

# The New Cambridge School Contribution and Legacy Graeme Smith<sup>1</sup>

## Abstract:

The New Cambridge school is most commonly associated with the three financial balances and the New Cambridge hypothesis. This paper will argue instead that its true legacy lies in its methodological contributions and the subsequent development of new modelling approaches based on its central empirical ideas, most notably Stock-Flow Consistent modelling. The New Cambridge work was proceeding concurrently with the rise of monetarism and the New Classical Counter-revolution; it is argued here that the differences between New Cambridge and New Classical can be understood through the choice of internal vs. external consistency in models and the attitude to microfoundations. External consistency (consistency with empirical data) is paramount in New Cambridge, internal consistency is paramount in New Classical. On the question of microfoundations, the New Cambridge scholars argued that these were not required in a study of how *whole economic systems* function. Nevertheless, following Kalecki's concept that micro and macro are complementary with neither being the foundation for the other, a suggested relationship to the compatible microeconomics of Minsky's interdependent balance sheets model is presented. The New Cambridge emphasis on empirical grounding also led them to call into question the prevailing axiomatic-deductive methodology in macroeconomics and to challenge the nature of economic theorizing itself by contrasting economics as logic, where theories are derived from axiomatic postulates and assumptions by rigorous reasoning, against economics as 'science' where theory formation is driven by empirical observation. In either case, model results must be tested against empirical evidence. It is argued that the New Cambridge work has given a definite impetus towards more evidence-based reasoning and that this, combined with the steady progression of modelling techniques as exemplified by the stock-flow consistent approach, holds out the prospect of a move towards a new realism in economics.

## 1. Introduction

This paper looks back to the 'New Cambridge' school and reassesses its contribution, taking a slightly different orientation from those that have gone before by arguing that the methodological innovations, rather than the policy insights are its enduring legacy.

The 'New Cambridge School' refers to a group of researchers working at the Department of Applied Economics (DAE) at Cambridge University during the 1970s and early 1980s during the directorship of Wynne Godley. He came from the Treasury where he had been engaged on the practical policy issues of the time, especially the UK's deteriorating balance of payments. The reason he gave for the move was to continue in public, work that he had previously been obliged to carry out in secret, and hence to raise the level of public awareness of economic policy. One means of achieving this was to form the 'Cambridge Economic Policy Group' (CEPG) which issued a yearly publication, the Cambridge Economic Policy Review (CEPR) with analysis and forecasts for the UK economy between February 1975 and December 1982<sup>2</sup>.

The department had been set up in the immediate post-war period largely on the initiative of Keynes who is quoted in Moggridge (1980) as saying in 1944 that "theoretical economics has now reached a point where it is fit to be applied". Its first director was Richard Stone who established the emphasis on empirical work in his vision and objectives for the department.

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<sup>2</sup>Now available at <http://cpes.org.uk/om/cepr>

“The ultimate aim of applied economics is to increase human welfare by the investigation and analysis of economic problems of the real world. It is the view of the Department that this can best be achieved by the synthesis of three types of study which now tend to be pursued in isolation. The Department will concentrate simultaneously on the work of observations, i.e. the discovery and preparation of data; the theoretical appraisal of problems, i.e. the framing of hypotheses in a form suitable for quantitative testing; and the development of statistical methods appropriate to the special problems of economic information. The special character of the Department’s approach to problems of the real world will lie in this attempt at systematic synthesis” (cited from Pesaran and Harcourt, 2000, pp. 149-150).

These three strands, the empirical observation, quantitative testing of theoretical hypotheses and econometric methods were to continue as the foundation of the department’s work in later years. It should be noted that Stone had a wider definition of econometrics than is common today: “econometrics may be defined as the quantitative analysis of actual economic phenomena based on the concurrent development of theory and observation, related by appropriate methods of inference.” (Samuelson, Koopmans and Stone, 1954, p142). Even so, Stone’s emphasis on econometrics brought him into later conflict with the ‘Cambridge Keynesians’ (Smith, 2014).

While the most widely known legacy of the New Cambridge school is the three balances identity and what came to be known as the New Cambridge hypothesis, this paper gives greater attention to another aspect, namely the methodological approach with its emphasis on empirical grounding, and argues that this is in fact its most enduring legacy. There is a clear thread that can be traced from Stone’s statement of objectives forwards through the New Cambridge years to the emergence of new approaches to macroeconomic modelling, particularly the stock-flow consistent modelling method which is now widely practised, especially by the post-Keynesians.

The CEPG model was a dynamic multi-equation model whose main targets were employment and output, the current balance of payments and the rate of inflation. The principal instruments were fiscal policy and the exchange rate. The primary objective was to guide economic policy and it was to be evaluated strictly in those terms. Two policy instruments would be insufficient to ensure satisfactory outcomes for all three targets which is a further reason for their unconventional policy recommendations.

The approach to macroeconomic modelling in the post-war period could be divided between large Structural Economic Models (SEMs) consisting of systems of dynamic equations and single equation models with estimation of parameters based on econometric analysis of time series drawn from national income accounts data. The single equation models often became ‘building blocks’ for the larger SEMs. Early success of these models was tempered by their failure to deal adequately with the stagflation that followed the oil price shocks of the 1970s. The entire approach came under attack in 1976 by the ‘Lucas critique’. Lucas (1976) argued that models should be based on theory, not on empirical correlations which were sensitive to policy changes, and that only a model based on theory could account for shifting policy environments. More specifically, models should be based on explicit microfoundations derived from the behaviour of individual agents. The effect of this critique was to divert mainstream model building away from structural econometric models towards ‘Real Business Cycle’ and DSGE<sup>3</sup> models. A similar criticism was levelled by Sims (1980) who questioned the basis of the identification restrictions typically imposed in time series econometrics models with the result that single equation models would be replaced by vector autoregressions (VARs) in which complete systems are estimated in an atheoretical way.

For the CEPG, these were adverse developments. Their modelling approach was founded on a commitment to empiricism and a rejection of the axiomatic-deductive mode of reasoning in applied economics. While the mainstream of economic research moved towards microfounded models, empirical-based modelling continued in some research programmes including the CEPG and later at

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<sup>3</sup>Dynamic Stochastic General Equilibrium models.

the Levy Institute when Godley transferred there in the mid-1990s. These choices have been vindicated in the broad sweep of history by the success of these models in forewarning of the growing financial instability in the period leading up to the Global Financial Crisis<sup>4</sup>.

Godley's time at the Levy Institute also saw the emergence of the Godley and Lavoie approach to stock-flow consistent (SFC) modelling with the publication of *Monetary Economics* (Godley and Lavoie, 2007) which became the definitive SFC handbook. SFC models can be seen as a natural descendent of the New Cambridge ideas. They have been widely taken up in the post-crisis period, partly based on the above-mentioned success of the Levy Institute model in the pre-crisis period, but also due to their inherent potential for capturing the dynamics of the financial and 'real' economies in an integrated way.

These themes will be developed in the remainder of the paper starting with a brief exposition of the three balances identity and the New Cambridge equation in section 2. The CEPG modelling approach is discussed in section 3 and an attempt to place it in some sort of modelling context is presented there. An examination of the debates that raged over the validity of structural econometric models and microfounded models leads to a questioning of the methodological principles underlying applied economic modelling and this is taken up in section 4. Section 5 explains SFC models as an inheritance from the New Cambridge methodology and section 6 provides a brief conclusion.

## 2. The New Cambridge Hypothesis

From the earliest days of the CEPG, they had been calling attention to the fact that the private financial balance of the British economy had been relatively small and stable for many years, so any conventional Keynesian attempts to increase effective demand by means of expansionary fiscal policy would only worsen the current account balance. This follows from a manipulation of the national income identities into what became known as the 'New Cambridge three balances identity'. From

$$Y = C + I + G + (X - M) = C + S + T$$

where Y is aggregate income, C consumption, I investment, G gov't expenditure, X exports, M imports, S saving, T taxation, rearranging terms gives

$$(S - I) + (T - G) = (X - M)$$

so, measured at current prices, the private sector surplus (S - I) plus the public sector surplus (T - G) equals the external balance (X - M).

Godley later described the realisation of this identity as a "Damascene moment"

"Having always thought of the balance of trade as something which could only be analysed in terms of income and price elasticities together with real output movements home and abroad, it came as a shock to discover that if only one knows what the budget deficit and private net saving are, it follows from that information alone, without any qualification whatever, exactly what the balance of payments must be" (Godley and Lavoie, 2007, Preface p.xxxvi).

If their assertion that the private financial balance (S - I) is 'small and stable', then  $\Delta(S - I) \approx 0$  and

$$\Delta(T - G) \approx \Delta(X - M)$$

so changes in the public sector position are transmitted directly to the balance of payments. This was in direct contrast to the accepted Keynesian assumptions in which it is private sector investment

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<sup>4</sup>For evidence, see the succession of policy notes from the Levy Institute between 1999 and 2009, available at <http://www.levyinstitute.org/publications/?doctype=11>

which is the volatile element of expenditure and hence the driver of the business cycle. In that world, fiscal expansion would increase aggregate demand and hence output and income. Nevertheless, Godley and Cripps were so sure of their ground that they published two articles in *The Times* in January 22 and 23, 1974 arguing that a relaxation of the fiscal policy would probably generate an exchange rate crisis. The second article argued that export subsidies and import restrictions were better alternatives than the use of fiscal policy to increase effective demand and employment in the UK in a sustainable way. Thus, their policy proposals were to use fiscal policy to control the current account deficit and the exchange rate to increase income. This brought them into opposition with other Cambridge Keynesians of the time, notably Richard Kahn and Michael Posner, who responded with their own letters to *The Times*, one of which appeared on April 17 1974 in which they argued that “Mundell-Fleming type constructs admit these results as special though unlikely cases”. It was in this letter that the first use of the term ‘the New School’ appeared – in a somewhat derogatory tone – but from it the name ‘New Cambridge’ emerged and has been with them ever since.

According to Dos Santos and Macedo e Silva (2010), “New Cambridge economists were vocal advocates of Polak's twin deficits hypothesis (even though for different reasons)”. Barbosa-Filho et al. (2006) propose that three main schools of thought have discussed aggregate financial balances – the Ricardian rational expectations approach of Barro (1974) and others; the Twin-Deficit approach associated, among others, with Polak (1957); and the structural external gap view often favoured by development economists. These three groups suggest three different causality structures for the three balances. The twin deficit approach tends to think of the private financial balance as largely independent of the other two. Any attempts by the government to use fiscal policy to expand the economy would therefore imply an increase in the current account deficit (or a reduction in the current account balance). The New Cambridge hypothesis is broadly supportive of this view. In the rational expectations approach on the other hand, it is the current account balance that is largely independent of the other two. In particular, any attempts by the government to use fiscal policy to expand the economy would imply an increase in the private financial balance (as agents save more in anticipation of future increases in taxation necessary to cover the government deficit). Finally, the ‘structuralist gap’ view also assumes that the current account balance is largely independent of the other two, though for quite different reasons. For them, the current account independence has to do with structural factors (such as deteriorating terms of trade and/or lack of competitive advantages in external markets for goods and services, and/or imperfections in international financial markets) that imply that private and government financial balances must sooner or later adjust so as to reduce too high a current account deficit (Barbosa-Filho et al., 2006). They observe that this pattern appears in some but not all developing regions.

### **The New Cambridge Equation**

Arising from the ‘small and stable’ private financial balance is the ‘New Cambridge equation’ which proposes the existence of “a functional relationship which can be estimated with a reasonable degree of accuracy between total private expenditure (including investment) on the one hand and total private income (including taxes and certain kinds of borrowing) on the other” (Cripps et al., 1976, p.46). As a matter of empirical observation, they had noticed that in the UK the stock of private net financial assets had been quite stable relative to disposable income over a considerable period of time, i.e. the stock of private sector financial assets was in a stable ratio to disposable income and this constituted a *stock-flow norm*<sup>5</sup>. In (Godley and Cripps, 1983, p.41) they state that it is an axiom of their macroeconomics that “stock variables will not change indefinitely as ratios to related flow variables”. Any changes to the stock of private sector financial assets would arise from the difference between the inflows to the private sector (private disposable income (*PDY*) plus net lending to the private sector *NL*) and the related outflows (private expenditure *PX*).

$$PDY + NL - PX = \Delta PFA$$

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<sup>5</sup>The concept of stock-flow norms rests on the principle that “stock variables will not change indefinitely as ratios to related flow variables” (Godley and Cripps, 1983, p.41). They are ratios between key stocks and their associated flows that remain stable over time.

and if we postulate that the ratio of private financial assets (*PFA*) to private disposable income (*PDY*) constitutes a stable stock-flow norm  $\Phi$  i.e.  $\frac{PFA}{PDY} = \Phi$ , then

$$\Delta PFA = \Phi \cdot \Delta PDY$$

and if the growth rate of disposable income  $\frac{\Delta PDY}{PDY}$  is  $g$ , then

$$\Delta PDY = g \cdot PDY$$

and

$$\Delta PFA = \Phi \cdot g \cdot PDY$$

So,

$$PX = (1 - \Phi \cdot g) \cdot PDY + NL$$

which defines a functional relationship between total private expenditure (consumption plus investment) and private disposable income plus net lending

$$PX = f(PDY, NL).$$

Much of the reaction to this arose from the merging of private consumption and investment into a single aggregate, private expenditure *PX*. The following justification is offered in Cripps and Godley (1976: p336)

this is very different from the traditional representation, which emphasizes the distinction between consumption, determined by personal income, and investment, determined by an accelerator process. In practice over the cycle the predictions of the two models need not be very different because investment and the share of profits in national income both move procyclically. Given the well-known difficulty of modelling the corporate sector, there is an advantage in aggregation provided the overall relationship is empirically robust.

This functional relationship was estimated (for the period 1954-1972) to be (Cripps et al.1976, p.46),

$$PX = 0.533 \cdot PDY + 0.416 \cdot PDY_{-1} + 0.899 \cdot HP + 0.790 \cdot BA + 0.962 \cdot S$$

where  $PX$  is the total private expenditure (including stockbuilding and net intra-company investment abroad),  $PDY$  is the private disposable income after tax and transfers,  $PDY_{-1}$  is the net increase in consumer hire purchase debt,  $HP$  stands for the net increase in bank advances to the personal sector, and  $S$  stands for changes in the book value of stocks and work in progress in the private sector, all in real terms.

The striking thing about this equation is that the sum of the coefficients of current and lagged disposable income ( $0.533 + 0.416$ ) was close to one. This was interpreted to mean that virtually all the disposable income of the private sector as a whole will be spent on goods and services with a very short lag (i.e. one year), an empirical finding which (Fetherston and Godley, 1978, p.34) called the explicit hypothesis associated with New Cambridge.

However, when the sample period was extended from 1954-1972 to 1954-1974 the relationship was much less clear. John Bispham, then editor of the National Institute Economic Review, wrote an article in 1975 stating that the New Cambridge equation had "broken down massively" (Bispham, 1975 p.47). Godley put it differently "... because we did not then understand inflation accounting, so when inflation took off in 1975, we underestimated the extent to which stocks of financial assets would rise in nominal terms", as well as pointing out that none of the competing forecasting models was very accurate under these circumstances either and "eventually our theoretical model was

enlarged to incorporate inflation accounting and included an early version of the conflictual, target real wage theory of inflation" (Godley and Lavoie, 2007, Preface p.xxxvii).

Despite this apparent instability during the high inflation of the 1970s, the equation continued to figure in the Levy Institute model which performed so well in the pre-crisis period (Godley, 1999).

### 3. The Modelling Approach

There is a long tradition of data-driven economic models which could be seen as direct forerunners of the CEPG model. One might start in 1758 with Francois Quesnay and his *tableau économique*, a model which showed a sectoral breakdown and financial flows between them. Or even earlier in 1665 with William Petty and his 'Political Arithmetick'. Leontief's input-output models are a matrix modelling method in which the interdependence of an economy's various productive sectors is observed by viewing the product of each industry both as a commodity demanded for final consumption and as a factor in the production of other goods. Then it is possible to determine the total quantities of various goods that must be produced to obtain a given amount for final consumption. One of his first published models was for the US economy in 1919. Another matrix modelling method that is designed to show the interactions between sectors of the economy is the Social Accounting Matrix (SAM) originally developed at the Cambridge Growth Project in 1962 (Stone and Brown, 1962).

A particularly important empirical modelling initiative that was progressing concurrently with New Cambridge and where the cross-overs were very significant is the approach developed by Tobin and the 'New Haven school' (Backus et al. 1980). In developing an empirical model of the US economy in both its financial and non-financial sides, they combined a theoretical hypothesis about the behaviour of a monetary industrial economy with a rigorous accounting framework based on the flow-of-funds social accounts developed by Copeland (1949). In his Nobel acceptance speech Tobin (1986, p.172) explained why his approach is different from the standard neoclassical models of the day. He defines five essential characteristics for a proper macroeconomics:

1. Precision regarding time, a model of short-run determination of macroeconomic activity necessarily refers to a slice of time. It is one step of a dynamic sequence, not a repetitive equilibrium into which the economy settles.
2. Tracking of stocks, an essential part of the process is the dynamics of flows and stocks, investment and capital, saving and wealth, specific forms of saving and asset stocks. It is not generally defensible to ignore these relations on the excuse that the analysis refers to so short a time that stocks cannot change significantly.
3. Several assets and rates of return, the traditional aggregation of all nonmonetary assets into a single asset with a common interest rate does not permit analysis of some important policies. Asset disaggregation is essential for a meaningful analysis.
4. Modelling of financial and monetary policy operations, specific transactions are used by government and central banks to manage money stocks and these transactions need to be part of the model.
5. Walras' Law and adding up constraints, everything must come from somewhere and must go somewhere – there are no black holes. This imposes a budget constraint on sectors of the model.

Tobin's challenge to macroeconomics was not taken up by the mainstream, but was rather swept away by the 'New Classical Counter-revolution' which brought Real Business Cycle models and a different approach to macro-modelling based on DSGE models.

Concurrently with Tobin's group, the CEPG was developing its own modelling approach. A quick comparison of Tobin's essential characteristics and the elements of the New Cambridge methodology will reveal considerable overlap. There was a direct connection between the two groups when they were both present at a conference on Keynes that was organized in Cambridge (UK) in 1983. Tobin's group focused its attention on portfolio and asset choice; the Cambridge UK group concentrated mainly on forecasting to address questions of whether an expansion was sustainable and to analyse the

balance of payments problems that were then plaguing the United Kingdom. Although their methods shared many features there are also important differences most notably in the formation of the behavioural equations – Tobin was a 'neoclassical synthesis Keynesian' whereas the CEPG could be placed more in the 'Cambridge Keynesian' tradition (Godley and Lavoie, 2007, Preface p.xl).

Cripps and Godley (1976) provide an overview of the CEPG model and its principal characteristics. The main targets are employment and output, the current balance of payments and the rate of inflation. The principal instruments are fiscal policy and the exchange rate. Tinbergen's criterion that "achieving the desired values of a certain number of targets requires the policy maker to control an equal number of instruments" indicates that two policy instruments will be insufficient to ensure satisfactory outcomes for all three targets unless the existence of a Phillips curve relating employment and inflation is assumed. But through the stagflation years of the 1970s, the Phillips curve relationship was shown to be weak at best. It is for this reason that the New Cambridge policy recommendations included unconventional measures like tariffs and import restrictions to control the balance of payments deficit. The primary objective of the model was to guide economic policy:

"The ultimate criterion adopted by CEPG is that its analysis should be judged in terms of success or failure in giving realistic assessments of the main contemporary policy issues which arise for the UK economy as a whole" (Cripps and Fetherston, 1979, p.40).

Demand and output are determined by a multiplier process in response to fiscal policy, exports and import propensities; employment is determined by real demand and output; exports and import propensities are determined by world trade and by the relationship between domestic and external price levels set by the exchange rate; and the rate of inflation is determined by cost increases, in particular money wages, import prices and tax rates (Cripps and Godley, 1976).

The choice of variables and structural relationships is guided by a variety of types of evidence (Cripps and Fetherston, 1979, pp.44-46):

1. Institutional and behavioural plausibility. Each macro-relationship should have an institutional interpretation which is in some broad sense verifiable.
2. Quantitative structural evidence. For example, input-output tables, data on wage bargaining groups or labour market flows are of great value in judging the timing and interactions between various aggregates.
3. Econometric time-series analysis. This also has a part to play despite known problems.
4. Examination of historical trend and disturbance terms.
5. Examination of the properties of the model as a whole.

Cripps and Godley (1976) summarise the main distinctive features of the model. The first is a re-statement of the New Cambridge hypothesis:

1. The consumption function concept is extended to bring private fixed investment and consumption into a single "private expenditure function" with private disposable income in aggregate as the main explanatory variable.
2. Money wage determination is determined by wage settlements, partly in compensation for past changes in prices and taxes and partly in anticipation of future changes in the real wage. This is broadly consistent with the later views of Keynes (Trevithick, 1975), and contrasts with the Phillips curve both in its original and "expectations augmented" form (Friedman, 1975). The vertical long-run Phillips curve implies that low unemployment will generate accelerating inflation. Under the CEPG assumptions a lower rate of unemployment (given the balance of payments and terms of trade) would normally be associated with a slower rate of inflation.
3. Special attention is given to the distribution of real income between wages and other incomes. Given the view that money wage bargaining is concerned with real wage targets, income distribution is of particular importance because it directly affects resources available for real wages and hence the rate of inflation.

Crucial to the evolution of any empirical modelling approach has been progress in data availability, and specifically, National Income Accounts data.

### **The National Income Accounts and Flow of Funds**

National Income accounting made steady progress throughout the twentieth century. Tily gives a historical account of these developments, especially highlighting Keynes' contributions (Tily, 2009). He starts with the pioneering contributions made at the start of the 20th century by Alfred Flux, Arthur Bowley and Josiah Stamp, and later by Colin Clark. The debates between these men mark the emergence of National Accounts as a serious discipline. Their work was supported by the earlier theoretical contributions of Alfred Marshall, and by practical developments, in particular the instigation of a Census of Production in 1907. Things moved further forward during Keynes' time at the Treasury during World War II, when he realized that planning a national economy needed accurate national accounting. Keynes commissioned James Meade and Richard Stone to create estimates of National Income and Expenditure (Meade and Stone, 1941). Stone received the Nobel Prize in Economics in 1984 for his work on national and international accounting (Stone, 1984). The United Nations introduced international guidelines in 1947 to promote better international comparisons of economic indicators. By agreeing on the definition of different monetary transactions, such as what counts as investment by businesses, national accounts figures became more comparable between countries. The International Monetary Fund published the first balance of payments manual in 1948. The "Simplified System of National Accounts" was written in 1951 under Richard Stone's direction to aid in the adoption of national accounting systems. The latest version of the System of National Accounts guidance was published in 2008 (OECD, 2009). The standard for accounting for international transactions and balance of payments data is the IMF's Balance of Payments Manual now in its sixth edition (IMF, 2009).

In parallel with, and also part of, the progress in national income accounting has been the development of flow of funds accounts. Morris Copeland studied money flows and is often credited with being the father of the flow of funds accounts for the US (Federal Reserve Bureau Z.1 Release). With his attempts to find answers to fundamental economic questions such as "when total purchases of our national product increase, where does the money come from to finance them" and "when purchases of our national product decline, what becomes of the money that is not spent" (Copeland 1949), he laid the foundation for an economic approach able to integrate real and financial flows of the economy. The flow of funds provides a dynamic picture of the economy that complements the static picture of the National Income and Product Accounts.

### **Evolution of Macroeconomic Modelling, 1976-2010**

Cripps and Godley (1976), positioning the CEPG model, state that "In its broad structure the CEPG model lies squarely within the post-war tradition of Keynesian model building". Fair (2012) offers a perspective on fifty years of macro model building in which he identifies two distinct phases – 'macro 1', mainly based on large simultaneous-equation econometric models; and 'macro 2', dating from the late 1970s, which arose from the New Classical Counter-revolution (NCCR) and generally take the form of DSGE models.

Following this classification, the CEPG model is clearly in the macro 1 category. Modelling in the macro 1 phase involved mostly single equation time series econometric estimation of aggregate equations for key relationships like consumption, investment and inflation. These estimated equations were the building blocks for a small number of large-scale econometric models. Such models have variously been called Cowles Commission models, Structural Econometric models (SEMs) and 'Large-scale macroeconomic models' with their origins in the work of Tinbergen (1939) and Klein (1950). Theoretical analysis of macroeconomic systems typically involved analysing small models involving aggregate relationships, where the individual equations were justified using an eclectic mixture of reference to this econometric work and (sometimes informal) appeals to theory. A seminal example is Blinder and Solow (1973).

The critical event in the switch from macro 1 to macro 2 was the ‘Lucas Critique’ (1976) which was aimed at the use of econometric methods based on historical data. Lucas was critical of the use of large-scale macro-econometric models to evaluate policy impacts when the empirical correlations that they were built on were themselves sensitive to the same policy changes. He asserted that only models based on theory could account for shifting policy environments and that the only way forward was to explicitly derive models from optimisation by representative agents using rational expectations. The Lucas Critique was followed by Sims (1980), in ‘Macroeconomics and Reality’, where he questioned the basis of the identification restrictions typically imposed in time series econometrics the solution to which was to estimate complete systems in an atheoretical way using vector autoregressions (VARs). From the early 1980s, single equation econometric estimation was largely replaced by VARs, and all structural models (whether parameterised or not) had to be based on explicit microfoundations, now known as DSGE models.

If the Lucas critique was the catalyst for the transition from ‘macro 1’ to ‘macro 2’, the global financial crisis may prove to be the trigger for at least a partial swing back in the opposite direction. If the New Cambridge criterion cited earlier (success or failure in giving realistic assessments of the main contemporary policy issues which arise for the UK economy as a whole) had been applied to the pre-crisis generation of models, most would have been found wanting. Post-crisis criticism of the state of macroeconomics was directed both at economic theory and modelling practice and DSGE models were singled out for particular criticism (Buiter, 2009, Davies 2012, Haldane 2012, Gordon 2009).

Principal among the many perceived defects of the pre-crisis DSGE models is the absence of financial markets,

this failure, we argue, stemmed from an incomplete understanding of the pivotal role of financial institutions in the amplification of the crisis and its transmission to the wider economy. Low global interest rates and a consequent search for yield in the pre-crisis period encouraged financial institutions to build highly leveraged balance sheets which, in turn, generated extremely large asset-price movements when a ‘small event’ – the downturn in the US sub-prime mortgage market – triggered the worldwide crisis (Adam and Vines, 2010, p.507).

Post-crisis modelling work has proceeded in two distinct directions, firstly modellers in the DSGE tradition have been retrofitting a financial sector into their models (e.g. Benes, 2014), and secondly there has been a renewed interest in empirical models (Colander, 2008). This bifurcation was perfectly captured by Diane Coyle, reporting on an ESRC sponsored symposium in 2012 on the state of macro,

My headline from the symposium is that macroeconomists are deeply divided, with any sense of consensus shattered. There is a division between those who regard increasing the sophistication and flexibility of existing models and approaches as an adequate response to the crisis, and those who believe a more far-reaching re-tooling is essential for both scientific and public policy credibility. This is more or less the same as the division between adherents to DSGE models, or more broadly a *deductive equilibrium framework that uses a small number of aggregate variables to make analytical predictions*; and those who believe macroeconomics must now become *more inductive and data-based*. As Professor Neil Ferguson, Professor of Mathematical Biology at Imperial College, put it in his comment on day 2 of the symposium, he was astounded by how little macroeconomists discussed data and the new techniques available for handling large amounts of data. (Coyle, 2012) (emphasis added)

Some examples from the second research category – ‘more-inductive and data-based’ – specifically chosen for their ‘inheritance’ from the New Cambridge tradition include the Levy Institute model (Zezza, 2009), Stock-Flow Consistent modelling (Godley and Lavoie, 2007), the Cambridge Alphametrics Model recently adopted by UNCTAD (Cripps and Izurieta 2014) and UKMOD, a model of the UK economy from the Centre for Business Research at the University of Cambridge (Gudgin et al. 2015).

#### 4. The Methodological Principles

The previous section identified the schism in macroeconomic modelling in the wake of the global financial crisis, with adherents of DSGE models continuing with the ‘deductive equilibrium framework’ by adding financial phenomena to their models while another group are showing renewed interest in a ‘more inductive and data-based’ approach as exemplified by the CEPG model and its descendants. This section examines the New Cambridge commitment to an empirical basis for theoretical and applied macroeconomics and their rejection of the axiomatic-deductive approach by reference to a selection of relevant literature.

In a recent retrospective on the New Classical Counter-Revolution (NCCR), Simon Wren-Lewis remarks

before the NCCR, macroeconomics was an intensely empirical discipline: something made possible by the developments in statistics and econometrics inspired by The General Theory. After the NCCR and its emphasis on microfoundations, it became much more deductive (Wren-Lewis, 2016, p.20).

The success of the NCCR was not based on the superior power of New Classical models to explain and understand the behaviour of output and inflation during the stagflation of the 1970s, let alone the Great Depression. Rather it was built on two separate parts: an attack on the perceived failure of contemporary Keynesian models to explain and predict stagflation, but more importantly the lack of a *sound theoretical or econometric basis* for traditional Keynesian models; for ‘sound theoretical basis’ read microfoundations. The justification for this attack appealed to the Lucas Critique and rational expectations. Wren-Lewis identifies a crucial divide in all of this,

macroeconomic modelling before the NCCR was empirically orientated: the emphasis was put on consistency with the data, or *external consistency* [...] it was rare to keep an equation within a model when it had been “rejected by the data”, however that was defined. In that sense, external consistency was almost a criterion for admissibility. In contrast, empirical relationships were often justified by very informal theoretical arguments [...] [New Classical models] are very different. Here it is essential that aggregate equations can be derived from microeconomic theory, and furthermore the theory behind each equation in the model has to be mutually consistent: what is often described as *internal consistency*. For acceptance in good academic journals, internal consistency is usually an admissibility criterion. By contrast, *external consistency is not required*. (Wren-Lewis, 2016, p.26) (emphasis added).

So there are two crucial methodological issues – internal vs external consistency (or a logical vs an empirical basis) and the need (or not) for microfoundations; and if we are to accept this need for microfoundations, what should they be?

#### A Logical vs Empirical Basis

In an empirical ontology the economy is an extant, objective phenomenon, the only way we can observe it is through the medium of the data that it generates. In the case of the macroeconomy, this data takes the form of the National Income and Product accounts (NIPA) and flow of funds data in the US, and similar data publications by national statistical agencies in most other countries of the world. There is a synergistic and inter-dependent relationship between the national accounts and the empirically grounded macroeconomics that New Cambridge exemplifies. The progress in national accounting and economic data collection has made possible this greater role for empirical work.

However, macroeconomics has traditionally been a mainly logical discipline where theories are formulated by rigorous reasoning from a small set of assumptions or postulates rather than a scientific one based on empirical observation,

it is vain to hope that truth can be arrived at, either in Political Economy or in any other department of the social science, while we look at the facts in the concrete, clothed in all the complexity with which nature has surrounded them, and endeavour to elicit a general law by a process of induction from a comparison of details; there remains no other method than the *a priori* one, or that of 'abstract speculation' (Mill, 1874, V55)

Mill is not complaining about the lack of reliable data, but the impossibility of making sound generalizations from the complexity of the real world. One cannot *not* axiomatize,

What are the propositions which may reasonably be received without proof? That there must be some such propositions all are agreed, since there cannot be an infinite series of proof, a chain suspended from nothing. But to determine what these propositions are, is the opus magnum of the more recondite mental philosophy (Mill, 1854, p. 746).

Keynes agrees, he always saw economics as a system of logic. His critique of orthodox economics was not aimed at the axiomatic method but at the premises:

For if orthodox economics is at fault, the error is to be found not in the superstructure, which has been erected with great care for logical consistency, but in a lack of clearness and of generality in the premises. (Keynes, 1936, p. xxi)

Davidson confirms this; specifically, the key criterion is the applicability of the axioms to the real world problem being addressed; presumably then agreement of the conclusions with the real world data will follow,

before accepting the conclusions of any economist's model as applicable to the real world, the careful student should always examine and be prepared to criticize the applicability of the fundamental postulates of the model; for, in the absence of any mistake in logic, the axioms of the model determine its conclusions. (Davidson, 2002, p.41)

Now, it is this view of economics in which theories are formed from axioms and assumptions by deductive reasoning that the New Cambridge school rejects,

We do not [...] believe that the way economies work can be discovered by deductive reasoning. We take the contrary view. The evolution of whole economies, like their political systems, is a highly contingent historical process. We do not believe that it is possible to establish precise behavioural relationships comparable with the laws of the physical sciences by techniques of statistical inference. Few laws of economics will hold good across decades or between countries. On the other hand we must exploit logic so far as we possibly can. (Godley and Cripps, 1983, p.44).

As an aside, this passage bears a noticeable resemblance to the ideas of the German historical school in its emphasis on contingent historical processes, empirical analysis and cultural specificity. The historical school was based on the idea that history is the most important source of knowledge about human affairs and economic processes, since economics is culture-specific, thus not generalizable between different places and different periods. They rejected the universal validity of economic theorems. Their approach to economics involved careful empirical and historical analysis rather than the use of logic and mathematics (Backhouse 2002).

Whether the New Cambridge scholars were influenced in their empirical principles by the work of the historical school is an interesting question. That Godley and Cripps reserve the right to "exploit logic so far as we possibly can" may be a possible point of divergence. Another interesting parallel arises from the *methodenstreit* (dispute about methods) between the German and Austrian schools. The German historical school thought that economists could develop new and better social laws from the collection and study of statistics and historical materials, and they distrusted theories not derived from

historical experience. They saw an important role for institutions in political economy (Backhouse, 2002). The Austrians on the other hand, led by Carl Menger, considered that economics was a work of philosophical logic and could only ever be about developing rules from first principles. They saw human motives and social interaction as far too complex to be amenable to statistical analysis.

Menger objected to mathematical economics, on the grounds that all that mathematics could demonstrate was relationships between quantities: it could not establish the essence of economic phenomena. To analyse interdependence and mutual determination was to lose sight of causal connections (Backhouse, 2002).

The Austrians and the neo-classical economists, concentrated upon the subjective, atomistic nature of economics. Menger said that the grounds for economics were built upon self-interest and evaluation at the margin, and that aggregative, collective ideas could not have adequate foundation unless they rested upon individual components. This was his doctrine of ‘methodological individualism’, the idea that all analysis must start with the individual, not with aggregate or collective concepts – an early harbinger of the microfoundations debate.

This *methodenstreit* marked the split between historical and theoretical economics, between empirical-inductive and logical-deductive methods and between individualistic, microfounded and aggregative macro analysis. This split still underlies much of the factionalism in modern economics, especially the methodological approach and the debate over microfoundations which is so relevant to the stance adopted by the New Cambridge school. Incidentally, the term "Austrian school of economics" came into existence as a result of this *methodenstreit*, when Schmoller (of the historical school) used the label in an unfavourable review of one of Menger's books. It was intended in a derogatory way but the name has just stuck, in exactly the same way that the ‘New Cambridge’ label came about.

Continuing this ‘methods dispute’ in modern times, the New Cambridge group justify their rejection of the axiomatic-deductive approach in the following terms,

the choice of theory and evidence are to be judged from [the] viewpoint of [success or failure in giving realistic assessments of the main contemporary policy issues which arise for the UK economy as a whole] rather than being determined *a priori*. This approach was chosen consciously in reaction to the prevailing axiomatic tradition of theoretical and applied work in which theoretical assumptions, data and econometric procedures are chosen *a priori*. There are many reasons for dissatisfaction with this axiomatic tradition as a methodology for applied economics. It does not in practice provide a basis for choice between important alternative theoretical postulates. It restricts the types of evidence which can be taken into account and limits the use even of this evidence to estimation of parameter values or choice within restricted sets of specific structural forms. It relies on implausible stochastic assumptions. It often results in models whose logical structure precludes investigation of the most important policy issues (Cripps and Fetherston, 1979, p.40).

and finally make the suggestion that economics based on the axiomatic tradition is little more than a belief system,

Within such an approach there is little scope for useful argument. The most that can be said is that different *a priori* assumptions, different selections of evidence, or different econometric methodologies would lead to different conclusions about policy. Choice between alternative axioms is entirely a matter of faith (Cripps and Fetherston, 1979, p.41).

This all amounts to a clear rejection of the axiomatic approach but how are modern proponents of empirical modelling approaches to proceed? Stone (1984) proposes empirical observation as a means of identifying issues to be explained and guiding formation of theories by abduction or "inference to the best explanation". This is consistent with the alternative proposed by New Cambridge,

CEPG's belief has been that use of the widest possible range of types of evidence and insistence on an explicit quantitative analysis of all important policy instruments and targets will make it possible to choose in a meaningful, if somewhat informal way, between alternative theoretical assumptions and econometric procedures, and indeed to discover new theoretical postulates and properties which were not anticipated *a priori*. (Cripps and Fetherston, 1979, p.41).

Although it came much later, Lee's suggestion that grounded theory could be a unifying empirical approach for heterodox economics quite accurately captures the CEPG approach, especially for theory formation, "The method of grounded theory can be described as a process in which researchers create their theory 'directly' developed from data (which are not the same as the 'objective facts' of the empiricist); and in which data collection, theoretical analysis, and theory building proceed simultaneously" (Lee, 2005).

In summary, the first pillar of the methodological innovation of New Cambridge is their insistence on an empirical approach and their rejection of the traditional axiomatic-deductive method as inappropriate for applied economics. A comparison with the *methodenstreit* between the German historical and the Austrian schools in the late 19C shows that this divergence between the empirical and the logical is not new. Finally, examination of Stone's abductive method and the grounded theory proposed by Lee could provide a philosophical and methodological foundation for their empirical approach.

### **Microfoundations**

The second major component of the New Cambridge methodological innovation concerned their rejection of the need for microfoundations for macroeconomics. This issue has deep roots in the history of economic thought. It is already visible in the *methodenstreit* referred to earlier and also in Keynes's insistence on the need for a separate 'Theory of Output and Employment *as a whole*' (Keynes 1936, p. 293; original stress). Peter Kriesler, writing about the work of Michał Kalecki, identifies two hypothetical extremes:

the first as seeing macroeconomics as a pure aggregation from the micro, with no new information resulting from the aggregation that is not already in the micro theory. On the other hand, the second view can be characterised as regarding the micro as a pure disaggregation from the macro, with no new information about the functioning of the economy being generated by the procedure. (Kriesler 1989, p. 123)

One of these extremes is the argument for microfoundations, and the other is an argument for macrofoundations. The macrofoundations argument says that it is not sensible to consider the behaviour of individuals without first understanding the macro environment in which they are operating. Kriesler states that neither extreme is correct, and that neither accurately represents Kalecki's views who considered micro and macro to be complementary, neither being the foundation for the other, but rather sitting alongside each other.

King (2012) identifies two distinct but closely related issues in the microfoundations discussion – the *fallacy of composition* and *downward causation*. The fallacy of composition says that complex systems like macroeconomics act as whole systems, the properties of the whole could not be inferred from the properties of their parts. This is closely related to the concepts of *emergence* – where the whole possesses properties not present in the parts – and *irreducibility* which says that emergent properties cannot be explained given a complete understanding of more basic phenomena, i.e. emergent properties are autonomous from the more basic phenomena that give rise to them. Downward causation just captures the idea that properties and behaviour of the whole influence the parts – "before there is any hope of undertaking meaningful micro analysis, *one must first determine the macro context within which that micro decision is made*" (Colander 1996, p. 61; original stress).

The New Classical Counter-revolution and the pressure for microfoundations were at their height during the New Cambridge period.

One extensive area of controversy concerns the so-called 'microfoundations' of macroeconomics. The view is widely held that no relationship between aggregates (between, say, total income and total expenditure) can validly be postulated which cannot be justified in terms of the behaviour of individual agents. Such a view seems perilously close to a denial that macroeconomics (defined as the study of how *whole economic systems function*) can be a valid subject at all" (Godley and Cripps, 1983, p.41) (emphasis added).

Godley and Cripps defined their macroeconomics as the study of how whole economic systems function, and could be seen as an attempt to answer Keynes' call cited above for a 'theory of Output and Employment *as a whole*'. They base their macroeconomics on the stock-flow axiom – the principle that "stock variables will not change indefinitely as ratios to related flow variables" (Godley and Cripps, 1983, p.41).

By stating the conditionality of the models [...] on the stock-flow axiom we formally exonerate ourselves from the need to provide further 'microeconomic' foundations for the most important part of the analysis [...]. The assumption of constant aggregate stock-flow norms may be consistent with a large number of different patterns of individual behaviour. (Godley and Cripps, 1983 p.43).

Anwar Shaikh makes the same point, "micro features do not necessarily carry to the macro level and any given macro pattern may be consistent with many different (even contradictory) micro foundations" (Shaikh, 2016 p.31).

Whereas the New Classicals see macroeconomics as an aggregation, i.e. just a linear superposition of the behaviour of individual agents (incidentally, leaving no possibility of 'emergent behaviour' from 'non-linear' agent interactions), the New Cambridge process is rather one of 'disaggregation'. It starts from the consistency of the whole which fixes constraints within which individual budgets are set,

concepts like national income, aggregate output, debt and financial assets can be defined in such a way that they all 'add up' in money terms in a mutually consistent way. The fact that money stocks and flows must satisfy accounting identities in individual budgets and in an economy as a whole provides a fundamental law of macroeconomics, analogous to the principle of conservation of energy in physics. But adding up constraints are obviously not sufficient to determine what will actually happen. For this we must add behavioural assumptions about how people and institutions operate within such budgetary constraints. (Godley and Cripps, 1983, p.18)

and from there to individual behaviour,

since human behaviour is so varied, our objective will be to establish principles of analysis which capitalize on adding-up constraints so as to confine the behavioural processes to a relatively small number of variables, each of which can then be the object of empirical study. The smaller the number of behavioural variables which govern how the system *must* function in view of the logical constraints, the more powerful will be our theory as a model for organizing and interpreting data (Godley and Cripps, 1983, p.18) (their emphasis)

So they accept that human behaviour is extremely varied (and variable), but by building the smallest possible behavioural model within the bounding framework of the logical structure imposed by the accounting, they avoid the traps that come with a 'bottom up' aggregation like the need to invent over-prescriptive theories of individual behaviour such as the optimizing representative agent with rational expectations, etc. More recently, Anwar Shaikh demonstrates that most of the central propositions of economic analysis can be derived without any reference to the standard devices such as hyper-rationality, optimization, perfect competition, perfect information, representative agents, or so-called rational expectations (Shaikh 2016).

If we accept Kalecki's view of micro and macro as complements, sitting alongside each other, we still need to be able to interpret macro results in terms of micro phenomena. Toporowski questions how the behaviour of individual agents integrates to form macroeconomic behaviour,

the distinguishing feature of economic theory is the connection between economic models and economic behaviour, defined as the way in which individuals make choices in markets. The need for economic theory, as well as economic policy making, to be founded upon an understanding of economic decision-making is obvious, but the much more fundamental question is how 'microfoundations' are integrated into a model of the economy as a whole? Microfoundations need a unifying or integrating principle; that is, a principle that will explain how individual decisions are combined in an economy to make up the macroeconomic phenomena given by aggregate economic data. (Toporowski, 2016, pp.92-93)

and he goes on to say "for the New Classicals the unifying principle is market-clearing through the price mechanism" (ibid. p. 93).

An alternative unifying principle, more consistent with the New Cambridge notion of the stock-flow axiom, is Minsky's view of an economy as an interdependent set of agents' balance sheets linked together by the cash flows that they generate. Minsky never accepted the neoclassical assumption of profit-maximising behaviour of firms without due regard for the varieties of market structure. Rather he saw it as an artefact of the mathematics that is used in modelling. Instead he claimed that the entrepreneurial behaviour of firms was central, and this leads to different microfoundations:

Minsky added to [his rejection of firms' profit-maximising] an analysis that was perhaps his most original contribution to microeconomics. This is the idea that firms, and economic units in general, should be viewed less as maximising the difference between income and the costs or inconvenience of generating that income. This is the standard flow-flow microeconomic problématique. Instead, firms, banks and households should be regarded as securing the financing of the liabilities that they issue to obtain assets in balance sheets. This is now a stock-flow problématique (Toporowski, 2016, p.96).

In Minsky's economy the structure of the agents' balance sheets determine the financial flows, assets determine inflows, liabilities determine outflows; the relationship between the inflows and the outflows determines the degree of financial stability (or fragility) of the economy as set out in his Financial Instability Hypothesis (Minsky, 1986).

The owners of capital-assets speculate by debt-financing investment and positions in the stock of capital-assets; . . . banks and other financial institutions speculate on the assets mix they own and on the liability mix they owe; . . . Firms and households speculate on the financial assets they own and how they finance their position in these assets (Minsky, 1975, p.123).

This relationship between balance sheet stocks and their related flows aligns perfectly with the New Cambridge view:

In Minsky it is possible to identify at least one other integrating principle. This is the principle of stock-flow consistency that appears as one of his criticisms of Keynes. According to this, all flows have balance sheet counterparts. In aggregate, this leads to the flow of funds models, recently developed by Godley (Toporowski, 2016, p.97).

Thus Minsky's view of an economy as a set interconnected balance sheets linked by their related cash flows provides an integrating principle that is compatible with the New Cambridge model.

In conclusion, the New Cambridge group do not accept that useful relationships between macroeconomic aggregates need to be derived from the behaviour of individual agents. Their preoccupation is with the way in which *whole economic systems* function. Their main methodological assumption centres on the concept of stock-flow norms and the behavioural axiom that stock variables will not change indefinitely as ratios to related flow variables. Furthermore, by embedding their analysis within a rigorous accounting framework with its 'adding up' constraints, they limit the degree to which behavioural assumptions are required to explain aggregate behaviour.

The alternative microfoundations based on Minsky's balance sheet model of agents' behaviour is not something that is to be found in the New Cambridge literature, but is presented nevertheless as a justification of the New Cambridge rejection of the New Classical demand for explicit microfoundations, being a view that is entirely consistent with the New Cambridge approach.

### **5. Stock-Flow Consistent Modelling**

Tracing forward in time from the New Cambridge era, at least three separate strands of modelling work have emerged from it:

1. Godley's work on the Levy Institute Model and from there to stock-flow consistent modelling (SFC) in the Godley and Lavoie tradition (Godley and Lavoie 2007),
2. Francis Cripps' work on the Cambridge Alphametrics Model (CAM) (Cripps and Izurieta, 2014)
3. UKMOD, a model of the UK economy from the Centre for Business Research at the University of Cambridge (Gudgin et al., 2015).

The Levy Institute model (Zezza, 2009) represents a further stage in the evolution from the original New Cambridge models. It was originally built in the 1990s with annual data and developed over the years, adopting quarterly data and with substantial revisions in the econometric methodology. The private sector is modelled as a whole, with no distinction between household and business as in the New Cambridge hypothesis. It uses elements of the Social Accounting Matrix (SAM) and stock-flow consistent models. One notable success in the use of this model is Godley's paper on the 'Seven Unsustainable Processes' (Godley, 1999) in which he uses three separate aspects of the New Cambridge legacy – the 'New Cambridge equation', a stock-flow consistent model and the CAM model of the world economy to analyse the sustainability of the US economic growth at the end of the 1990s. He identified seven reasons why the current boom was unsustainable, completely contrary to the prognoses of the mainstream and of officialdom, in particular the projections of the Congressional Budget Office (CBO, 1999) and the Economic Advisors to the President (CEA, 1999). Godley's analysis not only warned of the downturn that would follow the bursting of the dotcom bubble but even looked ahead to the Global Financial Crisis. This paper alone could be taken as a vindication of the entire New Cambridge project and an endorsement of the approach but it was not an isolated event, Levy Institute scholars were actively publishing papers throughout the 2000s warning of the unsustainable imbalances building up in the US economy (Godley and Izurieta, 2002), (Papadimitriou et al., 2006), (Godley et al., 2007), (Godley et al., 2008).

The final development in the New Cambridge tradition is Stock Flow Consistent (SFC) modelling in the style of Godley and Lavoie (Godley and Lavoie, 2007). It is an evolution of the models that Godley was producing at the Levy Institute in the 1990s. Their first collaboration combined a Kaldorian growth model that Lavoie had been working on with the stock-flow accounting brought by Godley (Lavoie and Godley, 2001). Marc Lavoie later wrote

This gave rise to a very neat analytical formalization, with a variety of possible regimes, provided by Lance Taylor (Taylor, 2004, pp.272-8, 303-5), another keen admirer of the methodology propounded by Wynne Godley. In my view, these two papers taken together, along with the extension by Claudio Dos Santos and Gennaro Zezza (Dos Santos and Zezza, 2005), offer a very solid basis for those who wish to introduce debt and stock market questions in demand-led models, allowing them, for instance to tackle the issues brought up by Hyman Minsky with his financial fragility hypothesis (Godley and Lavoie, 2007, Preface xlii)

The following five characteristics summarise the essential features of the SFC modelling approach features that are traceable back to their New Cambridge origins:

1. Empirically Grounded; consistency with the national accounts data ('external consistency') takes precedence over 'internal consistency'. The sound theoretical or econometric basis often derives from stylised facts and stock-flow norms at the macro level rather than detailed assumptions of individual behaviour. The microfoundations rest on Minsky's model of interlinked agents' balance sheets.
2. Integration of the Monetary and Real sides of the economy; by linking the real flows to changes in sector balance sheets through the flow of funds accounts, the models respect 'adding up' constraints – everything comes from somewhere and goes somewhere, there are no black holes. This is in contrast to the *ceteris paribus* assumption so widely used in many modelling approaches where it is assumed that variations in the variables of interest can be studied and everything else can be assumed to remain constant.
3. Dynamic and Stock-flow consistent; all flows have balance sheet counterparts. It rests on the principle that "stock variables will not change indefinitely as ratios to related flow variables" (Godley and Cripps, 1983, p.41). This leads to the concept of *stock-flow norms* which are ratios between key stocks and flows that remain stable over time. The way that flows update stocks makes the model inherently dynamic.
4. Use of accounting identities and stock-flow norms to provide a logical framework; this framework sets a boundary on what can happen and excludes much of what logically cannot happen. "If stock-flow norms are regarded as exogenous variables, a large proportion of our macroeconomic results will come in the form of logically inevitable conclusions" (Godley and Cripps, 1983, p.44).
5. Use of behavioural equations to 'close' the logical structure described in the previous point; "The ratio of purely logical propositions to those which are contingent on behavioural assumptions is higher than is normal in a book on macroeconomics" (Godley and Cripps, 1983, p.44).

The SFC approach has been enthusiastically taken up mainly by heterodox economists and especially the post-Keynesians, so much so that many models are often labelled PK-SFC. Hopes have been expressed that SFC modelling can become a new *lingua franca* for heterodox economics, providing a common mode of communication that addresses the whole economy as a system, that integrates the monetary and the real sides of the economy and is empirically grounded. Godley (2004) offers the "SFC approach as a reconstruction of macroeconomics and a radical alternative to the neoclassical approach". Taylor (2004) uses it in his *Reconstructing Macroeconomics*. Dos Santos argues that it represents a convergence and a way forward for Keynesian economics (Dos Santos, 2005). This vision seems to be on the way to being realized, it has lately become quite routine for published post-Keynesian papers to include a stock-flow model in some form.

## 6. Conclusions

This paper has argued that the true legacy of the New Cambridge (NC) work lies in its methodological contributions and that subsequent development of its central empirical ideas has led to several new modelling approaches that are increasingly coming into their own, most notably Stock-Flow Consistent modelling. The paper started by looking at aspects of the New Cambridge hypothesis and showed how even these 'theoretical' insights were essentially driven by empirical observations. This led naturally to an examination of how this grounding in empirical evidence became a cornerstone of their methodology. The emergence of the New Cambridge work was proceeding concurrently with the rise of monetarism and the New Classical Counter-revolution (NCCR); the difference between NC and NCCR essentially reduced to the choice of internal vs. external consistency and the attitude to microfoundations. In keeping with the empirical nature of New Cambridge, external consistency is paramount and they argued that microfoundations were not relevant in a study of how *whole economic systems* function. Nevertheless, it could be argued that compatible microfoundations can be found in Minsky's interdependent balance sheets model. The emphasis on empirical grounding also led them to call into question the prevailing axiomatic-deductive methodology in macroeconomics and to challenge the nature of economic theorizing itself by contrasting economics as logic, where theories are derived from axiomatic postulates and assumptions by rigorous reasoning, against economics as 'science' where theory formation is driven by empirical observation. In either case, model results must be tested against empirical evidence. It was argued that the New Cambridge work has given a definite impetus towards more evidence-based reasoning and that this, combined with the steady progression of modelling techniques as exemplified by the stock-flow consistent approach, holds out the prospect of a move towards a new realism in economics.

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