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The Role of Commercial Banks and Financial Intermediaries in the New Consensus Macroeconomics (NCM): A Preliminary and Critical Appraisal of Old and New Models

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1 Introduction[1]

The early 1990s were marked by a convergence of views in mainstream macroeconomics. That convergence gave rise to the so-called New Consensus in Macroeconomics (NCM hereafter), which conquered the academic word, central banks and other major policy-making institutions around the world (Arestis 2007; Tovar 2009; Woodford 2009). The NCM was regarded as a 'new neoclassical synthesis' incorporating important elements of both New Keynesian economics and Real Business Cycle economics (Goodfriend and King 1997; Goodfriend 2004; Dixon 2008;

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Fontana 2009b; McCombie and Pike 2013). In 2000 John Taylor, a leading contributor to the development of this new macroeconomic paradigm, listed the most original features of the NCM:

> First, the long-run real GDP trend, or potential GDP, can be understood using the growth model that was first developed by Robert Solow and that has now been extended to make 'technology' explicitly endogenous. Second, there is no long run trade-off between inflation and unemployment, so that monetary policy affects inflation, but is otherwise neutral with respect to real variables in the long run. Third, there is a short run trade-off between inflation and unemployment with significant implications for economic fluctuations around the trend of potential GDP; the trade-off is due largely to temporarily sticky prices and wages. Fourth, expectations of inflation and of future policy decisions are endogenous and quantitatively significant. Fifth, monetary policy decisions are best thought of as rules, or reaction functions, in which the short-term nominal interest rate (the instrument of policy) is adjusted in reaction to economic events. (Taylor 2000, p. 90)

Much has happened between 2000 and today, including a worldwide dramatic financial and banking crisis, a consequent devastating recession and a prolonged stagnation period, which continues today. There is now a unanimous consensus in the economic profession that commercial banks (banks for short) and financial intermediaries are at the heart of these remarkable economic events. Therefore, it may seem odd that Taylor (2000) does not mention banks and financial intermediaries among the most original features of the NCM. It was not a mistake or oversight of the paper. Banks and financial institutions were rarely mentioned, let alone modelled, in the original NCM model (e.g. Woodford 2003; see, also, for a critical analysis, Goodhart 2010). This is really extraordinary vis-à-vis the fact that the NCM model was enthusiastically adopted by most central banks and treasuries around the world (see, e.g. Adolfson et al. 2007; Smets and Wouters 2003, 2007; Tovar 2009). Yet, some interesting attempts to account for banks and financial institutions in mainstream macroeconomic modelling were made in the early 1980s. The so-called financial accelerator mechanism (FAM hereafter) literature pioneered by Ben Bernanke (Bernanke 1981, 1983; Bernanke and Gertler

1989) analysed the role of banking and financial frictions as triggers or amplifiers of the business cycle. The FAM literature has been rediscovered after the 2007–2008 financial crisis. It has been used to amend the NCM model to account for the nature and role of banks and financial intermediaries in modern economies (see, among others, Christiano et al. 2013; Del Negro et al. 2014).

The purpose of this chapter is to offer a preliminary and critical review of the progress made in mainstream macroeconomics in the last two to three decades. Did really the NCM model ignore banks and financial intermediaries? Are the core theoretical propositions of the NCM unable to explain some important features of real-world economies, and especially the remarkable economic events of the last decade? And how the insights and results of the FAM literature have been encompassed into the NCM model? What are the prospects, if any, for the new NCM cum FAM model to explain the nature and role of banks and financial intermediaries in modern economies? These are some of the main questions that this chapter tries to answer.

The chapter is organised as follows. Section 2 presents the three-equation model describing the macroeconomic core of the NCM in a closed economy, the so-called benchmark NCM model. It highlights the nature and role of the 'rational expectations hypothesis' (REH hereafter), and the concept of the 'natural equilibrium' in the benchmark NCM model. It also proposes an amended version of the latter, which takes into account criticisms raised against the use of the REH and natural equilibrium in the NCM. The so-called augmented NCM model allows for the possibility of interdependence between aggregate demand and aggregate supply, a hallmark of real-word economies captured by demand-led Post Keynesian economic models (Setterfield 2002, 2010; Fontana 2009a, 2010; Palacio-Vera 2009), via some hysteresis effects. Section 3 reviews the core features and main results of the FAM literature and presents a simple set of equations describing the 'benchmark FAM model'. It also draws attention to the nature and role of banks and financial intermediaries in the latter model. Furthermore, it proposes an augmented NCM cum FAM model ('augmented FAM model', for short), which allows for hysteresis effects. A table summarises all models discussed in the chapter, namely, the benchmark NCM model, the augmented NCM model, the benchmark

FAM model, and the augmented FAM model. Section 4 assesses the current state of mainstream macroeconomics. It reviews many attempts that have been made to amend the NCM model in order to fix its failure to explain the remarkable economic events of the last decade. It highlights how the absence of banks and financial intermediaries, and systematic errors in inflation forecasting, has been accounted for in the new augmented FAM model. It also discusses the inability of the latter to allow for the possibility that financial instability is an endogenous by-product of the normal functioning of modern economies. Furthermore, it considers the monetary policy implications of the augmented FAM model, including the possibility of replacing the dominant price stability goal with an alternative financial stability goal, which aims to stabilise the market value of private and public financial assets. Finally, Sect. 5 offers some final remarks.

2 A Critical Analysis of the Benchmark NCM Model

The macroeconomic core of the NCM can be described through three reduced-form (or aggregate) equations, namely, an aggregate demand equation, an inflation equation and an interest rate rule. Each macroeconomic equation is in turn strictly microeconomics-founded, that is, every relationship among aggregate magnitudes is derived from the constrained inter-temporal optimisation of an individual utility function. This function underpins the behaviour of a single, sovereign, completely rational representative agent with perfect foresight, who maximises its utility over an infinite horizon by combining labour supply/leisure time and consumption/saving in each period. McCombie and Pike (2013) label these features the 'paradigmatic heuristics' or 'pseudo-assumptions' of the NCM model (see also McCombie and Negru 2014, who explore the general question of paradigm-dependent economic theories).

In simple algebraic terms, the reduced-form benchmark model can be represented as follows (Clarida et al. 1999; De Grauwe 2010; see, for a

critical assessment of it, Arestis 2007, 2009; Arestis and Sawyer 2004, 2006, 2008):

$$Y_t^g = a_0 + a_1 Y_{t-1}^g + a_2 E\left(Y_{t+1}^g\right) - a_3\left[r_t - E\left(\pi_{t+1}\right)\right] + \varepsilon_1 \tag{4.1}$$

$$\pi_t = b_1 Y_t^g + b_2 \pi_{t-1} + b_3 E\left(\pi_{t+1}\right) + \varepsilon_2 \tag{4.2}$$

$$r_t = \left(1 - c_3\right)\left[RR_t^* + E\left(\pi_{t+1}\right) + c_1 Y_{t-1}^g + c_2\left(\pi_{t-1} - \pi^T\right)\right] + c_3 r_{t-1} + \varepsilon_3 \tag{4.3}$$

where Y_t^g is the current output gap, π_t is the current inflation rate, π^T is the target inflation rate, r_t is the current nominal interest rate, RR_t^* is the natural or optimal real interest rate, $E(\cdot)$ defines future expected values, a_0, a_1, a_2, a_3, b_1, c_1, $c_2 > 0$, $(b_2 + b_3) = 1$ and $0 < c_3 < 1$.[2]

Equation (4.1) corresponds to the old *IS* curve and is grounded on the separation between aggregate demand and aggregate supply, with the (growth of) natural output being supply-determined and independent of the level, and rate of change, of aggregate demand (Fontana 2010). It shows that the output gap—that is, the difference between the (logarithm of) actual output and its 'natural' or potential or long-run level—depends negatively on the expected real interest rate. The output gap depends also positively on the past and expected future output gaps. Equation (4.2) corresponds to the 'accelerationist' (or expectations-augmented, New Keynesian) Phillips curve, acting as the aggregate supply function. It shows that the inflation rate depends positively on the output gap (and also on the past inflation and the expected future inflation), signalling demand pressures. For this reason, it is sometimes called the 'inflation-adjustment (IA) line' (e.g. Romer 2000; Taylor 2000). Equation (4.2) can be considered as the equivalent of the NAIRU principle (e.g. Lavoie 2006, p. 169): the inflation rate accelerates whenever the actual (growth rate of) demand and output exceeds the natural (rate of growth of) output. Equation (4.3) is the monetary policy rule or the reaction function of the central bank. It incorporates the well-known 'Taylor rule' (e.g. Taylor 1993, 1999), according to which changes in the nominal interest rate set by the central bank are positive function of the 'natural' real interest rate, the expected future inflation rate, the past

output gap and the past inflation gap (i.e. the deviation of the actual inflation in previous period from its target value). In formal terms, it is usually derived from the minimisation of the 'loss function' of the central bank, where the losses for each period are a weighted average in quadratic terms of the deviation of inflation from its target rate, and of current output relative to its potential level (Woodford 2003, p. 381). Since prices are supposed to be sticky in the short run, and changes in expected inflation are taken into account, when steering the nominal rate, the central bank is effectively setting the real interest rate (Romer 2000, p. 155).

Two points are worthy to mention here. First, the interest rate policy rule replaces the traditional *LM* curve in the *IS-LM-AS* model, along with its assumption that the central bank targets the money supply. In the NCM the central bank is able to influence the short-run real interest rate, and money is a residual (Meyer 2001). Second, the short-run stickiness of prices also explains the limited effectiveness of monetary policy. In the long run, prices are flexible, and hence the central bank is unable to influence the real interest rate. Therefore, monetary policy affects real variables and inflation in the short run, but is neutral in the long run. Finally, notice that combining Eq. (4.1) with Eq. (4.3) gives a negatively sloped relationship between inflation and output gap, which represents the aggregate demand function of the model (see, among others, Romer 2000; Taylor 2000; Fontana and Setterfield 2009).

The closure of the model (4.1)–(4.3) requires the specification of the nature of expectations, that is, of the form of the set of functions $E(\cdot)$. In this regard, NCM authors admit that expected values of inflation and output may deviate from actual values in the short run. This discrepancy, in turn, may temporarily push the economic system out of its natural equilibrium state (or natural growth path). Consequently, there is some room for public intervention in the short run, though mainly through the steering of the target interest rate, in order to anchor inflation expectations. By contrast, forecasts could not be systematically wrong over time. The rational expectations hypothesis, that is, the assumption that agents know the right economic model and can use all information efficiently, remains the first theoretical pillar of the NCM. Exogenous non-systematic shocks may affect the equilibrium in the long run: in Eqs. (4.1), (4.2), and (4.3), this random component is 'captured' by ε_i (with

i = 1, 2, 3). But, apart from this, every systematic economic policy is doomed to leave real magnitudes, notably output and employment rate, unchanged. For instance, the only long-run effect of a long-lasting expansive fiscal stimulus would be an increase in inflation and (both nominal and real) interest rates (Fontana 2009b, c). This result is the NCM equivalent of the well-known neoclassical principle of the long-run neutrality of demand-led macroeconomic policies (Fontana 2011). In addition to rational expectations, the other theoretical pillar of the NCM is the notion of a natural (or long-run or trend) equilibrium, namely, the state towards which a fully competitive economy would tend in the long run, when the inflation expectations of agents are utterly fulfilled. In the natural equilibrium state, output and employment levels are determined by three factors: (i) the quantity of labour-force and capital (i.e. the stock of resources), (ii) the system of preferences of individual agents (i.e. the utility function of consumers or households), and (iii) the available technology (i.e. the production function of firms).

The mechanics of the NCM model follows from the theoretical pillars discussed above. A departure of output from its natural level (or natural growth rate) causes inflation to change, which in turn leads the central bank to move the short-run nominal interest rate, and given the stickiness of price, the short-run real interest rate, such that to bring current output back to its normal level.[3] This is the so-called nominal-anchor function of monetary policy (Allsopp and Vines 2000, p. 11). The institutional structure of the economy, including prevailing conditions on the labour market, is sometimes considered, but the natural or potential level of output is always independent of aggregate demand changes, including fiscal and monetary policy led changes.

However, the two theoretical pillars of the NCM modern, namely, the rational expectations hypothesis and the notion of a natural (or long-run or trend) equilibrium, are problematic (Hargreaves-Heap 1980). Real-world economies are essentially non-ergodic and path-dependent systems (Davidson 1978; Hanngsen 2006). Economic variables do not progress steadily towards an exogenously given unique and stable equilibrium. They can reach several (suboptimal) equilibria, and each of the equilibria achieved depends on past values. On the whole, it is not clear how the natural equilibrium would be reached in the long run. The achievement

of such an optimal position is simply postulated. In order to clarify this point, a simplified version of the previous three-equation NCM model is presented below:

$$Y_t = \alpha_0 - \alpha_1 \left(r_{t-1} - \pi_{t-1} \right) + \varepsilon_1 \tag{4.4}$$

$$\pi_t = \pi_{t-1} + \beta_1 \left(Y_{t-1} - Y^n_{[t-1]} \right) + \varepsilon_2 \tag{4.5}$$

$$r_t = \pi_t + RR^*_t + \gamma_1 \left(\pi_{t-1} - \pi^T \right) + \gamma_2 \left[Y_t - E\left(Y^n_{[t+1]} \right) \right] + \varepsilon_3 \tag{4.6}$$

where α_0, α_1, β_1, γ_1, $\gamma_2 > 0$. The main difference with the previous model is that Eq. (4.4) now determines the current value (or growth rate) of output, Y_t, instead of its gap with the natural level (or growth rate), $Y^n_{[t]}$ (where square brackets show that, in principle, natural output is independent of current conditions). In addition, for the sake of simplicity, Eqs. (4.4) and (4.5) are assumed not to be forward-looking. The variable RR^* in Eq. (4.6) is the real rate of interest assuring the ex ante matching of savings and investment at the natural level of output. It corresponds to the Wicksellian natural rate of interest (Fontana 2007) and can be derived by substituting Eq. (4.4) in Eq. (4.6). Then, by imposing that the actual inflation rate equals the target rate, and that the output gap is nil, it follows:

$$RR^*_t = \frac{\left(\alpha_0 - Y^n_t \right)}{\alpha_1} \tag{4.7}$$

If the central bank sets the value of RR^*_t in accordance with Eq. (4.7), then the economy reaches its natural equilibrium, and the system (4.4)-(4.5)-(4.6)-(4.7) behaves like the system (4.1)-(4.2)-(4.3). Yet, the assumption that the level (or growth rate) of potential output is an exogenous variable has been criticised by several authors. Labour productivity (e.g. the impact of learning by doing of workers, technological innovations and investment in fixed capital) and the availability of labour force (e.g. migration flows) are strictly linked to the current level of demand

and output (Setterfield 2002; León-Ledesma and Thirlwall 2002; Lavoie 2006; Fontana and Palacio Vera 2007; McCombie and Pike 2013; Sawyer 2013). All these factors affect the future potential output of the economy. Following Lavoie (2006, p. 182), the reduced-form NCM model (4.4)-(4.5)-(4.6)-(4.7) should, therefore, be amended by introducing an additional equation:

$$Y_t^n = Y_{t-1}^n + \phi\left(Y_{t-1} - Y_{t-1}^n\right) + \varepsilon_4 \tag{4.8}$$

where $0 < \phi \leq 1$.

Equation (4.8) means that the short-run level of output affects the long-run potential or natural level of output (Lavoie 2006, p. 181; see also Flaschel 2000; Fontana 2010). In other words, Eq. (4.8) allows for hysteresis effects to be introduced into the benchmark NCM model, in this way allowing for the interdependence between the aggregate demand for and the aggregate supply of goods and services. For this reason, the reduced-form NCM model (4.4)-(4.5)-(4.6)-(4.7)-(4.8) is labelled the augmented NCM model in the rest of this chapter.

3 Adding Banks and Financial Intermediaries to the NCM Model

In the aftermath of the 2007–2008 financial crisis, several scholars argued that the NCM model is not fit for modern economies. It does not capture fundamental aspects of the working of financially sophisticated capitalist economies, including the possibility of financial turmoil, financial and banking crises and related prolonged recessions (e.g. Foley and Farmer 2009; Krugman 2009; Buiter 2009; Spaventa 2009). Lucas (2009) seems to agree with this view. He maintains that the 2007–2008 financial crisis was not predicted because such events cannot be predicted by NCM model (and related DSGE models alike): simulations based on the NCM model are not an 'assurance that no crisis would occur, but […] a forecast of what could be expected conditional on a crisis not occurring' (Lucas 2009). In this regard, one of the main theoretical issues, with significant

practical consequences (see, e.g. Allington et al. 2012), is that the benchmark NCM model relies on both the 'efficient market hypothesis' (EMH hereafter) and the 'Modigliani-Miller theorem' (MMT hereafter), in the medium to long run at least (Veronese Passarella 2014). According to the EMH, prices of traded assets always reflect all available information, while the MMT maintains that, under a number of restrictive assumptions, the value of a firm is unaffected by how it is financed. As a result, given enough long time, money and finance would not affect output and employment, but only inflation and nominal interest rates. This again is not surprising: if an autonomous investment function of firms is ruled out of the model, then conditions of financing of investment (and current production) cannot, by definition, influence real variables.

The explicit analysis of the possible interaction between the real economy and the prevailing conditions in the banking and financial sectors is the core feature of the 'financial accelerator mechanism' (FAM) literature, originally developed by Bernanke, Gertler and Gilchrist during the early 1980s (e.g. Bernanke 1981, 1983; Bernanke and Gertler 1989; see also Bernanke et al. 1996, 1999). The FAM literature recognises that firms need external finance in order to realise their investment projects. Furthermore, it brings to light the informational asymmetries between lenders (i.e. banks and financial intermediaries) and borrowers (i.e. firms). On this basis, then it analyses the process by which negative shocks to the real sector of an economy are amplified by the workings of the banking and financial sectors.

The FAM literature introduces several innovative aspects into the mainstream macroeconomic debate. First, the informational asymmetries between lenders and borrowers make both the EMH and the MMT so cherished by NCM authors inapplicable. Second, these informational asymmetries mean that lenders have little information about the reliability of borrowers. Lenders face conventional agency costs, including monitoring costs and potential bankruptcy risks, which in turn translate into a premium for firms of the cost of external finance vis-à-vis internal finance. Third, in the face of informational asymmetries, banks and financial intermediaries assess the ability of repaying loans by using the market value of the net worth of firms, that is, the collateralised assets of firms.

Two important implications follow from these theoretical innovations. First, the net worth, and hence the ability to borrow of firms moves procyclically (e.g. Bernanke and Gertler 1989). An increase in asset prices and cash flows raises the net worth of firms, and reduces the premium of external finance on internal finance. This in turn boosts investment, aggregate demand and economic activity, which have then positive feedbacks on the net worth of firms and so on. Similarly, a fall in assets prices triggers a vicious self-reinforcing cycle. A reduction in the net worth of firms leads banks and financial intermediaries to tighten financing conditions. This reduces the ability of firms to borrow and finance investment. Economic activity falls, which then further reduces assets prices and the net worth of firms, and so on. This is the core of the FAM. An initial shock to the economy, however small it is, is likely to be amplified by changes in the balance sheets of firms and, more generally, by conditions in the banking and financial sectors. Second, the dynamics of the FAM is intrinsically nonlinear, since it depends on both the current level of internal finance of firms, and the general conditions of the economy. For instance, the more an economy is in a deep recession, the less likely would be the availability of external and internal finance, and hence the stronger will be the autoregressive movement in demand (e.g. Bernanke and Gertler 1989, pp. 14–15; Bernanke et al. 1996, pp. 3–4). This, in turn, will produce dramatic effects for firms. They will be accumulating excess inventories, while reducing the employment level and/or real wages bargained with workers (e.g. Greenwald and Stiglitz 1993, p. 109).

It is worthy to note that references to an exogenously given natural level or rate of growth of output are rare in the FAM literature. On the one hand, it is clearly stated that the methodological starting point of the FAM model is the benchmark NCM model. On the other hand, FAM scholars ignore long-run financial relationships in their works (e.g. Bernanke and Gertler 1989, p. 15). In other words, price flexibility is no longer regarded as the natural or long-run condition of the system, but just as the limiting case—as Bernanke et al. (1999, p. 6) call it. The long run is regarded as an ideal path, rather than as the historical tendency of capitalist economies. But then, if the relationship between price stickiness and price flexibility is reversed, with the latter being the exception rather than the norm, short-run sub-optimal equilibria become the rule,

and so it does public intervention. This controversial interpretation of the FAM literature is supported by the repeated reference to the debt-deflation theory of Fisher (1933), and also by mention of the work of Minsky and Kalecki (e.g. Bernanke et al. 1999; Bernanke 1983, which quotes Minsky 1977). In fact, the discussion by FAM scholars of agency costs resonate the Minskian 'objectivation' of the lender risk into interest rates, fees and commissions that firms have to pay in order to access external financing (e.g. Minsky 1986). In this regard, another interesting feature of FAM models is the assumed heterogeneity of agents. As Bernanke et al. (1996) explain these models 'step outside the convenient representative-agent paradigm … [since] the distribution of wealth affects the dynamics of the economy in a nontrivial way' (pp. 3–4).

According to FAM scholars, during economic recessions the reallocation of bank lending from firms whose net worth is decreasing to more solvent firms triggers a 'flight-to-quality' (or 'flight-to-safety') process. This, in turn, increases the financial fragility of a country. Against this background, it is argued that large corporations are likely to be less hit by the greater cost (or difficulty) in obtaining credit in downturns compared to small firms. FAM scholars then conclude that 'recessions that follow a tightening of monetary policy are perhaps most likely to involve a flight to quality, because of the adverse effect of increased interest rates on balance sheets and because of monetary tightening may reduce flows of credit through the banking system' (Bernanke et al. 1996, p. 6; see also Bernanke and Blinder 1988). To put it differently, FAM scholars seem to argue that monetary policy affects output and other real magnitudes not so much because prices are sticky, as it is assumed in the benchmark NCM model, but rather because it affects the price and access to external finance, which has a crucial impact on the investment and production plans of firms.

As far as the formal modelling is concerned, the benchmark FAM model is usually obtained through a process of microeconomic foundation of the macroeconomic dynamics. This is done by considering a production (or investment) technology that involves asymmetric information between firms, who have direct access to the technology, and banks and financial intermediaries, who have not. In addition, it is assumed that banks and financial intermediaries incur agency costs in order to observe

the investment returns of firms. These costs are in turn assumed to be a decreasing function of the soundness of the balance-sheet of borrowers, that is, the net wealth of firms. Finally, since the latter is likely to move pro-cyclically, agency costs will behave counter-cyclically, therefore improving lending conditions in booms and deteriorating them in recessions. In this way, the accelerator (macroeconomic) effect of income on investment is brought back to a simple (microeconomic) principal-agent problem (Bernanke et al. 1996, p. 27).

The simplest way to include the FAM mechanism within the benchmark NCM model discussed in the previous section is to replace Eq. (4.1) with the following:

$$Y_t^g = a_0 + a_1 Y_{t-1}^g + a_2 E\left(Y_{t+1}^g\right) - a_3\left[r_t - E\left(\pi_{t+1}\right)\right] + a_4 H_{t-1} + \varepsilon_1 \qquad (4.9)$$

with:

$$H_t = H_{t-1} + \omega Y_t^g + \varepsilon_4 \qquad (4.10)$$

where H_t is the net worth of investing firms, $0 < \omega < 1$ is the share of aggregate (retained) profits and capital gains in total output (gap) and $\alpha_4 > 0$ is the sensitivity of total output gap to changes in the creditworthiness of firms, through changes in the finance available for investment. The basic idea underpinning Eqs. (4.9) and (4.10) is that investment, and hence current output, is crucially affected by the financial soundness of the consolidated balance-sheet of firms. More precisely, the lower (higher) the amount of internal funds accumulated by firms over the previous periods, the lower (higher) will be current investment and output. It is worthy to note that changes in internal funds can affect production decisions both through the self-financing of investment (direct channel) and through the degree of creditworthiness of firms used by banks and financial intermediaries (indirect channel). Whatever the prevalent channel, the result is a strengthening and extension of the short-run effects of aggregate demand on output and employment levels.

Table 4.1 Four different mainstream macroeconomic models

	Without finance	With finance (accelerator)
Temporary effect of demand	(I) Benchmark NCM	(III) Benchmark FAM
Permanent effect of demand (hysteresis)	(II) Augmented NCM	(IV) Augmented FAM

Source: Authors' construction

Table 4.1 presents the four different mainstream macroeconomic models discussed in this chapter, notably the benchmark NCM model (I), the augmented NCM model (II), the benchmark FAM model (III) and the augmented FAM model (IV). Models (I)–III) have been examined above, while model (IV) is a modified version of model (II). It takes into account the cumulative effects on investment of changes in the market value of the net worth of firms, as it occurs in model (III). Yet, unlike model (III), model (IV) does not involve any exogenously given natural level of output towards which the economy is assumed to move. In algebraic terms, it is derived by replacing Eq. (4.4) of model (II) with Eq. (4.11):

$$Y_t = \alpha_0 - \alpha_1 \left(r_{t-1} - \pi_{t-1} \right) + \alpha_2 H_{t-1} + \varepsilon_1 \tag{4.11}$$

where $\alpha_2 > 0$, while Eq. (4.10) can be rewritten as:

$$H_t = H_{t-1} + \omega \left(Y_t - Y_t^n \right) + \varepsilon_4 \tag{4.12}$$

Consequently, the interest rate rule defined by Eq. (4.7) must be replaced by Eq. (4.13):

$$RR_t^* = \left(\alpha_0 - Y_t^n + \alpha_2 H_{t-2} \right) / \alpha_1 \tag{4.13}$$

The model determined by the system of equations (4.11)-(4.5)-(4.6)-(4.13)-(4.8)-(4.12) is a synthesis of models (II) and (III): like in model (III) changing conditions in the banking and financial sectors amplify

real shocks and can trigger booms and recessions. In addition, like in model (II), long-run levels of output and employment are affected via hysteresis effects by the current level of demand. This second feature is what distinguishes it from the benchmark FAM model.

Interestingly, FAM scholars acknowledge that the financial accelerator introduces a long-lasting (though not ever-lasting) hysteresis effect of aggregate demand into the benchmark NCM model. In the absence of information asymmetries—it is argued—investment demand can be safely assumed to be fixed over time, in the first approximation at least. By contrast, 'when information asymmetries are present, investment demand will vary and be history-dependent' (Bernanke and Gertler 1989, p. 20). This effect has important policy implications, namely, that one of main goals of central banks should be to strengthen the balance-sheets of economic agents, through the stabilisation of financial asset (viz. collateral) markets. This policy implication of the FAM is explored in great details in the next section.

4 The Current State of Macroeconomics

The repeatedly wrong predictions, and especially the failure in providing a satisfactory explanation of the 2007–2008 US crisis and the subsequent global financial crisis and economic recession, have represented a serious blow for the reputation of the NCM. There have been two main reactions to this in the economic discipline. Some scholars have argued that the proclaimed consensus around the benchmark NCM model was short-lived and finally unsuccessful (e.g. Buiter 2009). Other scholars have accepted the shortcomings of their original macroeconomic analyses and tried to amend the NCM model. As argued by McCombie and Pike (2013), the analytical core of the NCM model is in fact still 'seen by many to be relatively unscathed (but with the imperative to build in assumptions that allow for debt default and bankruptcy)' (p. 521). To be fair, attempts to make the benchmark NCM model more realistic were made before the onset of the 2007–2008 financial crisis. The most popular way was to modify the benchmark NCM model to allow for the possibility that a fraction of

households or consumers cannot access financial markets. As these non-Ricardian consumers cannot borrow or save to smooth consumption, they follow a simple 'rule of thumb', namely, they always spend all current labour income on current consumption. Galì et al. (2004) showed that 'if the weight of such rule-of-thumb consumers is large enough, a Taylor-type rule must imply a (permanent) change in the nominal interest rate in response to a (permanent) change in inflation that is significantly above unity, in order to guarantee the uniqueness of equilibrium. Hence, the Taylor principle becomes too weak a criterion for stability when the share of rule-of-thumb consumers is large' (p. 740). Furthermore, the presence of non-Ricardian consumers is proved to affect significantly the reaction of an economy to fiscal policy shocks. For instance, an increase (decrease) in government spending entails now a remarkable increase (decrease) in output, in the short to medium run at least. This conclusion has been further strengthened by recent work indicating that the actual size of the multiplier of government spending is larger than one, either when the zero-lower bound on the nominal interest rate binds or the nominal interest rate is constant (e.g. Christiano et al. 2009).

In the aftermath of the financial crisis, attempts to improve or update the benchmark NCM model have multiplied. There have been two main targets of the original benchmark NCM model. First, scholars have focused their efforts on systematic errors in inflation forecasting. Second, and related to the previous point, scholars have tried to model financial markets and financial frictions. Starting with the former, the overestimation of deflationary effects of the financial crisis in the benchmark NCM model has been usually regarded as the consequence of the underestimation of price stickiness, which is captured by the so-called Calvo parameter in the accelerationist Phillips curve (Calvo 1983), namely, Eq. (4.2). The underestimation of the degree of price rigidity has, in turn, been explained by the lack of financial frictions in the benchmark NCM model. Once these frictions are introduced, it is argued that the NCM model accurately predicts the behaviour of the US economy since 2008, including the weak drop in inflation rate. Intuitively, the rationale is that financial frictions make the Phillips curve 'flatter', that is, they reduce the parameter b_1 in Eq. (4.2), or the parameter β_1 in Eq. (4.5), presented above. The

US crisis could therefore be interpreted and modelled as the result of aggregate demand shocks in the presence of a flat aggregate supply curve (e.g. Del Negro et al. 2014, pp. 19–21).

As far as the explicit modelling of financial markets and financial frictions is concerned, some NCM scholars have explored the effects of volatile risk premia, by assuming that fluctuations in these premia are the most important shocks driving the business cycle. This insight closely follows the work of Bernanke and Gertler (1989) and Bernanke et al. (1999). It represents an attempt of developing the benchmark FAM model, where the major difference between old and new models is mainly the accuracy of theoretical modelling and econometric techniques. In this regard, a fundamental contribution has been provided by Christiano et al. (2013), who assume that firms combine internal funds with external funds, namely, bank loans, to acquire raw (physical) capital, and that the interest rate on loans includes a 'premium' covering the costs of default of firms. The production of goods and services is then likened to a process in which firms convert raw capital into effective capital under 'idiosyncratic uncertainty' or 'risk'. Christiano et al. (2013) show that increases in risk premia raise the premium charged by banks, and reduce the supply of loans. In this way, they argue that increases in risk premia could account for some key features of the 2007–2008 financial crisis and related economic recession:

> With fewer financial resources, entrepreneurs acquire less physical capital. Because investment is a key input in the production of capital, it follows that investment falls. With this decline in the purchase of goods, output, consumption and employment fall. For the reasons stressed in [Bernanke et al. 1999], the net worth of entrepreneurs – an object that we identify with the stock market – falls too. This occurs because the rental income of entrepreneurs falls with the decline in economic activity and because they suffer capital losses as the price of capital drops. Finally, the overall decline in economic activity results in a decline in the marginal cost of production and thus a decline in inflation. So, according to the model the risk shock implies a countercyclical credit spread and procyclical investment, consumption, employment, inflation, stock market and credit. These implications of the model correspond well to the analogous features of US business cycle data. (Christiano et al. 2013, p. 2)

In short, fluctuations in risk premia over the risk-free interest rate should be regarded as the main trigger (or amplifier) of the business cycle. Once this mechanism is introduced in the benchmark NCM model, this is shown to accurately reproduce US cyclical fluctuations since the mid-1970s (see, also, Gilchrist et al. 2009; Merola 2013). These results echo early work by Borio et al. (2001) and Borio (2006), which explored the effects of changes in the absolute level of financial risks over time. Borio and his colleagues show that, when incentives and potential mismeasurements by financial market participants are allowed, the underestimation of risks in booms and the overestimation in recessions become a realistic possibility. This has deleterious effects on bank provisions and capital ratios. In turn, this strengthens the pro-cyclicality of bank profits, thereby encouraging banks to increase lending in booms and to reduce it in recessions. Alternative recent ways of modelling of financial markets and financial frictions include the introduction of collateral constraints, currency risk premia in open economies, and Minsky-Fisher type of mechanisms (see, for useful surveys, Brunnermeier et al. 2012; Roger and Vlcek 2012). Other models have been obtained through the explicit inclusion of a heterogeneous, monopolistically competitive banking sector (e.g. Hafstead and Smith 2012). In summary, all recent attempts to improve or update the benchmark NCM model have tried in a way or another to model financial markets and financial frictions, and in this way they represent varieties of model (IV) presented in Table 4.1, namely, augmented FAM models.

The different augmented FAM models discussed above represent recent attempts by mainstream macroeconomists to improve or update the benchmark NCM model. For all interesting properties, these models share two problems, namely, a theoretical weakness and a policy inconsistent problem that seem to hinder further progress in mainstream macroeconomic theory and policy-making. Starting with the former, augmented FAM models assume that financial instability and long-lasting slumps are the result of exogenous market frictions, that is, imperfections, asymmetries or rigidities in the banking and financial sectors. They never allow for the possibility that financial instability is the endogenous by-product of the normal functioning of modern economies. In other words, augmented FAM models still assume like in the

old benchmark NCM model that in the long run free market forces would drive the economy towards a unique exogenously given and socially optimal equilibrium. It was this hypothesis of a natural equilibrium, coupled with the REH, which had left early NCM scholars with no other choice but the adoption of ad hoc assumptions about the stickiness of prices to fit real-world data. As explained by De Grauwe (2010), '[w]hy is it that in a world where everybody understands the model and each other's rationality, agents would not want to go immediately to the optimal plan using the optimal price? […] Calvo pricing is an *ad hoc* assumption forced unto the model to create enough inertia so that it would fit the data better' (pp. 416–17). A similar consideration could be made against modern macroeconomists attempting to update the benchmark NCM model by modelling conditions in the banking and financial sectors, including the possibility of financial instability, via ad hoc assumptions about exogenous market frictions. This critical stance has in fact led some behavioural economists to explore the effects of different heuristics on the financial behaviour of agents (e.g. De Grauwe 2010), while other economists are experimenting with alternative macroeconomic modelling, including the 'stock-flow consistent' approach of Godley and Lavoie (2007; see also among others, Dos Santos 2006; van Treeck 2009; Caverzasi and Godin 2015; Greenwood-Nimmo 2014; Sawyer and Veronese Passarella 2017; Nikiforos and Zezza 2017).

Notwithstanding the theoretical weakness of old and new FAM models discussed above, these latter models lead to a different rule of central banking vis-à-vis the benchmark NCM model. This is the policy inconstant problem. Although seldom pointed out, this policy implication of FAM models should not be underestimated. The point is that once it is admitted that lending is driven by the creditworthiness of borrowers, and thereby by the soundness of their balance-sheets, it turns out that the stabilisation of the market value of financial assets, especially those used as collaterals by firms, should be the priority of the central bank. The policy implication of FAM models would also highlight another real-world feature of the last couple of decades, namely, that the vast majority of refinancing operations in the interbanking market are conducted through REPOs, with government bonds acting as collaterals. But, if this

is the case, then the support of government bonds, and not price stability, should be regarded as the overriding concern of central banks, at least during periods of recessions and economic stagnation. Notice that replacing risky private assets with low-risk government bonds guaranteed by central banks would further strengthen the soundness of the balance-sheets of firms, thereby contributing to smooth the business cycle (e.g. Fontana et al. 2017). This is the 'portfolio effect' pointed out by Minsky (1986) and recently rediscovered by Eggertsson and Krugman (2012, p. 1471).

In short, as a result of the 2007–2008 financial crisis and the failure of the NCM benchmark model to explain it, let alone to predict it, many attempts have been made to amend mainstream macroeconomics. The introduction of volatile risk premia, collateral constrains, currency risk premia in open economies and Minsky-Fisher type of mechanisms are the most innovative financial frictions used to improve the long-established NCM model. A severe limitation of these models is that they never allow for the possibility that financial instability is the endogenous by-product of the normal functioning of modern economies. Notwithstanding this limitation, the introduction of financial frictions in the NCM model highlights the valuable role that central banks could play in stabilising the market value of financial assets, especially those used as collaterals by firms.

5 Summary and Conclusions

Early in the 1990s, a convergence of view emerged in mainstream macroeconomics. The NCM model quickly spread among academics and policymakers alike. The 2007–2008 financial crisis, resulting recession, and the current stagnation period have highlighted a problematic feature of the model. Banks and financial intermediaries, which have played a vital role in the start and unfolding of these dramatic real-world events, are not mentioned, let alone modelled in the NCM. During the last decade, several attempts have been made to improve and update the NCM model by adding to it a role for banks and financial intermediaries. This chapter has offered a preliminary and critical assessment of these efforts.

The chapter has started with a discussion of the set of three equations describing the benchmark NCM model in a closed economy, and has highlighted the role that the REH and the notion of 'natural equilibrium' play into it. It has also discussed an amended version of the model, the augmented NCM model, which allows for the possibility of interdependence between aggregate demand and aggregate supply, such that it could capture some prominent features of real-world economies. The chapter has also reviewed the original contributions to the FAM made by Bernanke and his colleagues in the early 1980s. These contributions have recently been rediscovered by scholars aiming to assign a greater role to banks and financial intermediaries in mainstream macroeconomics. The original benchmark FAM model together with the recent augmented FAM model has been discussed at great length in order to highlight the nature and role of financial instability in these models. The main conclusion of the chapter is that for all good intentions, there are two still main problems that seem to hinder progress in mainstream macroeconomic theory and policy-making. First, the policy implications of the recent theoretical innovations have not been fully explored. The augmented FAM suggests replacing price stability with financial stability as the main goal of central banks. Second, and more importantly, in the most recent mainstream macroeconomic models, financial instability is still modelled as the outcome of exogenous market frictions, rather than the endogenous by-product of the normal functioning of modern economies.

Notes

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2. The values of the 'deep parameters' of the NCM and related DSGE models, i.e. the parameters which are supposed not to be affected by policy, are

usually obtained through either 'calibration' methods or Bayesian estimation econometric techniques (Tovar 2009).

3. For a critical assessment of the monetary policy rules in the NCM, see Fontana and Palacio-Vera (2002), Brancaccio and Fontana (2013). See also Allington and McCombie (2005), for an analysis of the role of stock market prices in monetary policy rules.

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