

## **The post-Keynesian economics of credit and debt**

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*To take a not at all arbitrary example, a standard macroeconomic approach, the IS-LM model (don't ask) told us that under depression-type conditions like those we're experiencing, some of the usual rules would cease to apply: trillion-dollar budget deficits wouldn't drive up interest rates, huge increases in the money supply wouldn't cause runaway inflation. Economists who took that model seriously back in, say, early 2009 were ridiculed and lambasted for making such counterintuitive assertions. But their predictions came true. So yes, it's possible to have social science with the power to predict events and, maybe, to lead to a better future.*

Paul Krugman, "Introduction" to Isaac Asimov, *The Foundation Trilogy*, The Folio Society, London, 2012, p. xv.

Paul Krugman believes that it is enough to go back to the old IS-LM model to understand how the economy functions and to make predictions about what is about to happen. He is partially right and partially wrong. Certainly the current sophisticated models put forward by most of his mainstream colleagues did not allow for correct predictions. However, although we need to go back to macroeconomics before the new classical and rational expectations revolution, thus going beyond the representative agent with rational expectations (RARE as John King (2012) calls it), we certainly should not go back to the simple IS/LM model that Krugman is so enamoured with. The purpose of the session on the economics of credit and debt is to stimulate new thinking on credit and debt. I will argue, like Krugman, that we don't need new thinking as such. A proper alternative to the dominant thinking, meaning here DSGE models, already exists. It was always there. It was either abandoned for more fashionable endeavours, or it was ignored and left out in the cold. Part of this work on the economics of credit and debt has already been resurrected in the media or among some people working in the financial industry: I think here of

the work of Hyman Minsky. Other works are gaining credence among a number of young researchers: I think here of the work of Wynne Godley, which Dirk Bezemer (2010) has called the post-Keynesian accounting approach. There are also some other works, not necessarily mentioned by Bezemer, which follow the same approach, although with slightly different tools. What these traditions in macroeconomics need is more manpower, that is, more researchers pursuing this line of thought. Macroeconomics needs to diversify itself.

Contemporary mainstream macroeconomics is essentially based on the system of national accounts that was put in place by the United Nations in 1953 – the so-called Stone accounts. At that time, some macro economists were already searching for some alternative accounting foundations for macroeconomics. In the US, Morris A. Copeland (1949), an Institutional in the quantitative Mitchell tradition of the NBER, designed the first version of what became the flow-of-funds accounts now provided by the Federal Reserve since 1952 – the Z.1 accounts. Copeland wanted to have a framework that would allow him to answer simple but important questions such as: “When total purchases of our national product increase, where does the money come from to finance them? When purchases of our national product decline, what becomes of the money that is not spent?” (Copeland 1949 (1996: 7)). In the initial standard national accounting, little room was left for banks and financial intermediaries and the accounts were closed on the basis of the famous Keynesian equality, that saving must equal investment. This initial system of accounts is a system that presents “the sector surpluses that ultimately finance real investment”, but it does not present “any information about the flows in financial assets and liabilities by which the saving moves through the financial system into investment. These flows in effect have been consolidated out” (Dawson 1991 (1996: 315)).

By 1968 however, a new *System of National Accounts* (SNA) was published by the national accountants of the United Nations. This new system provided a theoretical scheme that stressed the integration of the national income accounts with financial transactions, capital stocks and balance sheet (as well as input-output accounts), and hence answered the concerns of economists such as Copeland. The new accounting system was cast in the form of a matrix, which started with opening assets, adding or subtracting production, consumption, accumulation, and taking into account revaluations, to obtain, at the bottom of the matrix, closing assets. Several countries have complete flow-of-funds accounts or financial flows accounts, as well as national balance sheet accounts. The problem now is not so much the lack

of appropriate data, but rather the unwillingness of most mainstream macro economists to incorporate these financial flows and capital stocks into their models, obsessed as they are with the representative optimizing microeconomic agent. How is it possible to discuss the financial crisis while relying only on income and expenditure flows?

Because I have already explained in a book (Godley and Lavoie 2007), as well as in a number of published papers, what I believe to be essential features of a proper macroeconomic theory of a monetized production economy, I will twist this paper towards an account of the history of economic thought as I see it pertaining to the topic at hand, dealing mostly with works that have a relationship with that book. I will start with the intellectual journey that we have been asked to provide. I will then briefly explain some of the key features of post-Keynesian economics. I will then follow with an examination of the contributions of three specific heterodox authors, Wynne Godley, Alfred Eichner and Hyman Minsky, along with early attempts at formalizing the integration of the real and financial sectors. Finally, I will discuss what I still find puzzling, that is, the role played by investment banks and their special investment vehicles, along with securitization, and how this could be formalized within the stock matrix which is being used in the stock-flow consistent approach.

### ***Intellectual journey***

Each of us is being asked to explain how we got to where we are. I was an undergraduate student in economics and mathematics (for three years) at Carleton University, in Canada in the early and mid 1970s. The economics department was fairly mainstream, with one exception, Tom Rymes, who introduced us in his honours seminar to a wide range of subjects, from general equilibrium theory to Milton Friedman, through the new Jensen and Meckling's theory of the firm which turned out to have such an impact on the financialization process of the following decades. Rymes, however, was most interested into Keynes's economics, which at the time included Patinkin, Clower, Leijonhufvud, as well as post-Keynesians such as Joan Robinson, Kaldor and Pasinetti. We were also asked to read the 1937 *Quarterly Journal of Economics* paper written by Keynes, giving us an opportunity to encounter the concept of fundamental uncertainty and its impact on economic behaviour. At that stage I had been seduced by post-Keynesian economic theory, and the tipping point was the survey article by Eichner and Kregel (1975), which convinced me that post-Keynesian economics was the right approach to understand the real world, that is, a monetized production economy.

For personal reasons I went to France as a graduate student, in a program called advanced macroeconomics at the University of Paris 1. Through various strokes of luck, I ended up early on befriending two young assistant professors there, Alain Parguez and Frédéric Poulon, who were developing their own version of the French monetary circuit theory. Another stroke of luck is that I took there a course by Coulbois, a stern expert in international finance who was however convinced that the neoclassical theory of foreign exchange markets was mistaken and who proposed instead what is the cambist theory, which later eased my understanding of the implications of the endogenous theory of money in an international setting, notably in my work with Wynne Godley on closed models of open economies. I also took a course by Miss Fau, an original thinker thought to be a crank by her colleague, because she was interested both in input-output and flow-of-funds theory. All in all, my sojourn in France gave me the opportunity to become abreast of developments by original thinkers in monetary economics, notably Jacques Le Bourva (1992) who developed the theory of endogenous money on his own, but also Jacques Denizet (1969), whose book, despite his different political views, proved to be quite in tune with the critiques that my future co-author Wynne Godley would address to mainstream macroeconomics.

Since my parents lived in London while I was in Paris, I had several opportunities to visit bookstores, and purchase post-Keynesian books such as those of Robinson (1956, 1971), Harcourt (1972), Davidson (1972), Kregel (1973), Pasinetti (1974), Minsky (1975), Wood (1975), Koutsoyannis (1975), Eichner (1976) and Weintraub (1978), which I all read many times over. They were the inspiration for my doctoral dissertation and for later research.

When, on another stroke of luck, I was hired in 1979 at the University of Ottawa, I found two colleagues, Mario Seccareccia and Jacques Henry, very much interested in post-Keynesian economics, and spent most of my initial years writing on endogenous money, the monetary circuit theory, and Minsky's financial fragility hypothesis. Already then, as shown in Lavoie (1983, 1986-7), I was concerned with the fact that Minsky's description of ever optimistic and ever risky bankers and entrepreneurs may not lead to the dismal macroeconomic consequences described by Minsky, because of possible macroeconomic paradoxes. Thus already at the time I was concerned with the interactions between the real and the financial sectors, and in the links between assets and liabilities, but the analysis was still rather rudimentary at the time, although my Minsky model was certainly one the first of a long series of such attempts to formalize

Minsky's ideas. Another paper of mine (Lavoie 1984, pp. 243-244, 251-252), illustrates this concern for economy-wide consequences, as it looks at what happens to the balance sheets of firms, and their borrowing conditions, when households desire to hold a larger proportion of their assets in the form of money balances, or when they desire to hold a larger proportion of their assets in the form of government-issued bonds, thus going further than standard French circuit theory, which focused on flows with little attention paid to stocks or to their stock-flow links.

As the title of the meeting shows, there is now a renewed interest for the role of credit and credit aggregates, in contrast to monetary aggregates. When the topic was put to the forefront, it was presented as a new paradigm in monetary economics (Stiglitz and Greenwald 2003), which among other things described the credit channel in the monetary transmission mechanism. When pressed to explain how credit rationing fitted the endogenous theory of money, I explained that credit rationing should not be conceived as a rising credit supply curve, but rather that the conditions being imposed on borrowers ('profitability, collateral and the like') ought to be considered as 'shift parameters'. In Lavoie (1992: 177-8), there is a reference to the *effective* demand for credit curve, based on the 'existing collateral and risk requirements for borrowing. When these requirements are modified, say relaxed, they shift upwards the effective demand curve for credit'. Wolfson (2012: 117) argued similarly in his attempt 'to develop a framework to analyse credit rationing that incorporates a horizontal endogenous money supply curve', previously detailed in Wolfson (1996). For a borrower of a given risk class, Wolfson draws a horizontal credit supply curve for the borrower of a given credit class. There are then two credit demand curves, in analogy with the notional and effective labour demand. There is a *notional* demand curve, which corresponds to the demand for loans by entrepreneurs, according to their own expectations. There is then another demand curve, the *effective* demand curve, which only takes into account the demand that responds to the conditions and expectations of the bankers.<sup>1</sup> The horizontal distance, at the existing lending rate, between the notional and the effective demand curves, is a measure of the extent of credit rationing. In other words, from the perspective of the bankers, the effective demand curve for credit is the demand curve arising from creditworthy borrowers. It is '*creditworthy* demand' (Wolfson, 2012: 118).

I somewhat moved out of monetary economics for a while, focusing more on growth theory, and more specifically Kaleckian growth models, trying in particular to introduce interest payments into these models, a line of research that has been particularly extensively developed since by Eckhard Hein (2006), although still keeping an eye on monetary policy (Lavoie 1996) and the New Consensus (Lavoie 2005). My research on monetary economics, or more precisely monetized production economies, took a new twist when I met Wynne Godley in December 1999. I had been fascinated by his former *Macroeconomics* book (Godley and Cripps 1983), with his highly original and ambitious work as well as the formal introduction of endogenous money through the need to accumulate inventories, but at the same time I was somewhat taken aback by its idiosyncratic presentation style and all the inflation accounting chapters. As far as I can remember, I first made a reference to this book in a survey that I made on circuit theory (Lavoie 1987), claiming that there were tight similarities between French and Italian circuit theory and the Godley and Cripps (1983) book – an assessment that turned out to be quite right since Wynne Godley himself studied the works of Augusto Graziani, the leader of the Italian monetary circuit school.

As I explained before, in the late 1990s Anwar Shaikh, who had been working at the Levy Institute, brought my attention to a working paper that had been written there by Wynne Godley (1996), saying that this was innovative work that was of outmost importance, although hard to follow. I did get a copy of the working paper, and remember discussing it with my colleague Mario Seccareccia, arguing that this was the kind of work that we ought to be doing if we wanted to move ahead with circuit theory and post-Keynesian monetary theory, which at the time, seemed to me to be in a sort of an impasse with its endless and inconclusive debates. We did nothing of the sort, until Godley (1999) published a heavily revised version of this working paper in the *Cambridge Journal of Economics* at the end of 1999, which is when I invited him in Ottawa, and a year later started our collaboration.

Working on our book *Monetary Economics* (Godley and Lavoie 2007) was for me the opportunity to discover or rediscover an important literature on flows of funds. A student of mine, Guy Fortin (1990), had written his MA thesis on flows of funds, so I was somewhat aware of this literature, but I had not paid enough attention to it. As many macroeconomists in the past, I then had difficulties in assessing how flow-of-funds analysis could be made really useful. My work with Godley forced me to look at it with a new light as Godley paid attention to what

was happening to saving and to credit flows, as well as their consequences for financial stocks. Also, because Godley had integrated the portfolio choice analysis of Tobin and his associates (Tobin 1969, Brainard and Tobin 1968), it induced me to give a second look to some of the work that had been done by previous heterodox researchers attempting to integrate portfolio choice, hence variables linked to stocks, and real flow variables, such as output and output growth.

### ***Stock-flow consistent models***

The main claim of the present paper is that stock-flow consistent models (SFC models), as they were first defined in 2002 by Claudio Dos Santos, an assistant of Godley at the Levy Institute, are the likely locus of some form of post-Keynesian consensus in macroeconomics, as it allows to entertain both monetary and real issues within a single model. In fact, the SFC approach is perhaps a misnomer, as several other theories relate stocks and flows in a consistent way. What is the peculiarity of the *post-Keynesian SFC approach* is that its models truly integrate the real and the monetary sides. To get a gist of what this SFC approach truly implied for Godley and his collaborators, we should recall some of the other names which were initially suggested, such as the the *real stock flow monetary model* (Godley 1993: 63), or names that Godley and I juggled with in the years 2000, such as the *financial stock-flow coherent* approach or the *sectoral stock-flow coherent* approach, to emphasize that stock-flow consistency was not just limited to the link between real investment and tangible capital, but involved most importantly the interrelated financial flows and stocks of assets and liabilities of the main economic sectors of the economy.

In attempting to provide a useful model of the economy that deals both with the real and the monetary factors, economists face two sorts of difficulties. First they have to identify the structural framework that they believe is relevant to the problem at hand. This means they have to choose the number of sectors that they wish to consider: firms, banks with or without non-bank financial institutions, the government, a central bank, the external sector, households, split or not into two categories, say workers and capitalists. From there, the modeller has to choose what assets and liabilities ought to be included in the model, and whether an asset or a liability can be omitted without much damage from a particular sector. For instance, should banks be assumed to hold long-term bonds or be assumed to issue equities, and should firms be assumed to issue corporate paper or be assumed to hold financial assets such as Treasury bills? These choices lead to the construction of a balance sheet matrix, which insures that the model

starts out in a coherent way. A proper balance sheet matrix also helps out to design a proper transaction-flow matrix, which will take into consideration all the financial flows associated with the assumed stocks. The same transaction-flow matrix also insures that each sector fulfills its budget constraint. To take into account capital gains, a re-evaluation matrix is also needed.

The second set of difficulties is in constructing appropriate behavioural equations. This part of the model I would argue is more open to controversy. It can be relatively easy to agree on the main structural features of a simplified economy; but different economists will paint the behaviour of firms or banks or even households in many different ways. Despite a possible common structural framework that should constrain the range of possible results, as Godley and Cripps (1983) initially hoped when they proposed a first version of the stock-flow consistent approach, different economists will still disagree on behavioural equations and the appropriate closure of the model. Thus the results obtained with these different models will differ, as has been confirmed when new SFC models, with assumptions slightly different from those of the earlier ones, produced different trajectories.

### ***Main features of post-Keynesian monetary analysis***

Before we look in more detail at some specific contributions, let us first review the main features of post-Keynesian economics. Post-Keynesians, as already pointed out, believe that the money supply is endogenous and demand-led. Post-Keynesians pay particular attention to the counterparties of the stock of money, in particular the loans or credits granted by the banking system. This explains in part why the main concern of post-Keynesians about the financial system resides in the availability of credit for productive activities and accumulation as well as the evolution of the stock of debts held by the various agents, as debt can generate financial instability, whereas mainstream authors focus on real balance effects, thinking that they will stabilize the economic system. This distinction has perhaps been best exemplified by Steve Keen, through his popular blog, and through his recent modeling of credit and debt processes. For post-Keynesians, the main causality runs from credits to deposits, meaning that bank deposits are created the moment a new bank credit is granted. There is reversed causation. If credit rationing occurs, it is mainly because of a lack of confidence on the part of the banking or financial system, and not so much because of asymmetric information or because of a lack of financial resources (reserves, own capital, or the like). Furthermore, the causality associated with reserves is also reversed, with reserves being endogenous and demand-led, thus being a



fraction of deposits, instead of deposits being a multiple of reserves. Indeed, central banks do their best to supply the amount of reserves that is being demanded by the banking system, but at a cost of their choice. This is true as well in an open economy, even with a fixed exchange rate regime: the fluctuations in foreign reserves will be compensated by changes in the other components of the balance sheet of the central bank, arising either from defensive actions taken by the central bank or from endogenous reactions of the private sector.

Post-Keynesians view interest rates as a distribution variable which, to a large extent, can be controlled by the monetary authorities. This is because the central bank is able to set the base rate at the level of its choice. The base rate is the target interest rate. This interest rate is usually a short-term interest rate. In the past it used to be the one-month or three-month yield on Treasury bills. Nowadays the target interest rate is the overnight rate – the federal funds rate in the USA, EONIA (Euro OverNight Index Average) in Europe. The target in many countries is in the middle of the band delineated by a ceiling and a floor, the rate of interest on advances from the central bank and the rate of interest on deposits at the central bank, so that, at least under normal circumstances, the overnight interest rate at which banks borrow from each other remains within the band. Indeed, the new operating procedures pursued by central banks have pierced through the veil of rhetoric and have vindicated the post-Keynesian view, thanks also to the renewed study of the links between government expenditures and central bank money, which has been pursued by the neo-chartalist branch of post-Keynesian economics, also sometimes referred to as modern monetary theory (MMT, Wray 2012) .

In normal times, all short-term interest rates (the T-bill rates) follow very closely the evolution of the overnight rate, and the latter is very close to the target rate set by the central bank. In unusual times, the evolution of short-term interest rates on private assets may diverge from that of the overnight rate and from the interest rates on government assets. The relationship between the target interest rate and long-term interest rates, especially rates on securities issued by the private sector, is looser. Liquidity preference is reflected in the differentials between all these other interest rates and the target interest rate set by the central bank. Liquidity preference does not affect the base rate, unless we extend the concept of liquidity preference to the behaviour of the central bank, which does not seem appropriate since the target interest rate is a discretionary policy decision taken by the monetary authorities.

Post-Keynesians, as it should now be obvious, are concerned with a monetized production economy, where money is neither neutral nor an inessential veil. As a result, post-Keynesians believe that a restrictive monetary policy will have negative consequences on an economy both in the short run and in the long run, meaning that it is likely to raise unemployment rates and reduce real growth rates. Similarly financial disturbances are likely to have both short- and long-run effects. Post-Keynesians hold two claims of reversed causality. Observing the statistical relationship between money aggregates and price inflation, post-Keynesians attribute the growth in money aggregates to the growth in output and prices, thus objecting to the mainstream assertion that price inflation is a monetary phenomenon arising from an excessive growth of the money supply. Finally, post-Keynesians argue that investment is not constrained by current saving or loanable funds, but that instead investment determines saving – a claim that some consider as a key presupposition of post-Keynesianism. This reversed macroeconomic causality is evidently closely related to the monetized production economy, where banks can grant loans without disposing of previously acquired deposits.

It used to be simple to differentiate post-Keynesian monetary economics from orthodox economics since mainstream authors assumed the presence of an exogenous supply of money, with interest rates being said to be endogenous, as in the IS-LM model. It is not so simple now, since several orthodox authors, which in that sense are orthodox dissenters, now endorse the concept of endogenous money which is so dear to post-Keynesian theorists. Indeed, real-business cycle theorists, New Consensus authors and New Paradigm Keynesians all accept that the supply of money is *essentially* endogenous, as did the French overdraft economists of Hayekian background in the 1980s (see Lavoie 1985). In the case of New Consensus authors, close to central bankers through their design of the famous dynamic stochastic general equilibrium (DSGE) models, it has been argued by critics that there is neither room nor need for the presence of money and credit in these models (Dullien 2011, Rogers 2011). Another important feature of the orthodox dissenters is their belief in the existence and uniqueness of a Wicksellian natural rate of interest, towards which the actual rate of interest set by central banks must converge. The belief or disbelief in such a rate is perhaps the critical distinguishing feature between orthodox economists and post-Keynesian economists – a point made earlier in Lavoie (1985). This distinguishing feature may be linked to Schumpeter's overall distinction between a *real analysis* that dominates mainstream theory and a *monetary* analysis, advocated by Minsky and the post-Keynesians, not to mention Keynes himself.

***Godley's systemic view of monetary economics***

Within this context, what is the contribution of Wynne Godley, to whom I have been associated over the last decade? When I reflect on the works of Wynne Godley, I realize that while he was concerned with highly technical issues, Godley was most preoccupied with understanding the functioning of the economy as a whole. Godley (1996: 14) has been groping “to show how the whole system fits together and cast banks in a realistic role”.

How the whole system did fit together had to rely first and foremost on accounting identities. Already, from this angle, Godley's work comes close to that of the circuitists with whom I was associated in my formative years. Circuitists also rely on national accounting identities with a minimum of behavioural equations, a feature that can also be associated with Michal Kalecki (1971). Kalecki had drawn from these and the assumption that workers did not save that profits in a closed economy were equal to investment expenditures minus the saving of capitalists plus the government deficit, while circuitists like Alain Parguez (1980) inferred from the identities that the retained profits of firms would equal investment expenditures minus the saving of households plus the government deficit, an equation also found in Steindl (1982). As is now well-known, in the 1970s, in his efforts to make better conditional forecasts in the context of what became known as his New Cambridge model that incorporates the role of the foreign sector, Godley put forward what is now known as the fundamental identity:  $(S - I) = (G - T) + CAB$ . In words, it must be that the financial saving of the domestic private sector, that is, the saving of the private sector minus its investment, must be equal to the amounts lent to finance the deficit of the public sector (its expenditures minus its net tax revenues) plus the amount lent to the foreign sector, that is, the current account balance surplus (*CAB*).

Still, these were flow identities. How did these flows relate to stocks? And how did real flows tied to economic activity relate to financial stocks of assets and liabilities? My view of Wynne's theoretical work is that his work is a quest for the Holy Grail of Keynesianism. Keynesians have for a long time mentioned the need to integrate the real and the monetary sides of economics. Integration was all the talk, but for a long time little seemed to be achieved. Stinted by the rise of monetarism in the 1970s, with the monetarists claiming that the Keynesians had no clue about the role played by financial aggregates, Kaldor (1970, 1982) was forced to sharpen his views of endogenous money while his friend Godley wanted to discover how money got into the economy. As Godley said at the Keynes centennial conference in

Cambridge in 1983, he wished “to outline a theory of the determination of real expenditure and real output in a monetary economy” (Worswick and Trevithick 1983: 170). His first attempt is the book that he wrote with Francis Cripps, his colleague at the Department of Applied Economics. I understand the Godley and Cripps (1983) book as an exercise in finding some way to amalgamate the real and the financial sides. This is clearly stated in the introduction to their book, where Godley and Cripps (1983: 17) claim that “our present synthesis may be broadly characterized by saying that we make a ‘monetarist’ financial system (based on the behaviour of stocks of money, financial assets and debts) drive a ‘Keynesian’ flow system based on the response of expenditure to income”, and it is reiterated in the epilogue, when they claim “to have provided a framework for an orderly analysis of whole economic systems evolving through time” (ibid: 305). Indeed, in the very first sentence of the book, they point out that “macroeconomics is the study of how whole economic systems function” (ibid: 13).

Godley believed that Keynesian orthodoxy “did not properly incorporate money and other financial variables” (Godley and Cripps 1983: 15), a regret that was also expressed at the time by other frustrated Keynesians such as Jean Denizet (1969) in France. In their attempt to integrate the real and the monetary sides, Godley and Cripps and their colleagues “found quite early on that there was indeed something deficient in most macroeconomic models of the time”, including their own, “in that they tended to ignore constraints which adjustments of money and other financial assets impose on the economic system as a whole” (Godley and Cripps 1983: 16). Interestingly, Godley was aware of the work being carried out at about the same time by Tobin and his Yale colleagues, as well as that of others such as Buiter, Christ, Ott and Ott, Turnovsky, and Blinder and Solow, who emphasized, as Godley and Cripps (1983: 18) did, that “money stocks and flows must satisfy accounting identities in individual budgets and in an economy as a whole”. Still, Godley thought that their analysis was overly complicated, in particular because they assumed some given stock or growth rate of money, “leaving an endogenous rate of interest to reconcile” this stock of money with the fiscal stance. I also suspect that Godley and Cripps (1983: 15) were annoyed by several of the behavioural hypotheses found in the work of these more orthodox Keynesians, as they “could only give vague and complicated answers to simple questions like how money is created and what functions it fulfils”. The Cambridge authors thus wanted to start from scratch, with their own way of integrating the real and the financial sides, thus avoiding these “tormented replies”.

In line with the New Cambridge approach that Godley and his collaborators developed in the 1970s at the Department of Applied Economics, Godley and Cripps (1983: 43) contend that stock-flow norms “are crucial to determining how actual economic systems work” and that they “exhibit a fair degree of stability”. They focus their attention on two stock-flow norms that will determine the behaviour of financial stocks: the desired inventory to sales ratio and the desired wealth to disposable income ratio. The stability of the latter has often been questioned in the past. However, it seems that it has not been realized that this wealth to income ratio target is constant as long as we assume a constant propensity to consume out of disposable income and a constant propensity to consume out of wealth, as most Keynesians would when constructing a model. The link between this stable stock-flow ratio and the stable propensities to consume is first made, as far as I know, in Godley (1996), and then reappears in subsequent work.

### ***Godley’s view of credit and banking***

Godley (1996) is the paper that truly launched the SFC approach in post-Keynesian economics. What struck me most when I first read it was that Godley was putting together a monetary flow analysis, linking monetary income and expenditure with a flow demand for credit, and a portfolio analysis, that explained the various demand functions for financial assets, including the demand for a stock of money. Brought up in the tradition of the monetary circuit theory, where monetary flows and the flow demand for credit are most important and where stocks of financial assets were a side issue, I always had some difficulty in seeing how the monetary circuit approach could be reconciled with the more traditional Keynesian portfolio approach based on stocks of financial assets. But Godley’s 1996 paper integrated the two views, showing formally, with a fully-integrated model that could be simulated, how flows and stocks would gradually change in line with each other through time. Godley’s models could simultaneously determine the stocks of money or securities held by households and the flows of credit, investment and income, as well as the stocks of private and public debts. The same integration had already been achieved in the Godley and Cripps (1983) book, but the integration was only partial, the difference being that most of the book assumed that all financial assets held by households were retained in the form of bank deposits. When adding the public sector, Godley and Cripps (1983) assumed that the non-bank private sector chose between government securities and bank deposits, but this choice was only described in words and not explicitly modelled.

In the French and Italian monetary circuit theory, as described earlier by Parguez (1980) and Graziani (1990), the production process starts with banks granting advances to production firms to pay for wages and intermediary products. This is initial finance. Firms are then able to pay back this initial finance as long as households don't accumulate new money balances in banks. Godley and Cripps (1983) have a similar view. For them, production takes time, and firms must borrow from banks to finance their new production. In both monetary circuit theory and the Godley and Cripps representation of the simplified circuit, the outstanding debt of firms towards banks will be equivalent to the money balances held by households. There are two innovations from Godley and Cripps (1983), compared to the monetary circuitists. The first one is that Godley shows that the outstanding debt of firms will be equal to the end-period inventories valued at cost. The second innovation is that he has an explanation of the size of the money balances. As recalled earlier, they were some stable proportion of disposable income. In his 1990s work, the proportion of money balances as a share of financial wealth was given an additional Tobinesque explanation.

As Godley points out on a number of occasions, he himself owed his formalization of portfolio choice and of the fully-consistent transactions-flow matrices to James Tobin. Godley was most particularly influenced and stimulated by his reading of the paper by Backus et al. (1980), as he writes in Godley (1996: 5) and as he told me verbally several times. The discovery of the Backus et al. paper, with its large flow-of-funds matrix, was a revelation to Godley and allowed him to move forward, by providing both a role for the banking sector and getting into sectoral flow-of-funds analysis. But as explained in Godley and Lavoie (2007: 493), despite their important similarities, there is a crucial difference in the works of Tobin and Godley devoted to the integration of the real and monetary sides. In Tobin, the focus is on one-period models, or on the dynamics of adjustment from an arbitrary distribution of assets to the desired portfolio composition, for a given income level. As Randall Wray (1992: 86) points out, in Tobin's approach "flow variables are exogenous, so that the model focus is solely on portfolio decisions". By contrast, in Godley and Cripps and in further works, Godley is preoccupied in describing a fully explicit traverse that has all the main stock and flow variables as endogenous variables. As he himself says, "the present paper claims to have made ... a rigorous synthesis of the theory of credit and money creation with that of income determination in the (Cambridge) Keynesian tradition" (Godley 1997: 48). Tobin never quite succeeds in doing so, thus not truly introducing (historical) time in his analysis, in contrast to the objective of the Godley and Cripps

book, as already mentioned earlier. Indeed, when he heard that Tobin had produced a new book (Tobin and Golub 1998), Godley was quite anxious for a while as he feared that Tobin would have improved upon his approach, but these fears were alleviated when he read the book and realized that there was no traverse analysis there either.

Another major difference between Tobin and Godley are their views about the role of banks. Again this is discussed in detail in Godley and Lavoie (2007: 497-499). Banks in most of Tobin's writings are veils that provide households with a greater variety of asset choices: "the *raison d'être* of Tobin's banks, so far as I can see, is to enlarge the asset choice of households and facilitate the agility with which it can be made" (Godley 1997: 49). By contrast, in Godley's view, banks play a distinct and essential role, since "bank loans are required to enable industry to function at all" (ibid: 49). Godley's banks are Kaldorian, responding to the financial needs of their credit-worthy clients. As pointed out earlier, this is linked to his view of the production process, which as we said, is similar to that of the French and Italian monetary circuitists. Within this framework, bank loans act as a necessary buffer for the fluctuations in inventories. The link between inventories and bank loans is preserved all the way from Godley and Cripps (1983) to Godley and Lavoie (2007).

There is another feature of banking behaviour that survived the 25-year transition. Godley and Cripps (1983: 160) describe the mechanism through which deposit and lending rates will remain around bill rates. If the Treasury-bill rate goes up, this will induce households to acquire bills from the banks and get rid of their money deposits. But if this is the case, the deposit to loans ratio will drop down, and banks will feel that they are less liquid, holding relatively fewer of their assets in the form of safe bills. Banks will thus be induced to raise their deposit rate, so as to preserve their liquidity ratio norm, and consequently they will also raise their lending rates to maintain their profit margins. The mechanism is first formalized in Godley (1996: 21), and it can be found in a similar form in later works, including Godley and Lavoie (2007). It is interesting to note that Alfred Eichner (1986) had identified a very similar mechanism through his empirical work, arguing that interest rates tended to be higher when the deposit to loan ratio was high relative to its trend level, thus also arguing along the lines of some sort of bank liquidity mechanism. It is not clear that such a mechanism still exists in the real world, as banks tend to use securitization or liability management, marking up the overnight rate target of the central bank to set the prime lending rate. Unless banks desire to achieve a

target deposit to loan ratio, a sudden increase in the amount of required loans will have no impact whatsoever on interest rates or interest rate differentials, a point that was made to me by John Smithin when we were together riding a cab in Berlin in 2001.

### ***Alfred Eichner and credit flows***

While Alfred Eichner is mostly known for his pricing model of oligopolistic firms, where firms set mark-ups as a function of their needs to finance capital accumulation, Eichner also made several under-rated contributions to post-Keynesian monetary theory. A crucial contribution of Eichner is focus on the ability of agents, non-corporate firms in particular, to obtain bank credit. The critical monetary factor is the availability of credit, and not the availability of money, a point also underlined with great force at that time by Albert Wojnilower (1980: 324) when he wrote that “I can testify that to all except perhaps the most indigent of the economic actors, the money stock – in contrast to oil or credit – is a meaningless abstraction”. This point will be reiterated forcefully by Eichner a few years later: “It is the demand for credit rather than the demand for money that is the necessary starting point for analyzing the role played by monetary factors in determining the level of real economic activity” (Eichner 1986: 99). This is confirmed by Arestis and Driver (1984: 53), when they analyze the key features of the Eichnerian econometric model: “In terms of its monetary aspects the emphasis is on credit rather than money in enabling spending units to bridge any gap between their desired level of discretionary spending and the current rate of cash inflow”.

This led Eichner to completely remove the money stock from his econometric model, as early as 1981 or 1982, a move that was to be imitated, without acknowledgment, ten or fifteen years later, by the proponents of the New consensus in monetary policy and by central bankers. As Eichner (1986: 110) pointed out then, “Eliminating the money stock from the model has the further advantage that it avoids any need to distinguish the ‘demand’ for money from its supply. It also renders moot the question of how the money stock is to be defined .... Indeed the only disadvantage is that it would mean abandoning the LM-IS framework that has dominated macroeconomics .... But then that might not be such a disadvantage”. And indeed, New Keynesian supporters of the New consensus have done just that: they have removed the LM part of the IS-LM model (see Lavoie and Seccareccia 2004).

The credit or lending side, rather than the money or deposit side, is normally the most



crucial aspect of monetary relations, because “it is the possibility of the non-financial sectors being able to make credit-financed purchases that, by relaxing the income constraint that would otherwise preclude any such possibility, explains how the level of national income can increase from one time period to the next” (Eichner 1987: 838). This statement is crucially important: someone must accept to increase his or her load of debt for the overall economy to grow. If the private sector does not do it, then the public sector will have to go into debt. This is another way to introduce balance sheet implications in macroeconomic theory. As Eichner (1987: 824) says: “The only way the amount of funds circulating as checkable deposits can be increased is if some nonfinancial sector is prepared to increase, not its net savings but rather, its net debt”.

What do bank loans depend upon? Eichner (1987: 854) very neatly rejects the standard textbook money multiplier: “Banks are not inclined to approve bank loan applications just because they have excess reserves. They will, in fact, be willing to grant loans only to those who can demonstrate that they are ‘credit-worthy’, and once this demand for loans has been satisfied, no additional credit is likely to be extended”. The actual amount of credit depends on the demand for credit and the extent of credit rationing by banks, not on the amount of excess reserves. Thus provided they are credit-worthy, “those in need of bank loans can obtain all the additional credit they need at a fixed rate ... and the supply of additional funds, or bank credit, can be represented by the type of curve shown in exhibit 12.20” (Eichner 1987: 858). Now, what is this curve? It is a perfectly flat (horizontal) curve, with the interest rate on the vertical axis and the increase in bank credit on the horizontal axis. Still, Eichner emphasizes the existence and the importance of credit rationing. So why is the supply curve of credit horizontal? How is credit rationing reflected in this diagram? Eichner’s answer, which must be found in Arestis and Eichner (1988), is that credit rationing is to be reflected in shift parameters that enter the demand for credit functions, as I have suggested in a previous section of this paper. Thus, Eichner’s means to reconcile the endogeneity of money with the possibility of credit rationing (or the liquidity preference of banks) are no different from the solution proposed by Wolfson. Credit rationing is reflected in shift parameters “that have nothing to do with the slopes of the two relationships”, the demand for and the supply of credit (Arestis and Eichner 1988: 1010-1011).

### ***Alfred Eichner and flows of funds***

Eichner’s (1986) viewed the operations of the central bank as being essentially of a defensive

nature, responding to the vagaries reserve demand and the movements in and out of the government banking account at the Federal Reserve. This was confirmed by his own empirical analysis, which showed a near zero correlation between net purchases of government securities and the monetary base, an empirical result which also achieved by Basil Moore (1988: 98) in his well-known book. Furthermore, his explanation of the defensive operations of the central bank “consists of viewing the Federal Reserve System as an integral part of the overall banking and financial system”. In other words, the Fed is viewed as part of a flow-of-funds system. Eichner’s insistence on going beyond the standard national income and product accounts, by adding flow-of-funds accounts and the analysis of balance sheets, is a key contribution to post-Keynesian monetary economics.

Flow-of-funds analysis is presented as early as Chapter 2 of Eichner’s (unfinished) 1987 book, right after an introduction to national income accounts. Thus Eichner considered that flow-of-funds analysis was an integral part of his fully integrated macrodynamics. Flow-of-funds concepts also appeared earlier as gross saving – the sum of tangible investment and the net acquisition of financial assets – is a key variable in the analysis of the behaviour of both corporate firms and households. Indeed, Eichner (1987: 660-1) relates household consumption to stocks of financial assets and to the availability of credit, interest rates on consumer loans and the loan amortization duration.

Eichner (1987: 810-838) devotes nearly 30 pages to flow-of-funds analysis in his chapter on money and credit, with more than a dozen tables reproducing flow of funds consequences of various decisions by economic agents. The very first of these tables (Eichner 1987: 811) illustrates the quadruple accounting entry principle first put forth by Morris Copeland, according to which any transaction requires at least four recorded changes. For instance, the moment that a bank grants a loan to a firm, both the asset and liability sides of both the firm and the bank require an accounting entry.

The intent of Eichner in presenting the flows-of-funds method is clear. He wants to convince his readers that “the amount of funds available to finance investment depends far more on the lending policies of the banks, including the central bank, than on the willingness of households to forego consumption” (Eichner 1987: 138) – an obviously Keynesian assertion. In particular, “As can be seen by tracing out ... the full income effect of a net increase in savings by one of the nonfinancial sectors, this will simply reduce by an equal amount the net savings of

one or more of the other financial sectors, leaving aggregate savings unchanged. If additional investment is going to be undertaken, it can only be financed ... through bank loans” (Eichner 1987: 836-7). Eichner was one of the few economists to pay attention to the flow-of-funds approach as a useful analytical tool.

### ***Minsky and flows of funds***

I now wish to make a brief mention of the work of Hyman Minsky. This section will be rather short because so much has already been written about his work following the financial crisis and the popularization of the “Minsky moment” expression. What I wish to show here is that Minsky was quite aware of Copeland’s quadruple entry principle which has been endorsed by both Godley and Eichner. This section will also constitute a transition towards the first post-Keynesian models that have fairly successfully integrated the real and the financial sectors.

Because of his deep concern for financial fragility, Minsky paid attention to the relationship between stocks and flows as he argued that starting out with an appropriate balance sheet matrix insures that economists “analyze how financial commitments affect the economy” (Minsky 1986: 221), by taking into account all the interrelated cash flows of the various sectors. Thus, the stock-flow consistent approach, that tries to integrate the real and the monetary sides of the economy by paying careful attention to balance sheets and financial commitments is certainly in line with what Minsky had in mind, for late in his career he was arguing that “the structure of an economic model that is relevant for a capitalist economy needs to include the interrelated balance sheets and income statements of the units of the economy” (Minsky 1996: 77).

Various statements by Minsky shows how close he was to the post-Keynesian stock-flow consistent approach put forth by Godley along some of the lines suggested by Tobin. For Minsky (1975: 70), “one way every economic unit can be characterized is by its portfolio: the set of tangible and financial assets it owns and the financial liabilities on which it owes”. This is the equivalent of the balance sheet matrix described by Godley. Minsky (1975: 118) emphasizes that assets have counterpart liabilities, as he writes that “an ultimate reality in a capitalist economy is the set of interrelated balance sheets among the various units”. He then adds that “items in the balance sheet set up cash flows”. This point is made again ten years later: “To analyze how financial commitments affect the economy it is necessary to look at economic units in terms of

their cash flows. The cash-flow approach looks at all units – be they households, corporations, state, and municipal governments, or even national governments – as if they were banks” (Minsky 1986: 221). This ties in nicely with the transactions-flow matrix found in Godley.

Another important feature of the transactions-flow matrix and the SFC approach is that economists must be fully aware of the budget constraints faced by all agents. This is also picked up by Minsky (1975: 132) when he makes the following claim: “Inasmuch as the effective demand for current output by a sector is determined not only by the current income flows and current external finance but also by the sector’s cash-payment commitments due to past debt, the alternative interpretation can be summarized by a theory of the determination of the effective budget constraints. The economics of the determination of the budget constraints logically precedes and sets the stage for the economics of the selection of particular items of investment and consumption”.

Finally, Minsky was also clearly aware of Copeland’s quadruple entry principle, which is at the heart of the SFC approach, as the following quote demonstrates: “The structure of an economic model that is relevant for a capitalist economy needs to include the interrelated balance sheets and income statements of the units of the economy. The principle of double entry bookkeeping, where financial assets and liabilities on a balance sheet and where every entry on a balance sheet has a dual in another balance sheet, means that every transaction in assets requires four entries” (Minsky 1996: 77).

### ***Early heterodox models tracking the real and the financial sides***

Formalizing Minsky’s insights was the occasion to integrate the real and the monetary sides. The seminal effort in that direction was the paper by Lance Taylor and Stephen O’Donnel (1985), which was a variant of another paper of Taylor (1985), based on the Kaleckian model of growth and distribution. This Kaleckian model, which seems to have replaced the standard Cambridge growth model among those concerned with the real economy, was first developed by Rowthorn (1981) and Dutt (1984). The Kaleckian model is essentially made up of three equations (just like basic New Consensus model has three equations): a pricing function, a saving function and an investment function. Taylor and O’Donnel modelled investment as a function of the discrepancy between expected profit rate of firms and the interest rate, with this expected profit rate being the sum of the actual profit rate and some confidence indicator. This was an interesting

innovation, akin to introducing Keynes's marginal efficiency of capital – an expectational concept – into the Kaleckian model. The real innovation of the Taylor (1985) and Taylor and O'Donnel (1985) models, however, is the introduction of a portfolio choice. In the second of these two models, households have the choice between holding cash money, interest-paying bills, or stock market equities, and this choice is influenced by the values taken by the interest rate and the expected profit rate of firms (the fundamentals, rather than the rate of return on equities!). A third innovation of the Taylor and O'Donnel (1985) model is the introduction of cyclical dynamics by adding a differential equation, which says that the confidence indicator rises as long as the interest rate is below some normal interest rate.

Claudio Dos Santos (2005) has outlined some of the weaknesses of the earlier models based on Minsky's financial fragility hypothesis. Despite its originality, the Taylor and O'Donnel model has some drawbacks, which are perhaps more obvious today than they were then. First, the supply of money is not endogenous; it is given by some fixed-growth rule. As a consequence, the interest rate is endogenous, but this may be seen by some as an advantage. Secondly, the model is not quite stock-flow consistent. While the portfolio equations have all the Tobinesque requirements, the balance sheets are incomplete. For instance, the authors refer to a government debt, but this debt is entirely exogenous and remains unexplained, except to say that the debt to GDP ratio is assumed to remain constant, or that the amount of base money grows with the government deficit. Thirdly, as already pointed out, the price of equities is determined by fundamentals, rather than demand and supply on the stock market. Fourthly, the banking sector plays no explicit role, and is only added as an after-thought. Fifthly, while the model is essentially driven by the evolution of the expected profit rate, the leverage ratio of firms plays no role at all in the model.

Franke and Semmler (1991) construct a somewhat similar model. They also omit the effect of the rate of capacity utilization and assume that investment is a function of the discrepancy between the expected profit rate of firms and the interest rate, with this expected profit rate being the sum of the actual profit rate and some confidence indicator, "the state of confidence". They also consider that the state of confidence is determined by a differential equation, rising as long as the entrepreneur's profit rate (the profit rate net of interest payments) is above the interest rate. Their innovation is to add a second term in the differential equation, arguing that the state of confidence rises as long as the leverage ratio of firms is lower

than some normal rate. As in Taylor and O'Donnel, households hold interest-free money, interest-bearing deposits and stock market shares, with a portfolio choice that depends on rates of return.

The Franke and Semmler model has drawbacks that are similar to those of its predecessor. First, the stock market value of firms is determined by fundamentals, and not the confrontation of the demand for and supply of equities. Second, although there is some endogeneity in the money supply, this is a supply-led sort of endogeneity, since the authors assume that bank reserves are being provided as a fixed ratio to the government deficit, an assumption similar to that of Taylor (1985, p. 392) and that they attribute, unsurprisingly, to Tobin (1982). Third, stock-flow consistency, or its achievement, is in doubt. Somewhat mysteriously, interest-free deposits turn out to be exactly equal to bank reserves, while bank loans turn out to be exactly equal to interest-bearing deposits. However, it should be noted that their extended model gets the accounting of saving right, in contrast to several articles before and after theirs. Their main contribution, relative to Taylor and O'Donnel, is that Franke and Semmler track the leverage ratio explicitly in their simulations.

Strangely enough the first successful effort at putting together the financial and the real sectors in a post-Keynesian model of growth has been essentially forgotten. This synthesis model is based on an extension of Kaldor's neo-Pasinetti model. As mentioned earlier, it was pointed out by Davidson (1968) that Kaldor (1966) failed to introduce money in his neo-Pasinetti model, thus assuming that all savings were done in the form of equities. Peter Skott (1981) very early on proposed a modified neo-Pasinetti model that would remedy to this. He introduces a budget constraint on firms, whereby firms can finance investment either by retained earnings, stock issues, or new loans. Households's consumption depends on their wealth, and they make a portfolio choice by deciding to hold fixed proportions of their wealth in money and equities. His initial model is not much detailed, as it serves mainly to justify the Kaldorian saving function, but it is definitely stock-flow consistent.

The model was further developed and modified in an article (Skott 1988) and a book (1989) that appeared nearly ten years later. However, the model did not seem to attract much interest, and still does not, despite paying close attention to standard post-Keynesian concerns with both finance and the real sector. In contrast to the models of Franke-Semmler and Taylor-O'Donnel, the money supply is endogenous in the main variant of Skott's model, and the

interest rate on bank deposits is exogenous, as most post-Keynesians would argue. The price of equities depends on demand and supply, with the former itself depending on the level of net profits of firms.

Two features of the model, besides its novelty with respect to portfolio choice theory, may have reduced its popularity. First, in the book at least, there is a complicated story about Harrodian instability in investment, tamed down by a Goodwin-like Marxist reserve army mechanism. In other words, Skott (1989) assumes that the model is unstable in the medium run, but that, when the economy keeps booming, it is eventually slowed down by the lack of labour, which will reduce the rate of growth of production. The mechanism, in my view, is not so easy to fathom, and is certainly difficult to present in a pedagogical manner, in contrast to the standard Kaleckian model. The second disturbing feature of the model is its short-run adjustment mechanism. Skott (1988, 1989) assumes that output is given in what he calls the ultra-short period and that demand adjusts to supply through stabilizing changes in prices. Only at a later stage does the rate of utilisation change. Although many post-Keynesians have argued that this was precisely what Keynes had in mind when he wrote the *General Theory*, it is somewhat difficult to swallow as a description of a modern economy with sticky prices, as several studies commissioned by central banks have shown. Finally, as an additional explanation regarding their unfortunate lack of impact, the Skott (1988, 1989) models, in contrast to the Franke and Semmler model, do not explicitly consider leverage ratios, and so could not be tied to the burgeoning literature on Minsky debt models. However, because of their common pedigree based on the neo-Pasinetti model, there is a substantial degree of similarity between the Skott models of the 1980s and the Lavoie-Godley (2001-02) model, which was to link Minskyan concerns and real issues a dozen years later.

A slightly simplified Lavoie and Godley (2001-02) model has been presented in analytical form by Lance Taylor (2004: 272-8 ). There Taylor shows that two stable cases are possible, as emphasized in the previous sections. The economy can behave along Minskyan lines, as higher economic activity leads to higher debt ratios for firms; or the economy can behave as described by Steindl, with higher economic activity being possibly associated with higher debt ratios in the short run but lower debt ratios in the long run.

Taylor (2004, p. 303) further introduces the possibility of a cycle by reintroducing the “state of confidence” that we already mentioned when discussing the Taylor and O’Donnel

brand of Minsky models. Taylor gets cyclical dynamics of the Minsky type by running the model in a Minsky mode and by adding a differential equation that says that the confidence indicator, here reflected in the constant of the investment function, keeps rising as long as the leverage ratio of firms is not too high. This rising parameter could reflect the animal spirits of both entrepreneurs and bankers. Taylor (2012) has more recently devised a more complex model, which incorporates in addition some of the Goodwin-style cycles that were analysed by Skott (1989). It pertains to give a formalized account of the process that led to the global financial crisis.

### ***Other traditions close to the SFC approach***

As was pointed out in the introduction, the SFC approach is not the only tradition to handle portfolio choices and credit and debt relations. Besides the well-known group of scholars working with James Tobin at Yale University in the 1960s up to the early 1980s, and which is sometimes called the pitfalls approach, one can identify at least three approaches that tried to provide a coherent approach in integrating the real and financial relationships at various sectoral levels. A first tradition is directly related to the flow-of-funds approach. The other two traditions are the scholars associated with the work of Peter Flaschel and those associated with a variety of computable general equilibrium models.

Various important surveys of flow-of-funds analysis and a stock-flow consistent approach to macroeconomics can be found, among others in Bain (1973), Davis (1987), Patterson and Stephenson (1988), and Dawson (1996). Such an integration of financial transactions with real transactions, within an appropriate set of sectors, was also advocated by Gurley and Shaw (1960: ch. 2) in their well-known book, as it was by a number of other authors, inspired by the work of Copeland. , argued very early on that Minsky's views on the fragility of the financial system could be examined with the help of a model relying on financial flows and national balance sheets. Eichner explicitly ties this approach to the flow-of-funds approach of Jacob Cohen (1986) and to the work of Godley and Cripps (1983). The post-Keynesian theory and the flow-of-funds approach also intersect in a paper by Alan Roe (1973), who also worked with Richard Stone in the early 1970s to establish flow-of-funds measures of financial interdependence, in a way which closely resembles the coefficients of Leontief's input-output analysis, as recently advocated by Lawrence Klein (2003). Roe (1973), whose article was appropriately titled 'the case for flow of funds and national balance sheet accounts' , believes



that individuals and institutions generally follow stock-flow norms related to their assets, liabilities, income or sales, but that during expansion, because of improved expectations, they may agree to let standards deteriorate. Roe is particularly concerned with brisk attempts at changing the composition of portfolios, when cash flows or expectations return back to normal values. This sounds very much like Minskyan economics, and indeed it is, as Roe explicitly refers to the work of Minsky on financial fragility, showing that a stock-flow consistent framework is certainly an ideal method to analyse the merits and the possible consequences of Minsky's financial fragility hypothesis.

Over the years, another group of researchers, around Carl Chiarella, Peter Flaschel and Willi Semmler, but also involving other co-authors such as Asada, Charpe, Franke, Mouakil and Proaño, have developed a series of stock-flow coherent models based on accounting matrices and budget constraints, using multi-dimensional differential equations, although these models more often than not entertain neoclassical assumptions such as a natural rate of unemployment or an exogenous supply of money. Their models are often referred to as KMG models as they reflect dynamics linked to Keynes, Meltzer and Goodwin, but several versions also entertain Tobinesque features. Recent works that show a deep concern for an integration of the financial side include Charpe et al. (2011) and Asada et al. (2011), with the latter dealing explicitly with the links between this approach and the standard post-Keynesian SFC approach.

Finally, as pointed out by Tarik Mouakil (in chapter 3 of Asada et al. (2011)), some brands of computable general equilibrium models, also attempted to integrate the real and the financial sides: these are the *financial computable general equilibrium* models, as could first be found in Bourguignon et al. (1991). Furthermore, there are some financial computable general equilibrium models associated with the Structuralist school, led by Lance Taylor (1990), which, as one would expect, bear a close resemblance to the post-Keynesian SFC models discussed earlier.

### **Taking securitization and other financial innovations into consideration**

In his review of Godley and Lavoie (2007), Lance Taylor (2008: 643-4) wonders whether the stock-flow consistent approach will ever be able to handle the complexity and the innovations that now characterize the financial system and the recent subprime financial crisis. Godley and Lavoie (2007: ch. 11) did include the possibility of loan default in their model, showing that an

increase in loan defaults would slow down the economy, because of its consequences for the net worth of banks, but default was limited to loans taken by firms, with no default on household debt – a not very timely assumption. The Godley and Lavoie (2007) models, along with other stock-flow consistent models at the time, also assumed a single financial sector. If one wishes to model what happened when financial markets seized, starting in 2007 and 2008, then one needs at least two financial sectors, perhaps made up of banks and non-banks, or commercial banks and investment banks, with some refusing to lend to the others when need arises. But leaving away this peculiar problem, can one build an appropriate stock-flow consistent matrix that will take into account the modern features of the financial system as described by Adrian and Shin (2009), such as securitization, asset-backed commercial paper or mortgage-backed securities, collateralized debt obligations, special purpose vehicles or special investment entities, repos, and other financial innovations?

Eatwell, Mouakil and Taylor (2008) have taken up the challenge. They start by adding a housing market. The demand for housing depends negatively on the price of houses, but positively on the rate of change of housing prices (the capital gains). It also depends negatively on the mortgage rate, the leverage ratio of households (their debt to net worth ratio), and the leverage ratio of banks, with the last two elements illustrating credit rationing due to borrower's and lender's risk respectively. In their model, as in that of Zezza (2008), the supply of new residential units speeds up when house prices rise relative to cost, and these housing prices in turn fall when the inventory of unsold houses rises.

Eatwell et al. (2008), as shown in Table 1, split the financial sector into two sectors, the banks as such and their special purpose vehicles (SPV). The SPVs are assumed to grant and acquire residential mortgages, transforming them into mortgage-backed securities (MBS) that have a variable price that depends on the mortgage interest payments that flow back to the SPVs and hence ultimately to the banks. Repos are introduced into the balance-sheet matrix by assuming that the central bank provides whatever reserves banks are required to hold. In fact, these repos are no different from central bank advances in other models; this justifies the absence of a government sector in the model, which would be needed if repos were based on sale and purchase agreements of Treasury bills, as they are in the real world, at least in the U.S. and in Canada.

The dynamics of the model are tightly linked to the evolution of the leverage ratio of

banks. This leverage ratio is defined as the amount of repos that banks are taking, relative to their net worth. It is this last term that generates the dynamics, since repos, as said previously, only change when reserves need to rise, because of the compulsory reserve ratio on deposits. Net worth can change substantially because the price of mortgage-backed securities falls when the interest payments made on mortgages fall. This model can generate Minskyan cycles that look like those already described by Taylor (2004).

One may quarrel with the chosen financial structure and propose something different. For instance, one could split the banking system into two components. The first component – commercial banks – grants mortgages and issues mortgage-backed securities, and has direct access to central bank advances. The second component – investment banks or the shadow banking sector – buys these securities. The investment banks finance these purchases by borrowing from the commercial banks, and by collecting long-term deposits from households. The leverage ratio of the investment banks may then rise either because its banks need to borrow more funds, as depositors lose trust in the investment banks, or because the price of the securities is falling. This modified modern balance sheet is shown in Table 2.

## **Conclusion**

With the advent of the SFC approach, I believe that it is possible to tackle the Keynesian Wall Street view so well described by Minsky within a fully coherent framework, which can be modified at will to entertain existing institutions or changing historical circumstances. One should remember however that in the end the realism of the behavioural equations, however proper is the structure of the model, still plays a key role. The SFC approach, despite its complexities, is far superior to the New consensus approach which starts from idealistic assumptions that have no relationship whatsoever with reality. Whatever extensions the DSGE model can be provided with, the problem is that the model starts from mistaken hypotheses which are purely ad hoc, some of which originate from a model (the Ramsey model) which was designed to describe a planned economy and not a capitalist economy. As has been pointed out by a large number of observers, on top of its unrealistic assumptions, the model fails to describe the peculiar behaviour of firms at times where their balance sheets are depressed (Koo 2009). A number of researchers are on the lookout for alternatives, including some authors who are working in central banks, as can be ascertained by reading the papers of Bartwell and Burrows

(2011) and of Bê and Le Breton (2011). Both papers examine the information that can be gathered from a more disaggregated approach based on flow-of-funds analysis.

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Table 1: The balance sheet matrix of the Eatwell, Mouakil and Taylor (2008) model

	Households	Firms	Banks	Special Purpose Vehicles	Central Bank	$\Sigma$
Inventories		$+ IN$				$+ IN$
Homes	$+ p_h \cdot h_h$					$+ K_h$
Cash			$+ HPM_b$		$- HPM$	0
Repos			$- R$		$+ R$	0
Deposits	$+ D_h$		$- D$			0
Loans		$- L_f$	$+ L$			0
Mortgages	$- M_h$			$+ M$		0
Mortgage- based securities			$+ p_s \cdot S$	$- p_s \cdot S$		0
Net worth	$- NW_h$	$- NW_f$	$- NW_b$	$- NW_g$	0	$- K_h - IN$
$\Sigma$	0	0	0	0	0	0

Table 2: A revised balance sheet matrix with mortgage-based securities

	Households	Firms	Commercial banks	Investment banks	Central Bank	$\Sigma$
Inventories		$+ IN$				$+ IN$
Homes	$+ p_h \cdot h_h$					$+ K_h$
Cash			$+ HPM_b$		$- HPM$	0
Advances			$- A$		$+ A$	0
Deposits	$+ D_h$		$- D$			0
Term deposits	$+ TD_h$			$- TD$		
Loans		$- L_f$	$+ L$			0
Repos			$+ R$	$- R$		
Mortgages	$- M_h$		$+ M$			0
Mortgage- based securities			$- p_s \cdot S$	$+ p_s \cdot S$		0
Net worth	$- NW_h$	$- NW_f$	$- NW_b$	$- NW_g$	0	$- K_h - IN$
$\Sigma$	0	0	0	0	0	0

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