting that there may be more exogenous components than the teams explicitly state. Consequently, parts of the estimated model may need to be overwritten in the production of a forecast.

Most of the models have some form of disaggregation of macroeconomic aggregates, although often only into very broad categories such as manufacturing and other industries. Some teams do provide sectoral or more detailed forecasts, but only the CGP model has detailed industrial disaggregation built into the structure. In this model relations are estimated for each industry and these are aggregated to give the total. This was developed from the work of Leontief, which was based on Marx's reproduction schema as discussed in chapter one. The alternative is the top-down approach where the macroeconomic aggregates given by a model are allo-

cated to industries using a fixed weight converter. This approach is inferior to the bottom-up one as it does not readily allow for structural change.

10.6 PROBLEMS

There are several issues in the use of macromodels which cause problems in use and interpretation. They are not arguments against using the models, but do illustrate their limitations and show the care that must be taken when using them. They also allow a healthy scepticism of the output of the models.

Most models cannot deal with any changes in the structure of the economy, because their econometric relations inherently require structural stability. This argument was used by Thatcher's ministers when models were used to criticize their policies. Models are estimated on past data and cannot be expected to forecast profound structural change. In addition, the structure of the model might not contain the information required, or the theoretically derived form of the model may restrict the analysis.

Related to this is the Lucas critique, an influential attack from the Right on the use of Keynesian models for policy analysis. The monetarist critique of Keynesian models originally led to the introduction of adaptive expectations. The new classicals then criticized this, arguing that under adaptive expectations processes individuals would continually make systematic errors, for example, continually underestimating inflation if it continued to increase. This was unrealistic and certainly inconsistent with rational behaviour. In addition, Lucas claimed that it was logically invalid to use a model estimated under one policy regime to evaluate the effects of a policy change, as any important change in policy would affect agents' expectations of the economy, which would affect the coefficients of the model. The introduction of rational expectations into models does not allow systematic errors, only random errors, and ensures that agents' expectations are consistent with the forecasts of the model. This rational expectations critique was thought to provide increased support for arguments of policy ineffectiveness, but in fact policy is ineffective only when rational expectations is combined with perfect market clearing.

Even if one accepts the necessity of rational expectations, however, there are great problems in introducing them consistently into even the smallest models. Model solutions can be sensitive to the end-points chosen. In larger models they usually only add expectational variables to a few equations. Also there is still considerable debate over the use of rational expectations (Pesaran, 1988a).

Problems can also occur in the structure of a model. There is always the danger of estimating identities, i.e. estimating an equation which turns out to represent the way that the data are constructed. In addition, if we have a model $A + B = C$, where $A = f(x)$, $B = f(y)$ and $C = f(z)$, then to estimate it we have to drop one of the relationships, unless $f(x) + f(y) = f(z)$, but the one we choose to drop will influence the model.

There is continual updating of the estimates in models, often to incorporate the latest fashionable econometric estimation techniques. In the 1970s the trend in the United Kingdom was to use time series techniques in econometrics, and to start with a general dynamic model and testing restrictions to attain a simpler model. Often modellers end up with complicated dynamic equations which have little to do with the underlying theory and can be difficult to interpret when introduced into the model. The recent trend has been to adopt cointegration techniques, which start from a static model with no dynamics at all.

There have been a number of studies of why forecasts differ. These have tended to consider the problems of exogenous data, judgemental adjustments, data differences and differences in the model structures, and to evaluate how these account for forecast differences (Artis, 1982; Wallis et al., 1987). In these studies it has been found that the structures of the models are important; exogenous variables play a minor role and the use of equation residuals tends to mask some of the model differences. In general, the judgemental adjustments were found to improve forecasting accuracy, with the exception being the NIESR model for a time, when the unadjusted model did better. Public forecasts tend to converge, since it is safer not to be too far from the crowd.

It is important to remember that models are conceived at different levels of abstraction and calibrated at different levels of detail. In using them one has to be careful to see whether they can address a particular policy question, and whether they can provide sufficiently detailed answers to be of relevance. One consideration is the time dimension. Models vary in the questions that they can answer: medium-term annual models can give bad short-term forecasts. Short-term forecasts are often more like guessing what the official figure will say rather than saying anything about the economy, as future revisions to data can be very large. In policy analysis one also has to consider linkages, the transmission mechanisms through which policy variables affect the rest of the model, and feedbacks, the second-round effects of a particular policy. It is, for example, difficult to introduce interest rates and financial variables into investment equations, but if they are not there then there will be no feedbacks when the effects of policy are

analysed. It is therefore important in using the models to make sure that they do include the probable transmission mechanisms required for a particular set of policies, or at least to be aware and so not be surprised when the results are not as expected.

There are clearly many problems involved in using macroeconometric models. However, they can provide a useful tool when used properly, as we shall consider later.

10.7 EXCUSES

Modelling teams have the problem of having to provide forecasts regularly which can then be judged *ex post*. When they are wrong, as they often are, they have to have some excuses or reasons for their poor performance. They have tended to show a great deal of invention in developing excuses. Probable responses to bad forecasting performance fall into three categories.

The first is to suggest that it is unreasonable to make such an evaluation as the model identified the underlying trend but it just got the timing wrong, that the forecast was self-defeating as the government actually changed policy to stop it happening, or that the exogenous assumptions were wrong for other reasons and it was not the model's fault.

The second form of response is to argue that the particular forecast was not typical as the model has been improved since then, that the person responsible has left, that they did much better predicting other variables than the ones considered in the evaluation, that the measurement or definition of certain variables has changed or that it is the official statistics that are in fact wrong.

Finally, the groups argue that everyone else made the same mistake, and if they did not, that the other groups had an unfair advantage because of the timing of the forecast, insider information and so on, or that forecasting is not the only role of the model, or the most important. If these approaches fail the group can always stop co-operating with the group doing the evaluation.

It would appear that the forecasting groups have turned being wrong into an art; they have certainly had plenty of practice.

10.8 THE USE OF MACROECONOMETRIC MODELS

It is clear that within the black box of the macroeconometric models all is not scientific and objective, as is often implied. The models should

be seen as tools used by groups of individuals with various influences on how they operate, both academic and political. The use of models to back up policy analysis and to compare different policies is important, but again it should not be seen as a purely objective technical exercise. This means that the scope for using models to formulate Left policies is great. This can be done by using and adapting existing models, by democratizing them or by developing new models, as discussed in chapter eleven.

An interesting recent development is the Ready Reckoner developed at the Warwick Bureau as an aid to teaching macroeconomics (Macdonald and Turner, 1988).[1] This personal-computer-based program provides a summary of the properties of the LBS, NIESR and Treasury models. A forecast is used as a base run and then the effects of a change in an exogenous policy instrument, such as goverment expenditure, on a number of key macroeconomic indicators are computed for each of the models. These simulations are performed for current and capital public expenditure, income tax, value-added tax, national insurance, interest rates, benefits, special employment measures and incomes policies. The effects of a policy package can be evaluated, assuming that the model properties are approximately linear and symmetric, an assumption which seems to hold in practice for reasonably small changes.

The program allows the user to produce a new forecast based on the old forecast, adjusting the exogenous assumptions made by the modelling teams. The effects of a new policy package can then be evaluated. This can be done for the three models and the results can be compared. While the program can only provide an approximation to the models, it does allow the probable effects of marginal policy changes to be evaluated and compared across three models, and alternative forecasts to be developed. This can be of interest in looking at alternative policy measures, alternative forecasts, in response to policy proposals and to find out the properties of the models. The model properties do vary markedly, although not as much as the base forecasts. See Turner et al. (1988) for a discussion of the use of the models in evaluating policy proposals.

The usefulness of the model forecasts when care is taken is illustrated by Singh (1978), who as part of a paper on how to utilize North Sea oil to strengthen the manufacturing base of the United Kingdom, used the two Cambridge models, the CEGP and the CGP, to forecast the future path of the economy from 1977 for a number of policy assumptions. The results are given in table 10.1. With no change in policies, they forecast a gloomy future, including unemployment at 2.9 million by 1985. The forecast was criticized by Eltis in a comment

Table 10.1 UK economic performance

	1977 Actual	1985 Forecast	1985 Actual
GDP (1973 = 100)	100	116	114
Investment (1973 = 100)	91.4	111.9	104.6
Balance of payments (1975 prices)	45	580	1427
Unemployment (million)	1.4	2.9	3.1
Inflation (%)	15.7	5.3	6.1
Exchange rate (weighted)	1.83	1.49	1.77

Source: Ron Smith, *Interlink*, no. 1, 1987; 1977 actual and 1985 forecast are from Singh (1978), and 1985 actual is rebased from *Economic Trends*, 1986

in the book for being unduly pessimistic. In fact, given that the forecast was 7 years ahead over a period of considerable turmoil, it was remarkably close to what actually happened. But this implies that the state of the economy in 1985 was just as Singh would have expected with continued Callaghan–Healey policies and implies that Thatcherism had a negligible impact on economic performance. This exercise shows that macromodels can be of use. It is interesting, however, that while both the Cambridge models performed extremely well on the criteria of accurate forecasting, they came under a great deal of attack for their pessimism, and have both had their research grants removed by the ESRC.

Overall, it would appear then that macroeconometric models can be of use if one bears in mind their limitations. An understanding of the models allows one to dismiss the detached arrogance of some of the modellers and commentators, particularly when they are criticizing Left policies. The demystification of macroeconomic models thus has an important role to play in the development of policies on the Left.

10.9 CONCLUSIONS

Our intention in this chapter was to provide some introductory information on macroeconomic models, both to inform and to demystify. It is clear that they are of interest and use, but generally their usefulness is overstated. There are a limited number of questions that they can answer, any exercise involves a large judgemental input, and any output is the product of team plus the model and so is not as technically neutral as is often made out. There remain many technical problems with the models at various levels of abstraction.

The models are certainly not sets of objective economic relations. There is a theoretical structure, a set of econometric relations which operationalize the model, based upon non-neutral data and techniques, and a modelling team with all its judgemental and practical problem solving inputs. One cannot separate the model from the modelling team and any product of their interaction should be viewed as such.

Having to some extent debunked and demystified macro-econometric models, the question is where do we go from here? The first obvious path is the democratization of models, a task which has become possible with the development of cheap and powerful personal computers. There are already tools available such as the Ready Reckoner which provide easy access to the models. Increased access to the models means increased access to valuable databanks. Future developments will make it easier to provide critiques of both the models themselves and the policies backed up by them, and to provide support for, and to aid the development of, alternative policies.

There is also the possibility of providing alternatives to the existing models. Firstly, non-fundamental changes can be made to existing models so that they become more useful and acceptable. Alternatively, new forms of models could be developed, reflecting non-orthodox economic traditions, as attempted by Terry O'Shaughnessy in chapter eleven and as discussed in chapter one. The potential for such developments is enormous.

APPENDIX: FURTHER READING

The Macroeconomic Modelling Bureau have produced four volumes (Wallis et al., 1985, 1986, 1987, 1988) which provide information on the models and undertake comparative exercises, on model properties, forecasts, and detailed comparative reviews of particular parts of the models. They now publish comparative assessments in the *National Institute Economic Review*. They also provide a service for academics wishing to use the models. Kenway (1989) provides a survey of the historical development of the academic related UK macroeconometric models.

The modelling teams produce, or did produce, regular forecasts and policy reviews, which sometimes include information on model developments:

Cambridge Economic Policy Review, Department of Applied Economics, University of Cambridge;
City University Business School, *Economic Review*;
London Business School, *Economic Outlook*;
Liverpool Quarterly Review.
National Institute Economic Review.

See also Barker and Peterson (1987) on the CGP model, and Godley and Cripps (1983) on the CEGP model. See Wallis (1987, 1989) and Britton (1989) for recent discussions of developments in the macromodels.

For general information on macroeconometric modelling and the theoretical debates see Cuthberson (1979), Arestis and Hadjimatheou (1982), Holden et al. (1982), Chow and Corsi (1983), Kmenta and Ramsey (1983), Smith (1987), Hall and Henry (1988) and Wallis (1989). For a discussion of approaches see Smith (1984) and Pesaran and Smith (1985), and the debate between Lawson (1981, 1983) and Hendry (1983).

NOTES

This chapter has benefited enormously from the advice, comments and suggestions of Ron Smith. I am also grateful to Ken Coutts, David Turner and Ajit Singh for their comments on an earlier draft.

1   The Ready Reckoner is available from Gary Macdonald and David Turner at the Macroeconomic Modelling Bureau, University of Warwick, on request. Enclose an SAE plus formatted 5¼ inch disc.

11

Modelling Economic Recovery

T.J. O'SHAUGHNESSY

11.1 INTRODUCTION

This chapter has two aims. One is to begin a discussion of what economic policies a post-Thatcher administration might pursue. The other is to consider the question of whether formal modelling can help in the discussion of policy issues. Most non-neoclassical economists are sceptical about econometric models.[1] There are two good reasons for this. On the one hand, most econometric models employ a neoclassical framework, or at least important neoclassical elements, so that a distaste for neoclassical theory is enough to justify a rejection of model-based policy evaluation. On the other, econometric models have proved rather inadequate in predicting macroeconomic performance, especially recently. Wallis (1989) describes the impact of the 1974–5 and 1979–81 recessions on the forecasting profession. These episodes – especially the first – convinced many that forecasting and policy evaluation using large-scale models cannot be defended. This view was forcefully put by Lucas and Sargent (1978).

Some non-neoclassical economists link theoretical weakness and empirical failure and thus leave open the way for non-neoclassical modelling.[2] Others go further and argue that the very attempt to capture the processes present in a capitalist economy using available data and standard econometric techniques is doomed to failure. Two main variants of this position can be distinguished. One stresses that the available data can give little insight into the real processes because the former represent uninteresting distorted traces of the latter; for example, the data record economic variables in price terms whereas value categories are what matter. The other takes a view that can be thought of as the opposite of this: the real processes of interest are not better behaved than the data, but worse, since the data record

only aggregates and averages, and since models based on the data invariably, and incorrectly, assume that these data describe equilibrium states.

The position adopted in this chapter is that modelling is useful in order to make sensible debate about policy possible. Without such debate it makes no sense to talk of democratic policy, unless all that is meant by this is that people only care about and are only consulted about decisions made locally where they work and live. A greater degree of participation and self-management at this local level is all very well, but there remain important macroeconomic issues to be settled. I cannot see how a start can be made here unless some modelling techniques are employed.

On the other hand, it is not possible to take over and use existing econometric models without being very clear about the theoretical and empirical weaknesses that these models display. Ideally, those who reject the neoclassical approach should perhaps co-operate and construct an alternative model of the economy and show that it performs better than its rivals. (The precise sense in which one model is 'better' than another is itself open to debate.) On the neoclassical side econometric modelling has become a large-scale co-operative endeavour, and so it is likely that serious alternative models will require the efforts of many before they can successfully compete. The difficulty here is that there is little prior agreement over what alternative approach to take. It therefore seems useful to move one step at a time by exploring the potential of various alternative approaches to modelling and policy-making within a small-scale modelling exercise.

11.2 ALTERNATIVE APPROACHES TO MODELLING

There are already a number of alternative approaches to econometric modelling and it is impossible to classify one of these as the standard neoclassical method. Nevertheless it would be fair to say that most working models today invoke the neoclassical paradigm which starts with endowments and preferences of individuals and derives predictions by solving the optimization problems that these individuals face. The complication is that these models are also influenced by a non-neoclassical tradition deriving ultimately from Keynes. The history of Keynesian macroeconomics and econometric modelling is one of complex interaction and it is impossible to do it justice here, although two facts stand out. First, macroeconometric modelling began as a critical response to Keynes's theories. Although Keynes was sceptical

about the usefulness of the whole approach, this feature of its genesis had implications for the fit between it and the neoclassical paradigm (Pesaran and Smith, 1988). Initially little effort was made to rationalize econometric relationships via appeals to individual optimizing behaviour, although this changed as time when on. A second consequence of the Keynesian influence is that most large-scale models are demand driven, with little or no attention being given to supply-side features.

As mentioned above, the main macroeconomic models performed rather badly when it came to explaining the world recession in the 1970s. Those who worked with them responded by stepping up efforts to ground behaviour within an optimizing paradigm and, to a lesser extent, to incorporate the supply side. Neither endeavour restored the models' prestige, but the second at least could have allowed contact to be made with an alternative approach to modelling which also has non-neoclassical antecedents. This approach, which treats an economy's capital equipment as an array of produced means of production rather than as given endowments, derives from the classical economists and Marx, and has been given modern expression in the works of Leontief and Sraffa and in the planning literature produced in a number of non-capitalist economies. The approach – though not necessarily these modern expressions of it – appealed to Marxists for obvious reasons. Here production rather than distribution or exchange was the focus of attention. Unlike in Keynesian models it was possible to consider different outcomes of the struggle over the distribution of income. It was also possible to gain some insight into key problems for Marxist analysis, such as the the relationship between values and prices and between the rate of surplus value and the rate of profit. This opened the way for the development of empirically based Marxist analysis of actual economies.

Unfortunately one major difficulty lay in the way of this project. No treatment of capital goods as produced means of production has been able to deal adequately with the fact that, in an economy in which technical change is taking place, most of the capital goods in use today are not being reproduced. This is not because it would not be technically possible to reproduce obsolete machines but because it would be uneconomic to do so. It means that old but unscrapped equipment is rather like land in that it allows its owner to accrue quasi-rents. To collect data on such an economy's input–output relationships and to interpret these data as if they refer to a production system within which capital equipment is reproducible is therefore misleading. It also follows that value–price calculations based on such data are invalid. Of course there are ways of dealing with technical change in

input – output systems but these work best when the form of technical change in most predictable. The more closely technical change in such systems approaches that found in real economies, the more difficult is the representation of their capital goods as reproducible means of production.[3]

The model described here straddles these two traditions, while attempting to avoid the characteristic weaknesses of each. It treats the macroeconomic environment of the economy it describes – that of the United Kingdom in the period up to the year 2000 – in rather Keynesian terms in that demand determines output in most sectors. However, the manufacturing sector is modelled rather differently, with output being limited by available capacity. Capacity in turn depends on past investment and scrapping behaviour. Thus in this sector capital equipment is treated as produced means of production, even if most of it is not currently reproducible. Another feature of the model which distinguishes it from its Keynesian and neoclassical rivals and links it to the classical and Marxist traditions is that the distribution of income is not determined within the model but is left to be determined by other processes.[4] The two key influences here are the the strength and confidence of those on both sides of wage-setting negotiations and the position taken by policy-makers in their dealings with employers, unions and claimants. The macroeconomic environment bears on both these influences but, given that so little is known about just how this works in practice, it seems just as unwise to proceed on the basis that income distribution is endogenously determined as to assume that it can be set by the policy-maker.

11.3 CAPACITY CONSTRAINTS ON RECOVERY

The key problem facing policy-makers designing a recovery programme for the UK economy is that manufacturing capacity is inadequate, so that any attempt to approach full employment will lead to an unacceptable and unsustainable level of imports. This is due to low levels of investment and accelerated scrapping of under-utilized equipment during the 1970s and 1980s. In this sense a large part of the problem is a legacy of the policies of successive Thatcher governments.[5] However, in another sense the experience of these two decades has merely demonstrated in more dramatic terms processes which were present during the whole of the post-Second World War period. Even during the relatively successful period from 1945 to the early 1970s it was not possible to create a macroeconomic environment which was

sufficiently buoyant to encourage entrepreneurs in manufacturing to undertake the necessary investment.

Typically, during this period, an expansionary policy would be implemented if unemployment was thought to be unacceptably high. Output and employment, including output and employment in the manufacturing sector, would expand relatively rapidly, as occurred, for example, in 1958–9, in 1962–4 and again in 1971–3. In manufacturing the margin of spare capacity would shrink, and this certainly encouraged entrepreneurs to consider new investment projects. However, there were significant lags between firms' observing higher levels of output and making expenditure decisions, and between investment expenditure being undertaken and new capacity becoming available. This meant that new capacity often did not come into use until after policy had become more contractionary.

Figure 11.1 shows manufacturing output and capacity for the period 1959:1 to 1988:2.[6] It is possible to observe the effects on capacity of high rates of output growth during expansionary phases, together with the effect of the lag between output growth and the subsequent adjustment of capacity. A closer examination of each of these episodes shows a rather consistent pattern.

Thus in the first episode, manufacturing output growth reached a maximum in 1959:4 when it was growing at 14.3 per cent per annum.[7] Full capacity was reached in 1960:3 while investment peaked in 1961:3, seven quarters after output growth. The peak in the rate of growth of capacity did not occur until 1962:4, twelve quarters after the peak output growth.
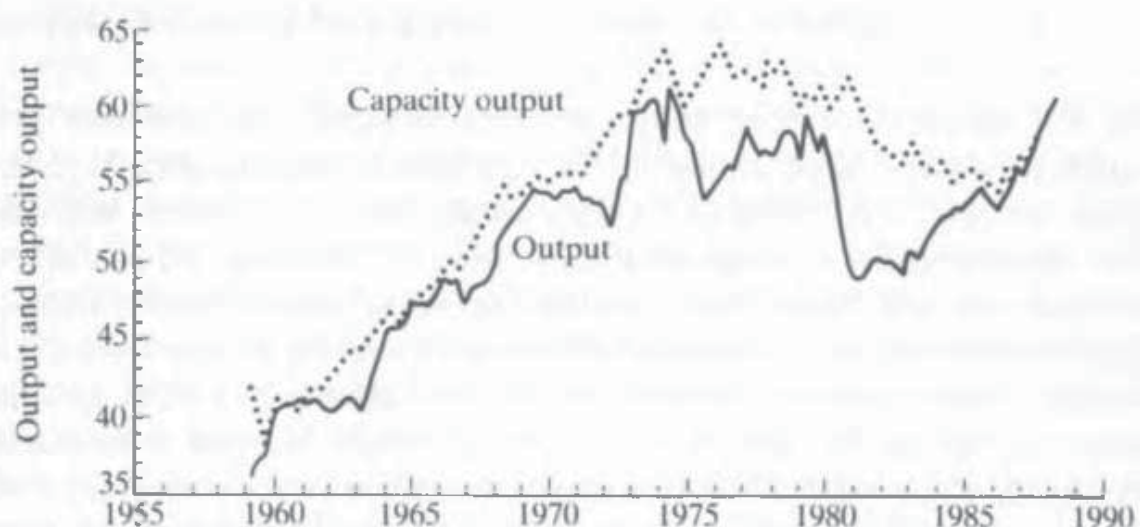

Figure 11.1

In the second episode output growth reached a peak of 13.2 per cent per annum in 1964:1 while full capacity in manufacturing was reached in 1964:4 and maintained in 1965:1. Investment peaked in 1966:1, eight quarters after output growth, while the rate of growth of capacity reached a maximum after fifteen quarters, in 1967:4.

The third expansion was also rather similar. Output growth was at a maximum in 1973:1 with full capacity being reached in 1973:3. The peak in investment occurred in 1974:4 while the fastest rate of growth in capacity was recorded in 1976:2, seven and thirteen quarters respectively after the peak in output growth.

These lags between observing accelerating output, undertaking investment and creating additional capacity meant that, in the meantime, some sectors of manufacturing were capacity constrained. Their customers, whether they were consumers or other firms, were thus encouraged to seek imported substitutes. During such periods import penetration rose and importers established connections with foreign suppliers and with customers which they naturally did not dismantle when spare capacity emerged once more in the domestic manufacturing sector. The macroeconomic counterpart of this process was a deteriorating balance of payments. Typically the authorities came under increasing pressure to modify their policies and, again typically, they did so some time before new capacity planned during the expansion became available.

As output growth slackened following the introduction of more restrictive policies, a margin of spare capacity emerged just at about the time that new capacity was becoming available. Spare capacity together with more pessimistic output projections in turn caused investment plans to be revised or scrapped, where this was still possible. Those who had expanded capacity were taught by this sequence that they had made a mistake by being too optimistic, while those who had cautiously delayed were reassured they had not lost an opportunity. Both groups had learnt that buoyant output growth during an expansionary phase in policy is not a sufficient basis for expanding capacity, however welcome such a phase might be from the point of view of employing existing capacity. This meant that in the next such episode the investment response would be slower and weaker as entrepreneurs sensibly adjusted their behaviour to best take advantage of the economic environment. Naturally this made the policy-makers' task even more difficult, so that the chance of keeping the expansion going long enough to accommodate the newly installed capacity planned and put in place earlier in the same expansion was much reduced.

By the early 1970s such a strategy was probably not available at all,

no matter how resolute the authorities chose to be. In effect, manufacturers, in planning the capacity that they installed, had ended up with plant that was designed to meet demand at the bottom of the cycle. They were prepared to allow additional demand during an expansionary phase to be met by imports, perhaps supplied by their foreign associates, subsidiaries or parent companies. This was a rational response to the policy environment that they experienced, but it made the policy-makers' task, as long as this was seen mainly in terms of short-run stabilization policy, difficult and finally impossible.

The macroeconomic implications of these mechanisms are illustrated in figures 11.2, 11.3 and 11.4. These show the course of the various components of final demand during the three expansions of 1959–61, 1963–65 and 1972–74. In each case consumers' expenditure grew rapidly at first. Investment expenditure also increased, but by 1972–4 the investment response is faltering and subdued.

In this context it is interesting to compare the current expansion with these earlier episodes. Figure 11.5 has been prepared using 1986–7 data and Treasury forecasts for 1988–90. It is clear that again consumers' expenditure is the main stimulus and that investment, even on the authorities' own assumptions, is playing a minor role. Even more striking, though, is the fact that the outcome projected in figure 11.5 is very unlikely to be fulfilled. Previous experience suggests that sooner or later the authorities will be forced to attempt to hold down the growth of domestic expenditure in the face of deteriorating external
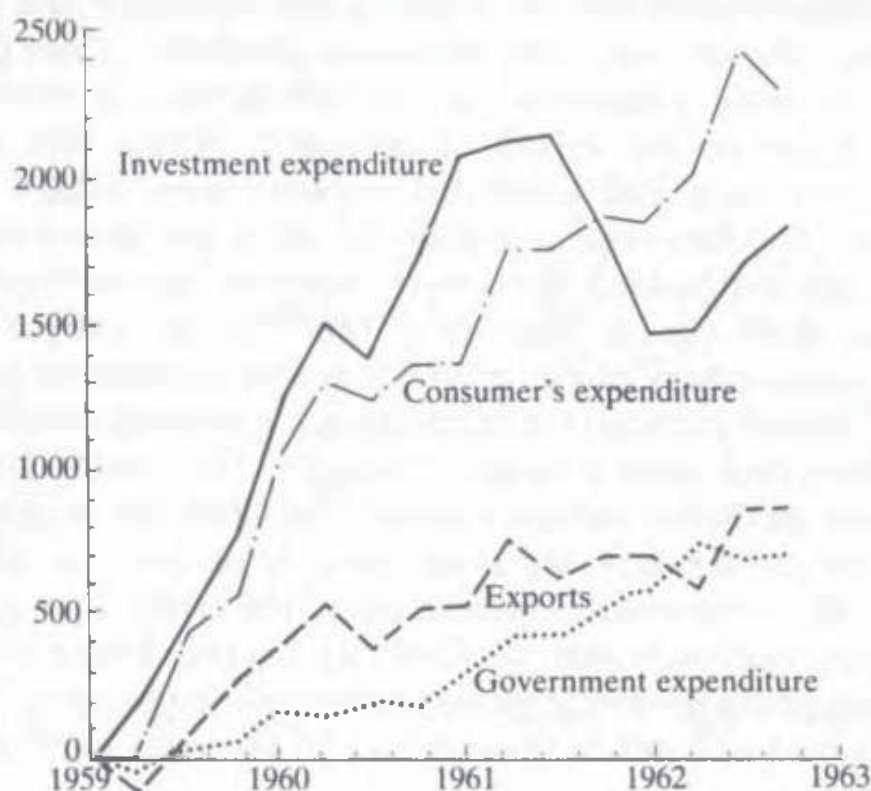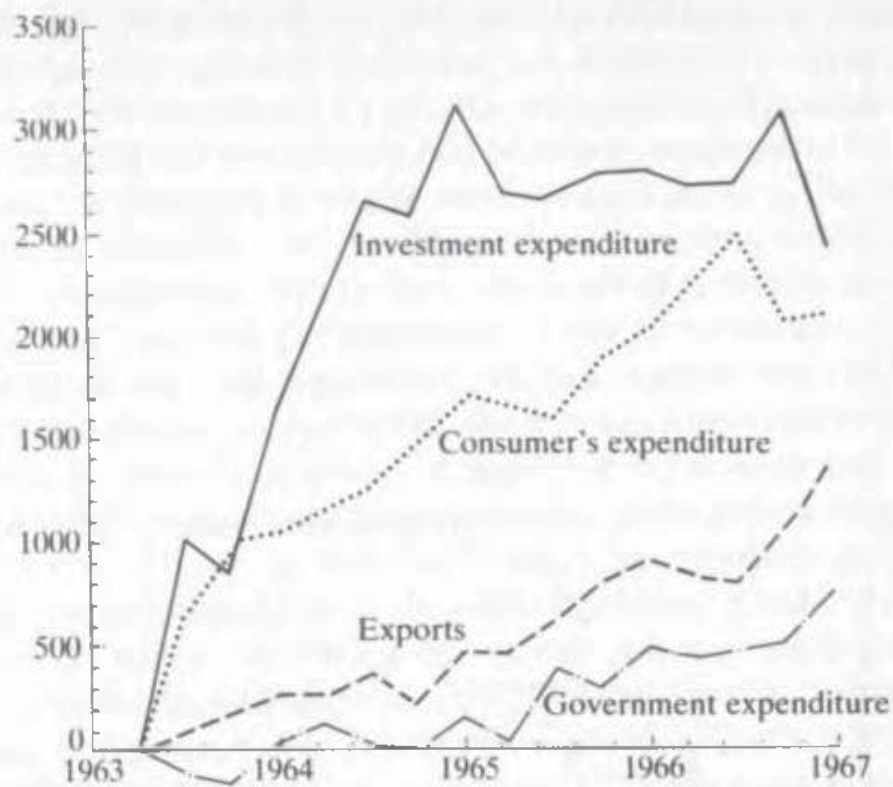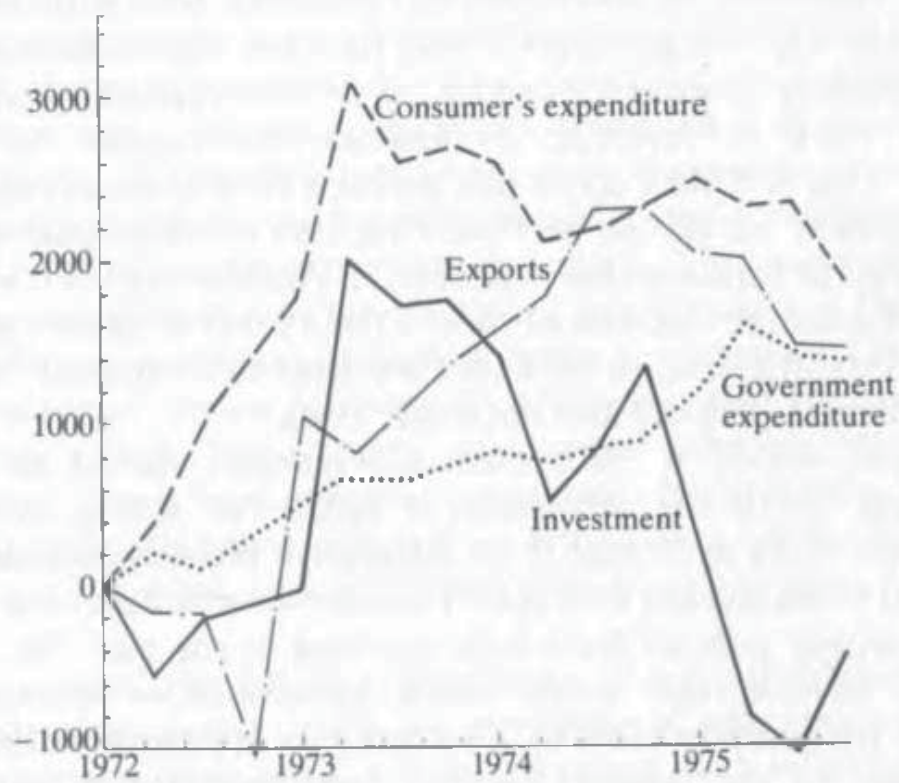

Figure 11.2
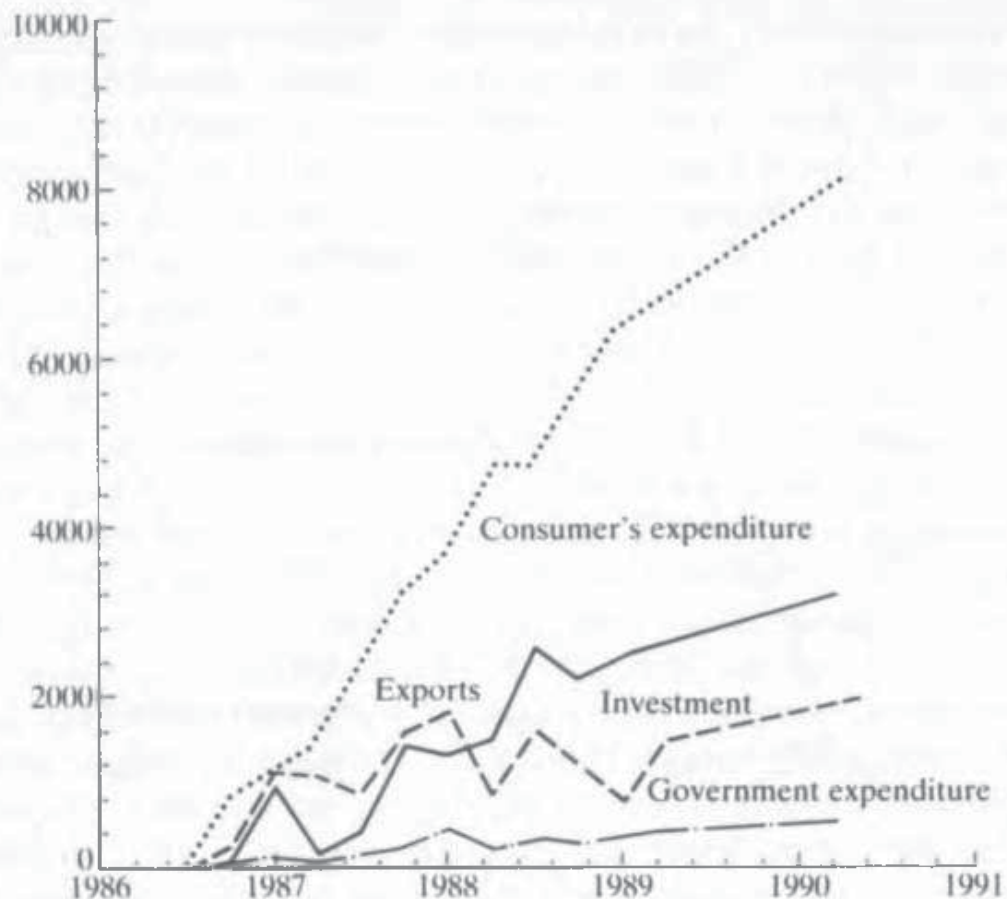
Figure 11.3

Figure 11.4

Figure 11.5

balance. The current Government has a number of options here. One involves the use of high interest rates to discourage consumption. A second involves slowing the growth of the real disposable income of those in work by reversing its policies with respect to personal taxation. This will slow down and perhaps reverse the current fall in unemployment which can be traced back to the multiplier effect of higher levels of consumption expenditure. Another option is to protect the real disposable incomes of those in work but to allow unemployment to rise sufficiently to choke off the demand for imports. All these options involve political and economic costs.

However, critics of the present Government should not be too complacent about the difficulties it faces, for similar constraints would have to be overcome if an alternative full-employment policy were to be implemented by a post-Thatcher government. It is not just that the wrong policies have been pursued in the past but that the economic environment within which policy-makers operate makes their task particularly difficult. Few analysts anywhere on the terrain marked out by the familiar political and theoretical differences of current economic policy debate have wanted to face this task. In the political centre moderate critics of the Government have called for a revival of Keynesian policies (see Charter for Jobs, 1985; Layard,

1986). They have played down the problem of capacity, assuming that higher levels of investment following an expansion in demand would take care of this constraint. From this perspective, arguments stressing capacity constraints are interpreted as overly pessimistic and as likely as not to give comfort to those who would like to stifle the current expansion in demand. On the Right there has been some talk of the economy's supply side but only at the level of political rhetoric. The argument has been put forward that, if the Government pursues less interventionist tax and regulatory policies, agents will find it worthwhile to produce more. However, there is little understanding here of what holds back accumulation in capitalist economies and no insight into what conditions are required to secure more productive economic arrangements. Those on the Left might be expected to take more seriously problems to do with the organization of production but here too there is some reluctance to admit the existence of capacity contraints (see Glyn, 1985). The Left, like the Centre, wants to remain optimistic about economic prospects under alternative policies and so places little emphasis on such constraints. There is also much greater faith here in the ability of policy to transform economic structures and to replace the old perverse mechanism of capital accumulation with something more rational, equitable and efficient within which the problem of productive capacity would not arise.

Nevertheless the problem is serious. Capacity constraints in manufacturing have limited earlier recoveries so that policy had to be reversed even before the authorities' employment targets were fully met. Moreover, capacity has now been run down much more dramatically than during previous recessions, while the level of unemployment makes a full-employment target seem impossibly far off.

The correct policy response is to rebuild manufacturing capacity at the same time that employment is increased. This is not in order to increase employment in manufacturing but to allow a full-employment policy to be followed in the economy as a whole. [8] The apparent disadvantage of such a recovery programme is that the cost per job created is much higher than alternative schemes involving an expansion of special employment schemes. Nevertheless it remains true that such alternative schemes are not viable as long-run solutions to the policy problem that the United Kingdom now faces, as is shown below.

Another difficulty facing a programme of accelerated investment in manufacturing is that there are problems of selecting appropriate industries, selecting firms within industries and selecting projects appropriate to firms. Such a selection process takes time and skill, whether it is done within a firm or by some other institution. The cost of making mistakes is that investment will not be efficient by, say, not

embodying appropriate technology or being misdirected altogether. Policy-makers may not have taken this seriously enough in the past when their focus was on the short-run demand and employment implications of policies to encourage investment; at least, critics of such interventionist policies have argued this.

Whatever the validity of such criticisms, once the problem becomes one of a resource-constrained recovery, the efficiency of individual investment projects in creating appropriate capacity is of crucial importance. Having made this point, however, it is difficult to know how to embody the potential cost of too rapid an acceleration of investment under such a programme. One way might be to assume that previous periods of increasing investment can serve as a guide, so that we do not project a rate of increase in manufacturing investment higher than that experienced before. In the three expansions described above manufacturing investment increased quite dramatically. Between the trough in 1959:3 and the peak in 1961:3 investment in manufacturing increased from £1127 million (at 1980 prices) to £1715 m, an increase of 52 per cent, corresponding to 5.4 per cent per quarter. Between the trough in 1963:1 and the peak in 1966:1 the increase was from £1278 million to £1697 million, or 32.8 per cent, corresponding to 2.4 per cent per quarter. Finally, between 1972:3 and 1974:4 investment increased from £1560 million to £1889 million. This was an increase of 21.1 per cent, at a rate of 2.2 per cent per quarter.

It may be prudent, therefore, to posit a rate of increase in manufacturing investment no higher than that achieved during these earlier episodes, although naturally it will be necessary to ensure that investment increases at this rate for a much longer period. Nevertheless, this still implies a rather slow approach to an appropriate level of investment. It may be necessary to be more ambitious than this, without neglecting altogether the potential cost of an investment programme which ignores the difficulties alluded to above.

11.4 MODELLING A CAPACITY-CONSTRAINED ECONOMY

The model employed has ten sectors:

1 agriculture, forestry and fishing;
2 oil;
3 Energy (other than oil) and water supply;

4   manufacturing;
5   construction;
6   distribution, hotels and catering, and repairs;
7   transport;
8   communications;
9   banking, finance, insurance, business services and leasing;
10 other services, including public administration, defence, compulsory social security, education and health services.

The manufacturing sector is treated separately and is analysed using a vintage model of manufacturing capacity. Investment in manufacturing has two effects: it is one component of aggregate investment which in turn is a component of demand for output in each of the various sectors, and, following a lag that is meant to capture the construction period for new capacity, it also contributes to available manufacturing capacity.

In the other nine sectors capacity constraints on current output are neglected. Thus demand determines output in the current period, although a notion of normal capacity in these sectors is retained. This means that if the current level of output requires an expansion of capacity, new investment takes place in successive periods until output and capacity are once more in their former relation. One difference between sectors, therefore, is that excess demand for manufactures (i.e. once capacity in the manufacturing sector has been reached) leads to an increase in imports of manufactures. In other sectors domestic output increases and there is no import effect.[9]

11.5 WAGE AND PRICE DYNAMICS

The model is framed in term of constant (1980) prices. Output and investment, together with wage and benefit rates, are therefore expressed in real terms. Thus price and wage dynamics are not modelled, even though changes in money wages, prices and the exchange rate are likely to be important features of a recovery process. The reason that these issues have been left to one side is that it is not at all obvious, on the basis of recent or more distant experience, just what will happen to the wage fixing system during the sort of recovery programme suggested here.

Two views can be distinguished. One, derived from Robinson and Kaldor, would suggest that higher investment demand in the face of capacity constraints in both the investment and consumption goods industries will lead to an increase in investment and consumption

goods prices relative to money wages. The fall in real wages and improved profitability in both sectors will reduce consumption demand and, to the extent that there are possibilities for adapting the current output of the consumption goods sector to the needs of firms that are investing, capacity constraints in the investment goods sector may be bypassed. Once the potential for such substitution has been exhausted, higher profits in the investment goods sector will mean that this sector attracts more than its share of new investment so that capacity there grows rapidly. Another route by which this substitution can take place is via foreign trade in manufactures. Lower real wages, leading to reduced domestic demand for consumption goods, may release more of the output of this sector for exports while part of the higher level of investment demand is met by imported capital goods.

Robinson and Kaldor could be relatively optimistic about raising growth rates via these mechanisms because they believed that there was room for some reduction in the level of real wages – or, in the more realistic context of rising output per head due to technological progress, a fall in the rate of growth of real wages – before the 'inflation barrier' was reached, at which point workers would attempt to protect their real incomes by negotiating higher money wage rates from employers. A more pessimistic view is that the inflation barrier is always much closer to the current level of real wages and that, if real wages rise for any reason, the inflation barrier also rises, leading to real wage resistance at whatever level real wages have reached. Since there may well be a tendency for real wages to rise following a fall in demand and an increase in the level of unemployment for reasons set out by Keynes in his short-period analysis in the *General Theory* (Keynes, 1936), this view leads to pessimistic conclusions about the possibility of increasing the rate of growth without setting off an inflationary process.

It is certainly not possible to decide, once and for all and in the abstract, which view is correct. Recent experiences in the United States and in Australia, for example, show that, in very different economic and political contexts, more buoyant demand and consequent higher growth rates have been accompanied by very substantial squeezes in real wages without leading to higher levels of money wages being agreed between workers and employers. On the other hand, most observers remain pessimistic about the prospects of achieving such a combination of outcomes in the United Kingdom.

The sensible course seems to be to err, if anything, on the side of pessimism. For this reason, it has been assumed, following the real wage resistance thesis, that the trend rate of growth of real wages is not a variable in the adjustment process to a higher rate of growth of

output. If real wages do fall below trend during this process things will be easier, but it seems safest not to count on such an outcome in the absence of good reasons for expecting why this should be possible. However, being pessimistic in this way about real outcomes may allow for some optimism about the probable course of nominal values. Since the adjustment paths being investigated do not require substantial increases in the prices of consumption goods or reductions in real wages it may well be not too unrealistic to imagine such adjustments taking place in the context of relatively stable prices and with money wages growing in line with the trend rate of growth of productivity. If, in addition, a workable incomes policy directed solely at stabilizing prices is in place, these desirable outcomes may well be achieved.

In the past, incomes policies have often been directed at the double objectives of securing a stable price level and changing the distribution of income in favour of profits. Because the latter objective was not discussed openly and accepted by wage-earners, such policies were almost certainly doomed to fail. The solution is to limit the objective of an incomes policy to securing a relatively stable general price level and to deal with the distribution of income between wage-earners and profit-receivers and the distribution of demand between consumption and investment as separate questions.

11.6 OPTIONS

Having set up and estimated a model it is possible to simulate various policy options. In each case the model was run forward to the year 2000 with different policies in place. Employment, consumption, the trade balance and other variables of interest can be examined with a view to selecting desirable and viable outcomes.

Naturally this exercise embodies a large number of assumptions about patterns of domestic and world demand, the course of oil prices and of the output of North Sea oil, participation rates and so on. In each case current trends were projected, tending if anything to be pessimistic rather than optimistic about the future. The key constraint lying behind the search for an adequate policy is that no policy is viable which fails to secure a reasonable balance of trade over the long run. This leaves open the question of whether it might be desirable to run a deficit for a number of years during which manufacturing capacity might be rebuilt. In effect this would mean running down the foreign assets that the United Kingdom has accumulated during the oil years. Using these assets to allow a higher level of investment to occur without cutting the growth of domestic consumption is possible, but

we have chosen to set a more austere standard by focusing on the cumulative external deficit and requiring both that its maximum value be kept within reasonable limits and that it eventually return to zero. This means that the stock of foreign assets used to finance the recovery programme is rebuilt once that programme has achieved its initial objective of re-equipping UK industry in order to create an efficient manufacturing sector.[10] An efficient manufacturing sector is one that produces a sufficient proportion of the total demand (domestic and export demand) for manufactures so that, once other exports and those necessary imports for which there are no domestic substitutes are taken into account, a sustainable external balance is achievable at full employment (Singh, 1977, pp. 127–8).

Unchanged policies

As a first exercise, the model was run with unchanged policies (as of mid-1986). The striking feature of this simulation is that unemployment falls quite significantly until the end of 1988. The reason is that consumer expenditure is growing strongly because of the growth in real wages and the effect of the existing array of special employment measures. Higher demand, particularly for the output of sectors in which productivity growth is slow, leads to some increase in employment and this in turn has a positive effect on consumer expenditure. (More recent changes in taxation policy will also have stimulated consumption expenditure.) The problem is that this combination of policies is not viable after mid-1988. The model predicts that the capacity constraint in the manufacturing sector is reached in the first quarter of 1988.

This was confirmed by data from the *Industrial Trends* survey by the Confederation of British Industry (CBI). The CBI capacity utilization series was used to estimate the vintage model of the manufacturing sector. It shows the proportion of firms reporting that their present level of output is below capacity. The series reached a minimum of 40 per cent in 1960:3, in 1964:4 and 1965:1 and again in 1973:3. However, in 1988:1 a new minimum of 35 per cent was recorded while in 1988:2 the figure was 32 per cent, indicating a higher level of capacity utilization than at any time since 1959 when the survey began. Once capacity is reached import penetration begins to rise and, a little later, the oil surplus disappears. Existing policies and trends are thus clearly inconsistent from the early 1990s onwards.

Unchanged policies plus austerity

Since real incomes cannot continue to grow at current rates while other policies remain unchanged, it is interesting to investigate whether a policy of more modest income growth would be available to meet the balance of payments constraint. By experimenting with the rate of wage and benefit growth once the capacity constraint is reached it is possible to find a combination of policies which brings the trade account into balance, but the cost is very great. Not only are real wages and benefits 15 per cent lower in 2000:4 than they otherwise would be, but we are confronted with unemployment of 5.6 million. Whether such an outcome is viable is something that may be left to readers' political judgement; it is certainly very undesirable.

Alternative policies

Three alternative policies are now considered. The first involves a more vigorous programme of special employment, but without any other changes. In this case the balance of payments constraint bites even more seriously than with unchanged policies. It is possible to raise the level of employment in this way so that unemployment disappears by the end of 1990, but long before then the balance of payments constraint would make itself felt. Moreover, the difficulties are not merely short term. While a high level of employment and continuing real income growth maintains demand at a high level, the effect on employment outside the special employment sector is very weak, so that the numbers involved in special employment schemes remains near three million throughout the simulation period.

Why then consider such a case, since it embodies such inconsistencies? My reason is that this case can be interpreted not only as the result of a special employment programme without an investment programme but also as the result of a successful employment programme and a failed investment programme. As such, it may be quite relevant, especially if the view is accepted that it is very difficult to raise the level of manufacturing investment significantly. The implication must be that such a vigorous special employment programme would also have to be abandoned in the face of the balance of payments constraint.

This is not to argue that 'austerity' in this context would need to take exactly the same form as in the case considered above. The reason is

that the balance of payments constraint can be met with higher levels of employment as long as income growth is held down even more. I have not reported a full range of such outcomes since I do not believe that it is in this direction that we should look for alternative policies. Nevertheless it is clear from these illustrative cases that an employment programme without a successful investment programme will lead to unsatisfactory outcomes.

A successful programme of investment

When manufacturing investment is treated as a control variable and increased in the appropriate way we begin to see a viable combination of internal and external balance emerging by the end of the century, with unemployment being fully absorbed by 1999:4. There are two major problems, however. The first involves the sheer scale of the increase in manufacturing investment required – to approximately three times the present level. The second has to do with the temporary but very large deficit on the trade account in the period during which new capacity is being built.

Two features of this deficit highlight the difficulties it represents. From the point of view of timing, things could hardly be worse. Five years after the policy is put into effect the deficit is large and growing, few 'real' jobs have been created and it is very likely there would be intense political pressure to modify the policy. The second feature of the deficit that is even more striking is the size of the peak. When the trade account comes back into surplus at the end of 1997 the cumulative deficit has reached £124 billion. It is clear that UK residents would not be able to rely on foreign assets to the extent required to finance this deficit, while foreigners are unlikely to be willing to invest in UK assets to anything like the necessary degree. Can this constraint also be met?

11.7 HOW TO PAY FOR THE RECOVERY

There is a way to meet this constraint, at least partially. What is required is a method of reducing the rate of growth of consumer expenditure once the capacity constraint has been reached and before new capacity becomes available. There are several ways of achieving this, such as via reduced real wage growth or higher levels of taxation, although these policies both have political costs. Combined with the political difficulties already mentioned it may appear that a consistent

set of policies would prove hopelessly difficult to implement.

The solution proposed here is a compulsory savings scheme designed to hold down consumer expenditure without attacking wage and other incomes. To do the latter in order to achieve the former has no obvious advantages unless it is accepted that a scheme such as the one proposed here is impossibly utopian. Yet I do not see why it is politically impossible to have accepted a scheme involving a temporary reduction in (the rate of growth of) working class consumption when schemes involving drastic and permanent reductions are considered politically realistic.

The scheme has some similarities to that proposed by Keynes in *How to Pay for the War* (Keynes, 1979). This is hardly accidental since similar constraints confront policy-makers whether they are planning a war or a massive programme of investment. In both cases new employment will be created and, with higher levels of employment and possibly higher earnings due to increased overtime and shiftworking, there will be a substantial increase in the demand for consumer goods. However, for different reasons, the supply of consumer goods cannot be increased straight away. Keynes faced a situation in which very effective import controls were already in place. He was therefore able to argue that the existing supply of consumer goods could be regarded as fixed and that the only question that arose was whether these goods would be all sold at high prices in the absence of a savings scheme, or at lower prices as a consequence of the scheme. In either case, real living standards would be the same, although the implications for inflation, the distribution of income and the political acceptability of reduced living standards would be very different. The other similarity between the situation then and now is that both crises are 'temporary'. It is not misleading to justify reducing (the rate of growth of) consumer expenditure on the grounds that to do so will make possible higher consumption in the future, since that is exactly what the policy allows.[11]

The savings scheme proposed here has several phases. It comes into operation when the capacity constraint is reached. The savings rate increases with time but not so rapidly as actually to reduce consumer expenditure. Once the trade account comes back into surplus the savings rate ceases to increase and once the cumulative deficit falls to zero the savings scheme ceases to operate. Blocked accounts can then be released as quickly as the external constraint allows. The scheme is specified by the single parameter that determines the growth of the savings rate in the first phase of the plan. In the model the scheme operates only on 'wage' incomes. Benefit income is exempt and other forms of income are neglected, although they would not be in practice.

The savings rate begins at 0.20 per cent in 1988:1 and rises to 6.6 per

cent in 1996:1 where it remains until 2000:2 when it falls to zero. This is hardly a dramatic attack on consumption standards (throughout it is assumed that real wages are growing at 2.0 per cent so that the savings scheme is blocking less than half the increase in wage incomes) and yet it has the effect of substantially reducing the peak cumulative deficit to a more manageable £67 billion. This amount is of the same order as the value of assets purchased during the oil surplus years. This suggests that a viable and consistent set of policies could be designed in this way.

It is now possible to employ the model to design an optimal policy, given the policy-maker's preferences over the employment objective and some appropriate consumption objective together with such constraints as are considered binding, such as the peak cumulative deficit. The parameters defining the investment programme, the extent of special employment and the savings scheme can be varied to produce an optimal outcome. Other objectives and constraints can also be incorporated into this process, so that, for example, social policy and macroeconomic policy can be discussed together in a coherent way.

11.8 CONCLUSION

The policy problem facing a government committed to a full employment programme for the United Kingdom is so difficult that simple formulae will certainly prove inadequate. By capturing the key features of the problem in a model of this sort, debate can take place about possible and desirable outcomes. To do so it has proved necessary to transcend the Keynesian demand-dominated tradition by incorporating a description of the production process in which past decisions to accumulate play a key role. At the same time, issues normally dealt with using production models, such as the problem of relative prices, have been left to one side. My aim has been to show that modelling in a non-neoclassical framework is both possible and useful.

NOTES

1   See, for example, Lawson (1981, 1983) and Hendry (1983) for a discussion of some of the methodological issues involved in using standard econometric techniques.

2   In a series of papers, Bowles et al. (1983, 1989) have presented a non-

neoclassical analysis of the US economy by defining and estimating appropriate variables such as the level of capitalist power.

3   Compare Landesmann (1988).

4   Here distribution is discussed in terms of the three broad categories of wage, benefit and profit income. Other aspects of income distribution, such as wage differentials between industries and occupations, between women and men and between different age groups, will certainly be of interest to policy-makers in a post-Thatcher administration. The model described here does not deal with these questions but could be extended to do so.

5   The current consumption-led expansion is doing little to correct this situation, since investment, while increasing, is still far from adequate.

6   Output and capacity output are measured in £ billion at 1980 prices. Quarterly data are used but are converted to annual rates. The method used to estimate capacity is described below.

7   Here and subsequently growth rates that are expressed in this annual form are to be understood as being derived from the value corresponding to the specified quarter compared with the value four quarters earlier.

8   Productivity grows more rapidly in manufacturing than in the economy as a whole, especially when the effects of an acceleration in manufacturing investment on the age structure of the capital stock are taken into account.

9   It may well be the case that, while measured output has increased in line with demand, customers experience queues, delays and overcrowding of service facilities so that, from their point of view, real output increases more slowly as new capacity is built.

10   'Efficient' in the sense of Singh (1977).

11   However, too much should not be made of the similarity between the situation in 1940 and the situation today, if only because doing so may give the impression that a much greater degree of austerity is being proposed than is actually implied by the policy suggested here.

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