

## **Crises and paradigms in macroeconomics**

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**Abstract:** The significance of the financial crises and world wide recession of 2008/09 for macroeconomic paradigms is discussed. The key attributes of the 'new consensus in macroeconomics' are outlined as a representative of mainstream macroeconomics. The key features of heterodox macroeconomics are outlined. The contrasting ways in which the two schools of thought treat unemployment, human behaviour, aggregate and money and credit are discussed. It is concluded that the events of 2008/09 once again cast doubt on the abilities of mainstream macroeconomics to confront the realities of capitalist economies.

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### **1. Introduction**

The birth of macroeconomics, associated with works of authors such as Keynes and Kalecki, is often viewed as a response to the depression years of the 1920s and 1930s, and to provide understanding as to why unemployment and excess capacity occur over long periods of time, contrary to the views of the previously prevailing orthodoxy in economics. Many have recognized the revolutionary nature of their works, and analyses which were recognisably linked with their work became the orthodoxy of the 1950s and 1960s even though that was in forms which omitted much of the essential originality of their works. But since then ‘classical economics’ (to use Keynes’s usage) in various guises has returned to dominance, whether under the heading of monetarism, new classical macroeconomics, new Keynesian economics and the ‘new consensus in macroeconomics’ (hereafter NCM)<sup>1</sup>.

The widespread set of financial crises focused on, but not limited to, the USA and UK, and the subsequent worldwide recession have raised many questions on its causes, its spread, policy responses<sup>2</sup>. They have again thrown into contrast the thinking and analysis which comes from Keynes, Kalecki and others, which we will label the heterodox macroeconomic tradition, and the mainstream tradition which is essentially pre-Keynesian with its most recent manifestation as the ‘new consensus in macroeconomics’ (NCM). This paper seeks to consider the implications of the financial crises for macroeconomic theory. There are two central aspects to this. First, there is the relationship between macroeconomic theory and fluctuations in economic activity, notably periods of recession and unemployment. Periods of sustained growth and low unemployment tend to lead to claims of an ‘end of the business cycle’. In the recent period, such claims were generally not framed in terms of the business cycle but in terms of the ‘great moderation’ (Bernanke, now Chair of the Federal Reserve, Bernanke, 2003, and general use), the ‘NICE’ (non-inflationary continuous expansion) (King, now Governor of the Bank of England, King, 2003) and the end of ‘boom and bust’ (claims in the UK by the Labour government)<sup>3</sup>. This ‘great moderation’ was often ascribed to the success of the policy regime of inflation targeting (and non-discretionary fiscal policy). The world-wide recession (and also the rise in inflation in 2008 to around 5 per cent in many industrialised countries) blows these claims out of the water. The argument below draws on this to argue that the mainstream NCM is unable to either explain or to cope with significant fluctuations in economic activity, whereas the heterodox alternative is able to do so.

Second, and specifically with regard to the financial markets, a number of commentators have pointed to how the dominance of the ‘efficient markets’ approach to finance lead to a Panglossian view of the financial markets in which, for example, movements in prices reflect all available information on future prospects (for example, Krugman, 2009). The ‘efficient market’ approach to finance is one based on optimising individuals operating in an environment of competitive market where individuals have ‘good’ information about a knowable future. In effect, the RARE (rational agents, rational expectations) model operates. This has been important with respect to the analysis of financial markets but the same basic approach to human behaviour and markets has been evident in mainstream macroeconomic theory such as the NCM discussed below. It is widely acknowledged that the financial crisis has blown the ‘efficient markets’ approach apart. We extend that argument to macroeconomic theories more generally. In the paper below we argue on the one hand that the NCM is indeed based on that approach, and seek to draw out some of the consequences of that. We proceed from that to consider (in section 4) what should replace RARE. It is pointed out that heterodox macroeconomics has not been based on RARE (even where some form of optimisation is used it is limited to short-period analysis, e.g. Keynes, 1936 and often subject to a range of caveats about its use). Heterodox macroeconomists differ widely in the manner in which they have approached the modelling of firm behaviour with respect to pricing, investment and wage decisions. The charge that heterodox macroeconomics lacks microfoundations has never been right : it should be clear from *The General Theory* that Keynes had microeconomic foundation for investment decisions, for labour supply decisions and for pricing, and Kalecki had a degree of monopoly approach to pricing and discussed investment decisions at length. But those microeconomic foundations were not those of inter-temporal utility maximisation with the equivalent of perfect knowledge<sup>4</sup>. Heterodox macroeconomic analysis involves the constraints on individuals and firms imposed by macroeconomic conditions, and the need for the macroeconomic foundations of microeconomics. Kalecki’s two way relationship between investment and profits is illustrative of the interactions between the micro and macro – investment decisions are made by firms in the light of capacity and profits prospects and there is an aggregate relationship between the investment and profits. It is also the case that heterodox economists are well aware of the pressures and constraints on what can be done, as discussed below.

The paper starts by considering the key features of the ‘new consensus in macroeconomics’ as the most widely used representative of mainstream macroeconomics, followed by a discussion of the key features of heterodox macroeconomics. In section 4 we draw out

implications of the prior discussion with regard to unemployment and excess capacity, whereas section 5 addresses the issue of the modelling of human behaviour. Sections 6 and 7 consider issues of aggregation and the nature and role of money and credit respectively. There is then a final concluding section.

## 2. The mainstream macroeconomics

In this section the ‘new consensus in macroeconomics’ (NCM) is considered as a representative of the mainstream macroeconomics. It would be our contention that there is an underlying similarity in mainstream macroeconomics in a reliance on individual optimisation with rational expectations, the incorporation of Say’s Law and lack of attention to money and credit.

A three equation model which summarises the NCM (and variants of which have been widely used for that purpose) is set out to aid discussion.<sup>5</sup> The equations are:

$$(1) \quad Y_t^g = a_0 + a_1 Y_{t-1}^g + a_2 E_t(Y_{t+1}^g) + a_3 [R_t - E_t(p_{t+1})] + s_1$$

$$(2) \quad p_t = b_1 Y_t^g + b_2 p_{t-1} + b_3 E_t(p_{t+1}) + s_2$$

$$(3) \quad R_t = RR^* + E_t(p_{t+1}) + c_1 Y_{t-1}^g + c_2 (p_{t-1} - p^T) + s_3$$

with  $b_2 + b_3 = 1$ ; where  $Y^g$  is the domestic output gap  $R$  is nominal rate of interest,  $p$  is rate of inflation (and  $p^w$  is the world inflation rate),  $p^T$  is inflation rate target,  $RR^*$  is the ‘equilibrium’ real rate of interest, that is the rate of interest consistent with zero output gap, which implies from equation (2) a constant rate of inflation; and  $s_i$  (with  $i = 1, 2, 3$ ) represents stochastic shocks, and  $E_t$  refers to expectations held at time  $t$ .

Equation (1) is the aggregate demand equation with the current output gap determined by past and expected future output gap, the real rate of interest and the real exchange rate (through effects of demand for exports and imports). Equation (2) is a Phillips curve with inflation based on current output gap, past and future inflation, expected changes in the nominal exchange rate, and expected world prices (and the latter pointing towards imported inflation). Equation (3) is a monetary-policy (Taylor) rule. In this equation, the nominal interest rate is based on expected inflation, output gap, deviation of inflation from target (or ‘inflation gap’), and the ‘equilibrium’ real rate of interest.

The themes which stand out from this simple representative model (and more so from the complete formulations) are:

- (i) The model is an equilibrium one in which any movement in economic activity is driven by exogenous shocks to which the Central Bank responds through the setting of the policy interest rate. The model has ever appearance of being stable and the only disturbing factor is ‘stochastic shocks’. Further, the equilibrium in this model is where the output gap is

zero, with implications that such a level of output is a highly desirable one. It would also generally be the case that the equilibrium situation was one of full employment. As Colander et alia remark ‘The confinement of macroeconomics to models of stable states that are perturbed by limited external shocks and that neglect the intrinsic recurrent boom-and-bust dynamics of our economic system is remarkable. After all, worldwide financial and economic crises are hardly new and they have had a tremendous impact beyond the immediate economic consequences of mass unemployment and hyper inflation.’ (Colander et alia, 2009, p.2)

(ii) Households are optimising utility over the infinite future subject to an inter-temporal budget constraint. The budget constraint is a life-time one in which households are able to borrow or lend, and whilst household is able to go into debt there is no bankruptcy through inability to repay the debt. There is also no credit rationing in the model. The household budget constraint (with the non-satiation) means that lifetime income equals lifetime expenditure which in effect is Say’s Law. There is no independent investment function and all desired savings in any period are absorbed into investment. As households are far-sighted, are on their budget constraint and are not credit constrained, Ricardian equivalence follows.

(iii) There is no serious treatment of money and credit. It has been noted that a money demand equation could be added on as a fourth equation but this relates stock of money to variables such as income and interest rate and the stock of money acts rather as a residual which does not feed back into the rest of the economy. There is an implicit form of endogenous money in which the stock of money is equal to the demand for money.

“There is a certain rate of interest on loans which is neutral in respect to commodity prices, and tend neither to raise nor to lower them. This is necessarily the same as the rate of interest which would be determined by supply and demand if no use were made of money and all lending were effected in the form of real capital goods. It comes to much the same thing to describe it as the current value of the natural rate of interest on capital” (Wicksell, 1965, p. 102).

(iv) There is a classical dichotomy in the sense that there is an independence between demand and supply. The determinants of the trend level of output are left unstated with respect to the model above and are taken as set by supply decisions. The level of demand is adjusted in line with the zero output gap, i.e. when output equals trend output. The adjustment is effected through the interest rate when that rate is equal to the ‘natural rate’ of interest. There is a classical dichotomy also in the sense that the price level and the stock of

money are proportional, though of course the adjustment process is that the stock of money adjusts to the price level.

(v) The process of inflation depends on a form of the Phillips' curve, as evident in equation 2 above. It is of interest here to note that inflation is then viewed as only driven by demand (as reflect in the output gap in equation 2) and expectations on inflation, which are themselves modelled as being 'rational'. This is then a demand-pull view of inflation with no allowance (other than through the stochastic term) for cost-push inflation, nor indeed for any notion of interaction of wage and price determination in the inflationary process.<sup>6</sup>

The Phillips' curve contains an interesting contradiction with standard microeconomic theory. In that theory, price relative to cost of inputs depends on the level of output (amongst other factors) since marginal cost varies with the level of output and the elasticity of demand may also do so. But the Phillips' curve relates the rate of change of prices (indeed relative to expected inflation) to the level of output : in one formulation it is the level of price (relative to input costs) which is dependent on the level of output, in the other the rate of change of prices.

(vi) Overall there is no suggestion of serious fluctuations in economic activity, no 'boom and bust', and any significant malfunction would be assigned to government. This could take the form of trying to use fiscal policy (which could be reflected in shifts in  $a_0$  in equation (1)) or through the Central Bank setting the interest rate 'incorrectly' (for example through errors in their perception of the equilibrium rate of interest  $RR^*$ ) and not following something like Taylor's rule.

(vii) In so far as there are fluctuations in economic activity (more evident in the new classical macroeconomics and the real business cycle) there is some suggestion of symmetry in that shocks (by definition) even out, that the cycle (as the term suggests) involves a return to the beginning (even if that is relative to trend output) and that the path of the cycle has no long lasting effects (that is no hint of any path dependency).

It should first be noted that in the NCM the cause of any macroeconomic 'difficulties' lies with the Central Bank in the sense that if the Central Bank hones the key interest rate on the 'natural rate' all is well (though that implicitly assumes that there is a close connection between the policy interest rate set by the Central Bank and the interest rates which appear in the markets). Conversely if the Central Bank does not hit the 'natural rate' then output deviates from its trend level, inflation rises or falls as the case may be. The notion that it was behaviour of Central Banks which led to the present recession was put by Taylor when he wrote 'that government actions and interventions caused, prolonged, and worsened the

financial crisis. They caused it by deviating from historical precedents and principles for setting interest rates, which had worked well for 20 years' (Taylor, 2008, p. 18).

There are other issues over the 'natural rate' – ranging from Central Bank not knowing what it is through to (more significantly) that the 'natural rate' is a concept which only arises in a range of models and question of compatibility of those theories with the real world – the 'natural rate' is a theoretical construct for which there may not be a real world counterpart. For example, a model based on a heterodox approach as outlined below would not permit of the concept of a 'natural rate'<sup>7</sup>. There is also the empirical issue as to whether the rate of interest is effective in influencing the level of demand and the rate of inflation.<sup>8</sup>

There is some sluggish adjustment in prices, as reflected in the Phillips curve, but there is no allowance for disequilibrium trading. In this regard, it can also be noted that a divergence of the real rate of interest from the natural rate would imply disequilibrium in the 'loanable funds' market, and hence the minimum of (desired) savings and investment happening, and that would imply that the volume of savings/investment would be less than or equal to the equilibrium level which is said to correspond to the 'natural rate of interest').

The NCM model, along with other mainstream models, is based on a representative agent approach (perhaps more accurately a representative household). Under such an approach, the problems of co-ordination in a decentralised market economy are inevitably played down. This co-ordination aspect of macroeconomics came to the fore with the re-appraisal of Keynesian economics literature. In the (post) Keynesian tradition the focus has been on the co-ordination of savings and investment decisions as key though unemployment can also be seen through the lens of co-ordination issues – there are people willing to work, and there are people wanting to buy the products which would be produced. The representative agent approach overcomes issues of co-ordination – if I am a representative agent, then how I behave will be I effect followed by all others. The representative agent could also be linked to the assumption of similar behaviour in terms of utility maximisation. The representative agent has difficulty coping with issues such as differences in expectations.

'The historical emergence of the representative agent paradigm is a mystery. Ironically, it appeared over the 70s after a period of intense discussions on the problem of aggregation in economics (that basically yielded negative results such as the impossibility to demonstrated 'nice' properties of aggregate demand or supply functions without imposing extreme assumptions on individual behavior). The representative agent appeared without methodological discussion.' (Colander et alia, 2009, p.7)

The mainstream approach can be characterised as seeking to arrive at a macroeconomic analysis on the basis of solely aggregation of individual behaviour – it would be more appropriate to call this aggregated microeconomics rather than macroeconomics. But even aggregation has posed difficulties not only in terms of how to deal with any disequilibrium such that intentions of one group do not match with the intentions of another group (that is demand and supply do not match up) but also in terms of the conditions under which aggregate relationships can be derived from individual ones. For example, ‘it has been known for some time ... that the logical requirements of consistent linear aggregation are so restrictive on functional forms that choice-theoretic microfoundations at the level of the individual agent have few implications for the behaviour of large-scale aggregates *unless* one is prepared to make a number of auxiliary assumptions. These include:

- a. homothetic preference;
- b. weakly separable and linearly homogenous production functions, identical for all firms ;
- c. homogenous and infinitely divisible commodities and factors of production ;
- d. a common set of prices with constant relative ratios;
- e. fixed distributions of income and endowments over time.’ (Martel, 1996, pp. 127-8).

### **3. The heterodox approach**

In contrast with the mainstream approaches, heterodox macroeconomics is macroeconomics in the sense described by Pasinetti that it is ‘not “macro-economic” in the sense of representing a first simplified rough step towards a more detailed and disaggregated analysis. It is macro-economic because it could not be otherwise. Only problems have been discussed which are of a macro-economic nature; an accurate investigation of them has nothing to do with disaggregation. They would remain the same – i.e. they would still arise at a macro-economic level – even if we were to break down the model into a disaggregated analysis’ (Pasinetti, 1974).

Heterodox macroeconomics analysis is clearly intended to be that of a monetary capitalist economy in which the monetary and financial sectors play a key role (in contrast to the passive monetary sector as envisaged in most mainstream macroeconomics). Indeed it is not possible to envisage a capitalist economy without money and finance (whereas the Walrasian general equilibrium can do so). The decision making of individuals and firms, the interactions of those decisions and the evolution of the economy have to be analysed in the context of fundamental uncertainty (in the sense of Keynes) where the future is unknown and unknowable, and the evolution of the economy must depend on the collective decisions

which are made. The institutional and social arrangements in an economy have to be reflected in the ways in which economic behaviour is analysed.

Heterodox macroeconomics comes in different shapes and sizes under a range of headings such as post Keynesian, Kaleckian, Minskian and drawing on some Marxian analysis. We argue here that there are a range of features which could be seen as underpinning heterodox macroeconomic analysis, though recognising that different analyses place different emphases. Eight key features are identified.<sup>9</sup>

#### *Aggregate demand*

A central element in heterodox macroeconomics is that the level of demand is always important for the level of economic activity, that is in the long-run (however that is defined) as well as the short-run. There is thereby a denial of the validity of approach of the neo-classical synthesis portraying the long-run as characterised by supply side equilibrium (at full employment). Whilst some other approaches to macroeconomics recognise the role of demand in the short-run but not in the long run, the heterodox approach views the role of demand as pervasive. There are then no market forces which could be relied on to propel the level of aggregate demand towards any supply-side equilibrium (or towards any other desired level of economic activity). There is a denial of the operation of relative prices to clear markets or of the real balance effect (in an endogenous money world) as the instrument of adjustment.

#### *Role of investment*

There has long been agreement in heterodox macroeconomic analysis on the key and dual roles played by investment as a relative volatile component of aggregate demand and the driving force in the savings-investment relationship, and as involving the creation of productive potential. Investment by its nature is forward-looking and firms are looking for rewards from their investment over a long future time horizon. But the future is inherently uncertain and unknowable, and investment decisions cannot come from or be modelled by precise optimisation.

Investment is undertaken by firms, and hence the amount of investment undertaken depends on the objectives of the firms, their organisation structure and goals as well as the market structure and competitive framework within which they operate. Heterodox macroeconomists have provide many analyses of investment, based on different approaches to firms' organisation and behaviour (see, for example, Crotty, 1990). In macroeconomic terms a key aspect of that has been the impact on rate of investment and capital accumulation (there are,

of course, many other important aspects). The pace of investment at any time has also to be understood in the context of the prevailing technological paradigm.

In terms of the macroeconomic variables which influence investment, there is broad agreement, notably profitability as a source of finance and as a spur to capital accumulation, and the level and change in capacity utilisation through some form of accelerator mechanism. Investment in effect fuses together the demand and supply side in that it is a component of demand but adds to productive potential. The particular significant aspect of the heterodox approach is that investment responds to on-going events including those impacted by the level of demand (most obviously capacity utilisation) rather than being the way in which the capital stock adjusts to the pre-determined growth path of the economy. 'The long-run trend is but a slowly changing component of a chain of short-period situations; it has no independent entity' (Kalecki, 1968, p.263). Further, 'technical progress is infused into the economic system through the creation of new equipment, which depends on current (gross) investment expenditure' (Kaldor and Mirrlees, 1962, p.174).

#### *Income distribution*

Heterodox macroeconomics has viewed the functional distribution of income as determined within the macroeconomic analysis, and that the distribution of income impacts on the level of demand. It is a basic proposition from Kaldor (1956) and Kalecki that the propensity to save out of wages is small (or zero) and out of profits substantial. Kaldor (1956) clearly indicates the relevance of that proposition for the distribution of income between wages and profits, though his analysis is based a full employment assumption. The Kaleckian approach views the distribution of income as set by the degree of monopoly, leading to the view that the volume of profits is determined by the spending decisions of capitalists ; the well-known aphorism that 'workers spend what they earn, capitalists earn what they spend' summarises this view.

The view that the propensity to spend out of wages was much larger than that out of profits led to a stagnationist view, namely that low demand and hence stagnation could result from wage share being relative low thereby depressing consumption demand. The incorporation of the idea that investment depends on profitability and capacity utilisation by Bhaduri and Marglin (1990) along with the differential propensities led to the distinction which they drew between a stagnationist regime and an exhilarationist regime, now more usually referred to wage-led or profit-led regimes. The significance of this approach is that it brings income distribution into a central role in the determination of aggregate demand and the level of economic activity. It also serves as a reminder that shifts in behaviour or in structure – in this

case in the differential in propensity to consume and the influence of profitability on investment – can have marked effects on approach to policy. The particular important element of this approach is the view that in a wage-led regime application of the orthodox medicine for unemployment – that is restraint of real wages – becomes counterproductive.

#### *Interdependence of demand and supply and path dependency*

The independence of demand and supply has been a (perhaps the ?) central proposition in mainstream economics, whether at the microeconomic level where the demand and supply curves only interact through the price mechanism with a separation of the factors influencing demand and those influencing supply or at the macroeconomic level.

The interdependence of demand and supply is closely related with path dependency. The term path dependency is used to emphasise two features. First, the path of the economy is not pre-determined as in neo-classical growth theory (including endogenous growth theory) but rather the path emerges in an evolutionary manner. Second, it is used rather than the term hysteresis which tends to suggest a movement from one equilibrium to another, albeit that the equilibrium towards which there is movement is influenced by the path taken.

The mechanisms by which there is path dependency and by which the path of demand opens up the supply future are various but three are generally to the fore. The first one, already discussed in the context of investment, where it is clear that current demand influences investment which thereby adds to the capital stock. This general idea can readily be extended to a range of investment including that in education and health provision. The second is the way in which people are drawn into or pushed out of the effective labour supply through demand. Participation rates vary, ages of enter into and exit from labour force change and there is regional and international migration. Clearly not all of such changes can be ascribed to pressures of demand as demographics, changes in social attitudes etc are involved. But the evolution of the labour force cannot be understood without reference to demand. The third comes from the operation of a Verdoorn law type effect and ‘learning by doing’ (and a variety of other forms of learning, e.g. ‘learning by exporting’). The rate of productivity change is then linked with the level of activity in the economy, which itself is determined by the level of demand.

#### *Money and credit*

The role of money created through the credit system and now labelled endogenous money has been a central element in heterodox macroeconomics for the past quarter of a century, though ideas on endogenous money and the development of the circuitist approach go much further back.

Endogenous money is important for macroeconomic analysis in a number of ways. First, an adjustment process which relies on some idea of real balance effect is no longer viable since endogenous money does not constitute net worth. The adjustment process becomes a matter of administrative decision rather than market mechanism. Second, the manner in which loans are provided by the bank system becomes a central question. It is not only that banks hold key to expansion since any refusal on their part to provide loans would limit any expansion of expenditure. The way in which the inevitable credit rationing occurs in terms of who are 'awarded' loans and who are not reflects a wide range of discrimination (gender, ethnicity etc.). The type of sectors (e.g. large vs. small business, high tech vs. low tech) favoured which influence the evolution of the economy in a path dependent world. The terms and conditions on which loans are supplied can also interact with the analysis of financial liberalisation.

Third, monetary policy becomes more closely identified with interest rate policy, though interest rate policy has always been the key element in monetary policy even in the hey day of monetarism. But the heterodox analysis suggests that interest rate movements have relatively small effects and points to the need for a broader concept of monetary policy (see Arestis and Sawyer, 2006).

Fourth, the behaviour of banks and related credit institutions become important for the economy. Their willingness or otherwise to provide loans and the terms on which they are provided impact on the level and structure of demand. Further, the financial sector is prone to act in ways which generate bubbles and crises : 'instability is determined by mechanisms within the system, not outside it; our economy is not unstable because it is shocked by oil, wars or monetary surprises, but because of its nature' (Minsky 1986, p. 172).

Finally, any notion of the non-neutrality of money disappears. It is difficult to even envisage what a non-monetary economy would look like in order to judge the neutrality or otherwise of money. But since money comes into existence via the credit process, the ways in which credit is created impacts on investment, and thereby the productive potential of the economy.

#### *Price and wage determination and the supply-side of the economy in the short run*

There have been many contributions by heterodox economists to the analysis of price determination and of wage determination. Here we can only sketch some aspects<sup>10</sup>. Firms make interrelated decisions on price, output supply and employment offers in light of the demand conditions which they face and their own productive capacity. In doing so, firms set the relationship between price and wage, and their pricing decisions bear on profit determination. The determination of wages is represented by a wage curve as a positive

relationship between real wages and employment and based on efficiency wage considerations and/or on collective bargaining. From the interaction of these price and wage determinations a form of supply-side equilibrium can be derived, which can be seen as forming an inflation barrier. This could be seen as akin to a non-accelerating inflation rate of unemployment (NAIRU). But this inflation barrier differs from the NAIRU in (at least) two major respects. First, it is presented in a manner which seeks to emphasise that the interaction of prices and wages do not take place in what may be described as ‘the labour market’, and hence the supply-side equilibrium is not set by the features of the labour market. Instead the emphasis is placed on the role of productive capacity. Second, there is no presumption that the inflation barrier acts as a strong (or even weak) attractor for the actual level of economic activity. There are no market forces which lead the level of aggregate demand to adjust to the inflation barrier.

### *Inflation*

Inflation is a non-monetary phenomenon in the sense that changes in the stock of money do not determine the rate of inflation in any causal sense, but rather the rate of change of the stock of money (endogenously) adjusts to the pace of inflation. There are a range of factors which impact on the rate of inflation including a struggle over income shares, the level of and rate of changes of the level of aggregate demand and cost-push factors coming notably from the foreign sector (change in import prices and the exchange rate).

A heterodox approach (which we labelled a structuralist approach, Arestis and Sawyer, 2005) concentrates on three key elements in the inflationary process. One set of inflationary pressures comes from the level of demand relative to the size of productive capacity. There is no presumption that there is adequate capacity in an economy to support the full employment of labour, and hence enterprises may be operating at or even above normal capacity with substantial levels of unemployment.

A second and related set of inflationary pressures comes from the inherent conflict over the distribution of income. The ability of the economy to reconcile the conflict depends, *inter alia*, on the productive capacity of the economy. The determination of an inflation barrier (as indeed in the literature on the NAIRU and on the ‘natural rate of unemployment’) involves the notion that wages and prices rise together with the difference in the rate of increase of wages and that of prices being equal to the rate of labour productivity growth. In other words, the distribution of income between wages and profits would remain constant. This serves as a reminder that there are basic conflicts over the distribution of income. If all groups and classes in society were in effect content with the existing distribution of income, then it could

be expected that there would not be a problem of inflation: at a minimum it would mean that the rate of inflation was constant. An increase in the rate of inflation can be viewed as arising from some combination of intention of some groups to increase their share of income and enhanced opportunity to do so. A higher level of demand for labour may, for example, be seen as enhanced opportunity for workers to increase their share. But a related higher level of demand for output would allow firms to increase their profits. The ‘conflict theory’ of inflation can be seen as based on this insight.

#### *Open economy considerations*

The openness of an economy means that the domestic economy is buffeted by events in the rest of the world. There is no reason to think that the domestic economy can be insulated from the rest of the world through smooth adjustments in the exchange rate : hence inflation in the rest of the world impacts on domestic inflation in that it cannot be assumed that some form of purchasing power parity holds under which the nominal exchange rate would move to offset any inflation differential.

It would be generally agreed that there has been considerable volatility of exchange rates (both nominal and real) under the floating exchange rate regime, and that capital related flows, rather than trade related flows, across the exchanges are the dominant factor influencing movements in the exchange rate. It has not been possible to understand the movements in the exchange rate, perhaps other than to say that uncovered interest rate parity does not apply. Whilst the real exchange rate has some mean reverting properties, these do not prevent movements of the order of +/- 25 to 30 per cent in the real exchange rate (and also in the nominal exchange rate given the similarities of inflationary experience across industrialised countries).

#### *Fluctuations in economic activity*

The heterodox approach has an ‘embarrassment of riches’ so far as ideas and models which help understand fluctuations in economic activity. Whereas mainstream macroeconomics can be rightly criticised for not readily encompassing crisis and recession, it may be sometimes thought that heterodox macroeconomic analysis is prone to readily see crisis. Heterodox macroeconomics has a range of ideas and analyses which address issues of fluctuations in economic activity, the oscillations of boom and bust, and various forms of crisis have a range of models. Ideas based on some form of what may be termed multiplier—accelerator, as in the work of Kalecki (1935), the conflict over income shares as in the ‘predator-prey’ models of Goodwin (1967) and others, and Minskian notions of the causes of ‘financial instability

(Minsky, 1982, 1986) and the interactions between the financial and real sectors of the economy.

#### **4. Unemployment and excess capacity**

The whole thrust of mainstream economics has been towards models in which equilibrium is characterised by full employment with the general presumption that there are strong forces at work which lead to equilibrium and hence to full employment. Observed deviations from full employment can be variously explained, whether through mis-perceptions, responses to technological shocks etc. but those explanations generally carry with them the notion that employment fluctuates around full employment, sometimes involving unemployment and sometimes overemployment. Other explanations have generally explored a variety of ‘imperfections’ – the route initially pursued by new Keynesian economics. The agenda has then been based on full employment as the norm with explanations sought for deviations from full employment.

In contrast, heterodox macroeconomics starts from the perspective that unemployment is the general characteristic of capitalist economies, and any attainment of full employment needs further explanation. Kalecki, for example, argued that under capitalism “a considerable proportion of capital equipment lies idle in the slump. Even on average, the degree of utilisation throughout the business cycle will be substantially below the maximum reached during the boom. Fluctuations in the utilisation of available labour parallel those in the utilisation of equipment. Not only is there mass unemployment in the slump, but average employment throughout the cycle is considerably below the peak reached in the boom. The reserve of capital equipment and the reserve army of unemployed are typical features of capitalist economy, at least throughout a considerable part of the cycle.” (Kalecki, 1991, p.311).

Unemployment and excess capacity strike at the very heart of standard economic analysis and the defined purpose of economics. Robbins, in 1932, defined the scope of economics as “the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses” and thereby economic analysis “focuses attention on a particular *aspect* of behaviour, the form imposed by the influence of scarcity” (Robbins, 1932). As Joan Robinson remarked, 1932 was not the most appropriate time to make this definition since the major economic problem of the time was not the scarcity of resources but rather a scarcity of demand for those resources.

This point is more than dissonance between theory and observation and it is rather that the occurrence and persistence of unemployment runs counter to the widely used definition of the

subject matter of neo-classical economics. Thus neo-classical economic analysis finds great difficulty in reconciling its definition of its own subject matter with the evidence of unemployment and excess capacity. The role of unbounded rationality in mainstream macroeconomics is evident from the discussion above, yet the waste of resources evidenced by unemployment and excess capacity appear as clear evidence of irrationality.

Unemployment as an issue has largely disappears from the mainstream approach. One version of that disappearance comes from the ‘natural rate of unemployment’ identified as a market clearing position with demand and supply of labour equal, and hence the suppliers of labour satisfying their supply decisions. Any apparent unemployment is then a matter of choice and involuntary unemployment is ruled out. ‘Unemployment in the unhampered market is always voluntary. In the eyes of the unemployed man, unemployment is the minor of two evils between which he has to choose’ (von Mises, 1949, p. 596), ‘Workers who lose jobs, for whatever reason, typically pass through a period of unemployment instead of taking temporary work on the ‘spot’ labour market jobs that are readily available in any economy... To explain why people allocate time to a particular *activity*—like unemployment—we need to know why they prefer it to *all* other available activities. (Lucas, 1987, 54)

Another version comes from the NAIRU approach. The NAIRU may not itself be a position of full employment, but it is a form of supply-side equilibrium. The level of unemployment may fluctuate around the NAIRU through fluctuations in aggregate demand or other reasons but the underlying rate of unemployment is the NAIRU. Hence any unemployment can be ascribed to supply-side failures rather than demand failures.

But there are other routes through which unemployment virtually disappears as a macroeconomic problem. First, estimates of the NAIRU based on econometric work are very likely to fall in the range of observed unemployment rates. When the NAIRU is seen as the rate of unemployment which corresponds to wages (adjusted for productivity) and prices rising at the same rate, and hence wage share constant, then in periods when the wage share does not change greatly, it must be the case that the estimated NAIRU falls well within the range of observed unemployment. Similarly if the NAIRU is seen as wages (or prices) rising in line with expected wage (or price) inflation, then in an era where wage (or price) inflation does not display a marked trend, the estimated NAIRU will be in range of observed unemployment. Thus comparisons between estimated NAIRU and actual unemployment will show a broad similarity and on average difference between estimated NAIRU and actual unemployment will be close to zero.

Second, attention has been shifted (in terms of the expression of the supply side) from unemployment to the output gap : this is exemplified in the equations for the NCM above. The output gap, being the difference between actual output and trend output, will tend to average out at zero by construction as the estimates of trend output are derived from actual output<sup>11</sup>.

Although unemployment has been always present, and on any reasonable definition full employment of labour is a rather rare occurrence under market capitalism, the world-wide recession brings unemployment to the fore. The mainstream approach centred on the non-occurrence of unemployment in any meaningful sense is unable to provide any explanation. Indeed the manner in which the NCM is set up to include a form of Say's Law and Ricardian equivalence, significant departures for full employment are precluded. In contrast, the heterodox approach has a ready explanation arising from the failures of the financial system and the collapse of aggregate demand.

## **5. Micro-economic foundations and human behaviour**

The mainstream approach has made much of having well-founded microeconomic foundations, and the implication that Keynesian and other macroeconomic analysis do not have such foundations. It has already been argued above that heterodox macroeconomic analysis clearly does have (and has always had) microeconomic foundations. The microeconomic foundations of the mainstream have, as indicated above, involved a representative agent approach with the consequent problems of proceeding from the microeconomic to the macroeconomic especially where there is a denial of macroeconomic (in the sense of Pasinetti) forces. Solow (2008, p.244) argues 'that the claim that "modern macro" somehow has the special virtue of following the principles of economic theory is tendentious and misleading.' (Solow, 2008, p.244).

Solow (2008) describes the models of the mainstream macroeconomics as deduced 'from a model in which a single immortal consumer-worker-owner maximizes a perfectly conventional time-additive utility function over an infinite horizon, under perfect foresight or rational expectations, and in an institutional and technological environment that favors universal price-taking behavior. In effect, the industrial side of the economy carries out the representative consumer-worker-owner's wishes.' (p. 243) And that even when imperfections are added 'basically this is the Ramsey model transformed from a normative account of socially optimal growth into a positive story that is supposed to describe day-to-day behavior in a modern industrial capitalist economy. It is taken as an advantage that the same model applies in the short run, the long run, and every run with no awkward shifting of

gears. And the whole thing is given the honorific label of “dynamic stochastic general equilibrium.” It is rather that ‘a modern economy is populated by consumers, workers, pensioners, owners, managers, investors, entrepreneurs, bankers, and others, with different and sometimes conflicting desires, information, expectations, capacities, beliefs, and rules of behaviour.’ (Solow, 2008, p. 243).

The micro foundation of mainstream macroeconomics which has been cited as a major contribution is, in effect, the major weakness with its reliance the RARE model. The two key weaknesses here are seen to be, first, as indicated above, having a microeconomic analysis which is aggregated on the basis of a representative agent approach has the weaknesses of not proving a macroeconomic analysis (in the sense of Pasinetti), of having not established conditions for aggregation and relying on the representative agent approach. Second, the microeconomic analysis is the RARE approach which ignores the specific institutional arrangements of an economy and which plays down the constraints under which individuals and firms operate.

The first of those difficulties has been discussed above, and we now turn our attention to the second one.

The RARE approach runs into objections based on ‘bounded rationality’, asymmetric information, perceptions and social conditioning of utility. The significance of the ‘bounded rationality’ is in part that people behave in ways which are substantially different from maximisation – e.g. satisficing, that how decisions are framed and which options considered become important. It is not a matter that ‘mistakes’ are made so that actual decisions differ from those ‘predicted’ by RARE but that there are systematic differences. This is well illustrated by rational expectations : it is not seen that expectations are always exactly accurate but rather that mistakes are stochastic. Indeed it was a key criticism of adaptive expectations that they could lead to persistent mistakes. But if adaptive expectations are interpreted as expectations on which decisions and actions are based and which arise from a person’s experience and perceptions, it seems difficult to deny their role. The ‘trick’ then becomes how is experience interpreted, how are perceptions formed etc..

Mainstream approach emphasises choice, and that outcomes are reflection of choices and preferences (though choices of sets of individuals have some how to be reconciled, e.g. equilibrium between demand and supply: but often in macroeconomic theory it is assumed that one side of the market dominates, e.g. supply). In contrast, the heterodox approach stresses the pressures on ‘economic agents’ – not denying there is an exercise of choice but that the room for manoeuvre may be limited and how the individual chooses is socially

conditioned. Perhaps the clearest example of this relates to the ‘supply of labour’ : the orthodox approach is clearly based on maximise utility based on leisure (and labour as anti-leisure) and income (and in turn utility of consumption = income) subject to budget constraint. In contrast, a heterodox approach would stress the social conditions which sets who works and who does not (e.g. age of retirement), the pressures on those of the working age population to work arising from the need to survive (Sawyer and Spencer, 2010). Another example would come from investment decisions. The mainstream approach would focus on profit maximisation whereas a heterodox approach would recognize the role of profits but also the competitive pressures on firms (‘accumulate, accumulate, that is the law of Moses and the prophets’ Marx).

‘Economic man’ is a ‘man for all seasons’ in the sense that it appears applicable to all situations and choices – all that is required for a particular analysis is to identify the variables which enter the utility function which is optimised – of course in principle everything would enter the utility function which is optimised with respect to the budget constraint. The only question then is for a specific investigation what simplifications can be made – for example in the analysis of labour supply the utility function is taken to include leisure time and income.

The brief discussion on investment in heterodox macroeconomics above can be used to illustrate a range of points. First, heterodox macroeconomics does have a micro-economic analysis (whether the term ‘foundations’ should be used can be debated). Hence, any idea that heterodox macroeconomics is not concerned with micro decisions is clearly false. Second, heterodox macroeconomics often has an ‘embarrassment of riches’, here in the context of understanding investment behaviour. Whereas the mainstream approach relies on a neo-classical (Jorgenson) approach to investment, heterodox macroeconomics has many approaches. The different approaches are, in part, a reflection of different views on how the ‘world works’ and what are the driving forces behind accumulation. They are also a reflection that firms in different competitive situations and with different governance structures behave in different ways – there is no universal theory of investment behaviour.

Although it has not often been explicit, heterodox macroeconomics in its microeconomic dimension has to have conceptions of human behaviour, individually and collectively within organisations.

The mainstream approach purports to portray human behaviour as ‘rational’. In doing so a rather limited notion of rationality in mainstream economics is used, that of consistency over choices. It is not doubted here that an individual would act rationally in the sense that  $X > Y$ ,

$Y > Z$  implies  $X > Z$  in situations where the individual is able to consider the three options and has clear perceptions on the benefits or otherwise of X, Y and Z. This would not though preclude that  $X > Y$ ,  $Y > Z$  today but  $Z > X$  tomorrow through changes in perception of what X, Y and Z involve and/or through changes in tastes and preferences. Any notion of ‘unbounded rationality’ though falls (at the level of the individual) for reasons of incomplete knowledge and information, through lack of ‘computer power’ and the essential unknowability of the future.

The rationality of the RARE approach involves much more than the consistency view of rationality at the individual level. It involves a rationality coming from knowledge of the future, and it involves a rationality in the sense that all beneficial trades have been undertaken. Disequilibrium in any market is a sign of irrationality in the sense that not all beneficial trades have taken place. Unemployment is irrational in that not all resources are fully utilised in the context of scarcity, and also in the sense there are individuals wanting (and needing) to work and produce and individuals wanting to acquire the goods and services which would thereby be produced.

This idea of rationality is related to the individual economic agent, and does not readily carry over to the organisation as economic agent. The simplest argument here is by way of appeal to Arrow’s impossibility theorem, that is that even where individuals decide rationally (as defined above), it does not follow that decisions made through some voting mechanism will display corresponding rationality. The mainstream approach within macroeconomics has retained a single well-defined objective for the firm, and in effect the firm is also an individual. Once a firm is considered as a social organisation, then individual rationality cannot be presumed to translate into organisational rationality.

Akerloff and Shiller portray Keynes’s view as that ‘the economy is not just governed by rational actors, who “as if by an invisible hand” will engage in any transaction that is to their mutual economic benefit, as the classicists believed. Keynes appreciated that most economic activity results from rational economic motivations—but also that much economic activity is governed by *animal spirits*. People have noneconomic motives. And they are not always rational in pursuit of their economic interests. In Keynes’ view these *animal spirits* are the main cause for why the economy fluctuates as it does. They are also the main cause of involuntary unemployment.’ (Akerloff and Shiller, 2009, p. ix). Further, ‘just as Adam Smith’s invisible hand is the keynote of classical economics, Keynes’ *animal spirits* are the keynote to a different view of the economy—a view that explains the underlying instabilities of capitalism.’ (Akerloff and Shiller, 2009, p. ix)

Whether ‘people have noneconomic motives’ (as indicated by Akerloff and Shiller) clearly depends on what is meant by noneconomic motives. If, as could be inferred from their discussion, notions of fairness influence decisions but are viewed as noneconomic, we would agree (though no doubt an argument could be constructed to the effect that fairness is an argument in individuals’ utility function). But we would not wish to limit economic analysis to what are generally viewed as economic motives.

Once it is acknowledged that individuals do not have the ability to compute the optimal decisions when all feasible choices are considered and when individuals operate in a complex and uncertain world with an unknowable future (such that specification of optimality is problematic to say the least), then how individuals frame decisions and what operating rules of thumb are pursued become significant in understanding individual decisions. For macroeconomic analysis a detailed understanding of individual decisions is not required (and indeed given our limited ability to incorporate information would provide us with far too much information than we could use). It is rather that ways of thinking about the major influences on key decisions is required. Take again the case of investment decisions. Rather than seeking to replace the neo-classical theory of investment under which firms optimise over a known future, it would be to investigate the macroeconomic variables which influence investment, how the environment in which the firm operates (competition, owner/management controlled) is relevant for investment, and how views of the future (the waves of optimism and pessimism). Heterodox economists (as hinted above) have many views on investment, and it could be argued that the macroeconomic variables which have often been identified as important for investment (such as profitability, capacity utilisation) ‘score well’ in empirical (econometric) evaluation.

## **6. Aggregation and macroeconomics**

The mainstream approach has spent some time seeking to derive aggregate relationships from microeconomic ones, and finding that precise aggregation would require a range of restrictive assumptions. The purpose of that exercise is in effect the replication at the aggregate level of microeconomic relationships. Heterodox macroeconomics has paid rather little attention to issues of aggregation. When it has done so, the outcome has not been satisfactory – for example, the aggregation from firm and industry level behaviour with regard to pricing to the macroeconomic level.

Heterodox macroeconomics has the specific difficulty that it recognizes heterogeneity of actions, decisions and behaviour of firms and households. It would recognize, for example, that there are different approaches to pricing behaviour (see Lee, 1998, Sawyer, 1983), to

investment behaviour (surveyed in Baddeley, 2003) and wage determination (Sawyer, 2002). Thus precise relationships at the aggregate level would be difficult to come by – and clearly it would not be possible to replicate at the aggregate level any microeconomic relationships. It may be possible to develop broad relationships for the aggregate level but lacking precision. For example, in Sawyer (1983) it was argued that the similarities between different pricing equations could be utilised to postulate that prices would be a (perhaps quadratic) function of the level of output, of input prices and the mark-up. In a similar vein in Sawyer (2002) I pointed to similarities between different views of wage determination.

Macroeconometric estimation has to utilise aggregate or sub-aggregate relationships (e.g. for pricing, an equation at the aggregate level or sectoral level), and these cannot be based on precise relationships. Even if it were possible in a heterodox approach to derive a precise relationship between variables at the level of the household or the firm, given what we have said about the different ways in which households and firms behave and the different pressures to which they are subject, any formal aggregation to yield a well defined functional relationship between aggregate variables is well nigh impossible.

## **7. Money and finance**

A key aspect of the significance of effective demand is the notion that in a market economy demand (in the sense of desire for goods and services) can only be made effective in the market through the possession of purchasing power – that is money. Heterodox macroeconomics has been firmly based in the idea of a monetary production economy. The difficulties which the mainstream analysis has in dealing with money and credit are well-known. This is reflected in ‘The most serious challenge that the existence of money poses is this: the best developed model of the economy cannot find room for it. The best developed model is, of course, the Arrow-Debreu version of Walrasian general equilibrium.’ (Hahn, 1983, p. 1). The mainstream approach has generally seen ‘money as a veil’. This may to some degree be traced back to the manner in which household behaviour is modelled. Clower (1965) pointed to the ‘unified decision hypothesis’ which was involved : a household makes decisions with respect to goods and services and factor supplies simultaneously, and is in effect modelled as exchanging labour and other factor supplies for goods and services. At most, money is an intermediary in that process. Clower then pointed to the issues which arose when the first set of transactions (selling factors) could not be carried through, and to the ‘dual decision hypothesis’.

The NCM (harking back to Wicksell) has replaced the given money supply assumption of monetarism with the given (by the Central Bank) interest rate assumption. This enables an

alternative yet simple representation (see, e.g. Carlin and Soskice, 2009) of macro model with the LM curve replaced by horizontal line in interest rate—income space. But the NCM (as indicated above) does not reflect the importance and significance of endogenous money. Once it is recognized that money (in the form of bank deposits) comes into existence alongside loans, and that the possession of money is required to make any demand effective in the market place, then the conditions under which the loans are extended becomes crucial. Banks willingness or otherwise to provide loans for investment purposes and for consumer expenditure sets the parameters for the level of expenditure.

A considerable advantage of heterodox macroeconomics comes from its long standing recognition of the importance of money, credit and finance.

## **8. Conclusions**

Nearly three decades ago, Minsky wrote that ‘from the perspective of the standard economic theory of Keynes’s day and the presently dominant neoclassical theory, both financial crises and serious fluctuations of output and employment are anomalies: the theory offers no explanation of these phenomena.’ (Minsky, 1982, p.60). It is the argument here that exactly the same remarks can be made with regard to the current orthodoxy, and specifically the centre of that orthodoxy in the form of the ‘new consensus in macroeconomics’. The financial crises, recession and rising unemployment are witness to the futility of a macroeconomic analysis which denies those phenomenon.

In this paper, we have sought to consider the impact which the financial crises and worldwide recession of 2007-09 for macroeconomic analysis. We have outlined, compared and contrasted mainstream macroeconomic analysis (particularly in its ‘new consensus in macroeconomics’ form) with heterodox macroeconomics. In doing so we have highlighted four sets of issues. These are:

- (i) the tendency for mainstream macroeconomics to predict full employment as the general outcome with fluctuations of employment around that level, whereas heterodox macroeconomics views full employment as an infrequent occurrence ;
- (ii) the reliance of mainstream macroeconomics on the RARE (rational agent rational expectations) approach whereas heterodox macroeconomics adopts a range of analyses of human behaviour and decision making, based on perceptions of how individuals and organisation ‘really behave’;
- (iii) the aggregated microeconomics nature of mainstream macroeconomics often relying on the use of the representative agent, whereas heterodox macroeconomics incorporates both microeconomic foundations and a genuine macroeconomics. Heterodox macroeconomics

incorporates different behaviours in different institutional settings which precludes formal aggregation ;

(iv) mainstream macroeconomics still fails to produce an analysis of a monetary production economy, whereas the heterodox approach with an emphasis on endogenous money, the loan creation process and the potential instability of the banking system are able to do so.

The financial crisis and worldwide recession of 2007-09 have emphasised the instability of the financial system, the failures of a market clearing approach in an uncertain world and the ever present threat of unemployment. The mainstream approach with its reliance on the RARE approach is not able to cope with these phenomenon, whereas the heterodox macroeconomics is well attuned to doing so.

## Endnotes

<sup>1</sup> As argued in Sawyer (2008), new Keynesian economics was neither new nor Keynesian.

<sup>2</sup> The world-wide recession of 2008-09 (and beyond) is viewed as coming from a number of inter-connected financial crises rather than a single one, though the crises in USA and UK were particularly significant.

<sup>3</sup> For example, in 2007, ‘And we will never return to the old boom and bust’ (Brown, 2007) ‘In previous decades instability and spiralling inflation too often pushed Britain's economy from boom to bust. In the past decade we have put that instability behind us, and have reaped the rewards’ (Darling, 2007).

<sup>4</sup> Keynes (1936) did retain a utility maximising approach to labour supply, though of course the labour supply plans of individuals could be realised in the market – hence unemployment. Similarly, Keynes retained a profit maximising approach to price determination.

<sup>5</sup> Meyer (2001) is an early expression of the NCM, Woodford (2003) and Gali (2008) provide a comprehensive treatment. Carlin and Soskice (2009) provide a teaching version.

<sup>6</sup> We have also argued elsewhere that the Phillips’ curve lacks coherent theoretical foundations (Arestis and Sawyer, 2007, Sawyer, 2010).

<sup>7</sup> Keynes (1936) rejected the idea of a single ‘natural rate of interest’. “In my *Treatise on Money* I defined what purported to be a unique rate of interest, which I called the natural rate of interest - namely, the rate of interest which, in the terminology of my *Treatise*, preserved equality between the rate of saving (as there defined) and the rate of investment ..... I had, however, overlooked the fact that in any given society there is, on this definition, a *different* natural rate of interest for each hypothetical level of employment. And, similarly, for every

rate of interest there is a level of employment for which the rate is the ‘natural’ rate, in the sense that the system will be in equilibrium with that rate of interest and that level of employment. Thus it was a mistake to speak of the natural rate of interest or to suggest that the above definition would yield a unique value for the rate of interest irrespective of the level of employment. I had not then understood that, in certain conditions, the system could be in equilibrium with less than full employment” (Keynes, 1936, pp. 242-243).

<sup>8</sup> See Arestis and Sawyer (2008) for extended discussion of points made in this paragraph.

<sup>9</sup> The following discussion draws heavily on Sawyer (2009).

<sup>10</sup> This section is heavily influenced by Sawyer (2002).

<sup>11</sup> There may be some differences in so far as trend output is estimated on the basis of past trends and extrapolated over a period when (at least in retrospect) the trend growth rate is different.

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