



Towards post-Keynesian ecological macroeconomics



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ABSTRACT

The paper starts with a brief criticism of macroeconomic analyses of different schools of thought for their focus on economic growth and maximisation of output. This applies to the traditional Keynesian approach, which has focused on the achievement of sufficient aggregate demand to underpin full employment and full capacity utilisation, down-playing aggregate supply constraints. This also applies to the neoclassical approach, including the current New Consensus Macroeconomics approach, which asserts the dominant role of aggregate supply in the long run, and where growth is set by the so-called 'natural rate of growth', with no concerns over environmental and ecological issues. The paper then proposes a different approach to macroeconomic analysis. It explicitly acknowledges that economic growth is a double-edged sword. Growth can help to alleviate persistent levels of high unemployment, but it can also lead to potentially catastrophic environmental problems. Building on the Monetary Circuit theory and the Demand-led growth theory, the paper offers an analysis of the interconnections and interdependence of the economic, biophysical and social worlds and by doing it hopes to provide the building blocks for the establishment of post-Keynesian ecological macroeconomics.

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The post-Keynesians have almost totally ignored environmental problems, as well as resource and energy constraints, in the tradition of maintaining capital accumulation and full employment Ecological economics is particularly weak on macroeconomic issues and, if anything, has tended to use economic equilibrium theories and concepts of capital, which are inconsistent with some of its basic premises about systems functioning derived from ecology. A more heterodox macroeconomic approach, sharing basic methodological concerns, would therefore be a significant step forward.

[Spash and Ryan (2012, p. 8)]

1. Introduction

Macroeconomic analysis comes in many schools of thought and approaches and has been undertaken with little or no concerns over environmental and ecological issues. Indeed, in many respects

macroeconomics has implicitly proceeded as though there are no resource and energy constraints. Keynesian macroeconomics, as represented by the *IS-LM* model of the neoclassical synthesis, focused on the determinants of aggregate demand, which in turn determined the level of economic activity in the short-run, with little or no interest over the supply-side of the economy. In some contrast, the mainstream approach in macroeconomics, appearing under headings such as the 'New Consensus Macroeconomics' (NCM henceforth) and neoclassical and endogenous growth theory, viewed aggregate demand as at most a short-run issue, and that the supply-side dominated the level and growth of economic output. Of particular relevance here is neoclassical growth theory with its assumption on substitutability between the factors of production and the role of the price mechanism in securing the full utilisation of resources (Rezai et al., 2013). This has generated the idea that growth of output would belong to a sustainable equilibrium 'natural rate of growth' path.

This paper adopts a different approach from both traditional Keynesian macroeconomics and the current NCM. It is grounded in a framework which draws on the work of Keynes (1930, 1936), Kalecki (1971) and their modern followers, and is generally presented under the broad heading of post-Keynesian macroeconomics

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(PKM henceforth).¹ This framework recognises that a modern economy is a monetary production economy, i.e., an economy where money is crucial for the production of goods and services and the distribution of income, and in that way it makes the economy prone to solvency problems and financial instability (Brancaccio and Fontana, 2012). This framework also acknowledges the role of fundamental uncertainty, rules out the possession of full information and optimisation under rational expectations, recognises path dependence and the interdependence of aggregate demand and aggregate supply in determining the long-run level of output and employment (Arestis and Sawyer, 2009; Sawyer, 2010).

PKM is not immune to the criticism of having largely ignored concerns with environmental and ecological issues. From its origin PKM has been concerned with the lack of automatic forces in a market economy, in both the short and long run, ensuring that the level of output corresponds to the full employment of labour. Full employment and economic growth as a means to achieve it have always been at the forefront of post-Keynesian contributions. As a result resource and energy constraints never played a prominent role in PKM. Yet, there have been noteworthy post-Keynesian contributions that have directly or indirectly touched on environmental and ecological issues.² These contributions can act as signposts for the creation of a PKM approach to ecological economics. More importantly, the past few years have seen the flourishing of a rich body of contributions relating PKM to ecological issues.³ Most of these contributions recognise that economic growth is a double-edged sword. Growth can help to alleviate persistent levels of high unemployment, but it can also lead to potentially catastrophic environmental problems. The theoretical framework proposed in this paper explicitly acknowledges these potentially conflicting effects of economic growth. It offers an analysis of the interconnections and interdependence of the economic, biophysical and social worlds and by doing it hopes to provide some building blocks for the establishment of post-Keynesian ecological macroeconomics.

The paper is organised as follows. Section 2 briefly discusses the supply-side factors of the economy, mainly physical (or manufactured) capital, labour resources and 'natural capital', and the ways in which these three factors interact through a production function in order to determine the output of the economy, on the assumption that there is non-substitutability among these factors. Section 3 proposes an analysis of the monetary and financial system based on the Monetary Circuit, where money is created by the banking system through the lending activity to firms. Section 4 considers the demand side of the economy. Aggregate demand is driven by investment, which also provides additions to the capital stock, and hence to the future potential supply of the economy. Investment and the Monetary Circuit are closely linked to each other in that the financing of investment comes from loans, and banks decide how much and which forms of investment occur. Section 5 examines the ways in which the use of physical capital and labour, and the depletion of 'natural capital' could interact, and considers the possibility of the emergence of a sustainable rate of growth of output in the long run. Finally, Section 6 concludes.

¹ There is some ambiguity concerning the spelling and meaning of "Post Keynesian" economics. This manuscript adopts a broad definition of Post Keynesian economics, and more to the point of Post Keynesian Macroeconomics, that encompasses among other things Kaleckian growth theory and the Monetary Circuit theory. Therefore, following the recommendation made by one of the referees, throughout the manuscript the spelling "post-Keynesian" replaces the more traditional "Post Keynesian" spelling. See, for an analysis of the different features of PKM, Fontana (2010, Ch. 2), King (2012), and Harcourt and Kriesler (2013).

² See, for instance, Davidson (1963, 1979a, 1979b), Bird (1982), Gowdy (1991), Vercelli (1998), Metroeconomica (2001), and Roncaglia (2003).

³ See, for instance, International Journal of Environment, Workplace and Employment (2005), Holt et al. (2009), Kronenberg (2010), Chen and Galbraith (2011, 2012), entries by Courvisanos, Perry, and Winnett in King (2012), Cambridge Journal of Economics (2012), Foley (2013) and Taylor et al. (2016-in this issue).

2. Resource Use

One of the main tenets of PKM is that the growth of an economy is driven by the growth of demand for goods and services, which in turn is set in motion by changes in the level of investment (in fixed capital formation). The central issue is then whether the growth of aggregate demand is sufficient to match the growth of the labour supply, and hence whether or not there is a tendency to underemployment of labour. Of course, a lack of capital equipment or supply bottlenecks can also prevent the full employment of labour (and indeed would be seen as major constraints). The analysis presented in this paper maintains this simple theoretical framework, but it enriches it with an analysis of environmental and ecological issues. The growth of the economy is perceived as driven by the growth of aggregate demand, and can be constrained by the growth of the labour supply in an economy approaching full employment. However, in addition to this, the growth process has to be constrained by the depletion of 'natural capital'. The working assumption in this paper is that the growth of aggregate demand tends to be greater than the sustainable growth of depletion of 'natural capital'.

The resources used in and used up in the production process are categorised under three headings, each with their own characteristics.

- (i) Physical (or manufactured) capital: this is capital (e.g., machines, buildings) created through investment. A significant element here is that investment links the aggregate demand side and the aggregate supply side of the economy: the amount of investment undertaken is the major driver of demand, but investment also contributes to the future supply capacity of the economy. Furthermore, investment is the route through which new ideas, production processes and products are introduced in the economy, in the sense that new production processes, for example, have to be embedded in different forms of capital equipment. The capital stock, K , is viewed as linked to capacity output (in the sense of physical limit), Y_c , by the following production relationship: $Y_c = K / v$ where v is the capital–capacity output ratio, which is treated as technically determined rather than influenced by relative prices. Actual achieved output, Y , is then $Y = u \cdot K / v$, where u is a measure of capacity utilisation, Y / Y_c .
- (ii) Labour: the augmented labour resource (labour resource for short, henceforth), N , that is the capacity to work of people is the multiple of labour productivity and person hours. Labour productivity q rises through several factors, including technical progress, skill formation and training activities, all of which can be influenced by aggregate demand and capital formation. Person hours L is determined by the average hours worked (per year) h , and the number of people employed E , that is $L = h \cdot E$. Actual output Y is taken to be proportional to N , that is $Y = a \cdot N = a \cdot q \cdot h \cdot E$, where a is treated as constant over time. It then follows that the employment rate, e , is given by the following relationship: $e = E / F = Y / a \cdot q \cdot h \cdot F$, where F is the labour force.⁴
- (iii) 'Natural' (or ecological or environmental) capital: this is a complex category of capital which is used, not without controversy,⁵ in ecological economics to indicate the role of nature in providing goods and services. Natural capital is a development of the notion of 'land', one of the factors of production in classical economics. It has both renewable (timber, river flow for hydropower) and non-renewable (e.g., oil, coal, natural gas) dimensions. Ekins et al. (2003) argue that natural capital performs four different environmental roles, namely (a) the provision of resources for production, (b) the absorption of wastes from productive processes, (c) basic life-support functions, and (d) amenity services. The

⁴ For simplicity, the labour force F is treated as a proportion of the population, i.e., variations in the age of entry into and exit from labour force are ignored.

⁵ See, for a detailed discussion of different views of 'natural capital' in ecological economics and their implications for distinct conceptions of 'sustainable development', Burkett (2003).

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