Macroeconomics after four decades of Rational Expectations

by

Andrea Saayman[1]

Abstract:

In 1982, Bennett McCallum took a critical view of Rational Expectations in his paper 'Macroeconomics after a decade of rational expectations' and he subsequently followed it up in 1993 with 'Macroeconomics after two decades of rational expectations'. This paper follows a similar strategy and aims to present a critical review of rational expectations and its influence on macroeconomic theory and application after four decades. The paper shows that while theory has developed substantially, the practical application thereof has lagged behind and the influence of rational expectations is still very much alive in practical macroeconomics.

Keywords: *Macroeconomics; Rational Expectation; Monetary Policy*

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[1] School of Economics, North-West University, Potchefstroom Campus, Private Bag X6001, Potchefstroom 2521;
e-mail: andrea.saayman@nwu.ac.za; Tel: 0182991443

1. INTRODUCTION

According to McCallum (1982), the Rational Expectations revolution started with the publication of Robert Lucas' work in 1972 on Expectations and the Neutrality of Money (see Lucas, 1972a) and the Econometric Testing of the Natural Rate hypothesis (see Lucas, 1972b). However, Mankiw (1990) noted that the notion of rational expectations was already introduced by Muth in 1961, but that on its own, it had no empirical implication. This changed with the work of Lucas, as well as that of Sargent and Wallace (1975), which familiarised economists with the application and implication of rational expectations – most notably, the irrelevance of systematic monetary policy – while Taylor's (1979) macroeconomic model with rational expectations provided the framework for future policy analysis. Within this expansion of the rational expectations revolution, Kantor (1979) concluded that it has forever changed the way in which macroeconomic phenomena are analysed.

However, rational expectations did not escape criticism. The influence of divergent expectations instead of convergent expectations (see Torr, 1984), sticky prices in labour and product markets and imperfect competition present some reaction against the revolution. Rational expectations do, however, remain one of the tools in economic practitioners' toolbox, as Mankiw (2006, p.44) writes that new developments in macroeconomic research "*had little impact on practical macroeconomists who are charged with the messy task of conducting actual monetary and fiscal policy*".

The recent financial crisis has sharpened the focus on the deficiencies of the current economic framework in which policy is formulated. This has led the 2008 Nobel prize winner, Paul Krugman, to state that much of macroeconomics over the past 30 years have been "*spectacularly useless at best, and positively harmful at worst*" (Anon., 2009). The foundations of modern macroeconomic policy that (i) markets are efficient and (ii) monetary policy has little influence on the real economy (Schettkat, 2010) have been shaken by recent events.

While there are various avenues that one can explore to address the issues raised by the recent crisis, this paper takes a critical review of rational expectations and its influence on macroeconomic theory and application after four decades and focuses specifically on its application to monetary policy. At the heart of rational expectations is the concept of expectations, which is reviewed before a background discussion and introduction to the rational expectations hypothesis and its influence on subsequent theory is given, followed by the application of rational expectations to asset prices. To provide a local perspective, rational expectations within the South African monetary framework are identified and this is followed by a critique of the hypothesis, focussing especially on the treatment of institutions and assets in the policy framework with the spotlight on new research contributions.

2. EXPECTATIONS

During the 1960s and 1970s, it became apparent that contemporary macroeconomic methods do not take into account how people react to policy decisions taken (Taylor, 1979), i.e. how expectations change due to policy changes, and research intensified into incorporating the behaviour of economic agents into macroeconomics (Akerlof, 2002). Muth (1961) investigated the effect of changes in expectations of economic variables on price movements. Expectations, which he sees as "*informed predictions of future events*" (p.316), change whenever the information available to agents change or when the structure of the system changes. Muth (1961) concluded that data on expectations up to the 1960s showed two important facts: (i) although there are differences in agents' expectations, the average of expectations are "*as accurate as elaborate equation systems*" (p.316), and (ii) the extent of changes in expectations that actually take place, exceeds the reported expectations. Therefore, he hypothesised that economic agents' expectations are 'rational', since they are "*essentially the same as the prediction of the relevant economic theory*" (p.316) and he showed that this hypothesis is consistent with the two phenomena perceived in expectations data.

Torr (1986) drew on work by Lachmann to argue that the expectations that are 'rational' refer to convergent expectations rather than divergent expectations. Convergent expectations occur when "*different people have rather similar expectations*" (p.295), while divergent expectations imply that people have widely different expectations. The latter is more likely to occur when the future is unknown, while the former is more likely in relatively certain situations. Both types of expectations can lead to equilibrium, not just convergent expectations. Torr criticises convergent expectations, and therefore also rational expectations, by stating that they are "*not expectations at all, but rather part of existing knowledge*" (p.299).

Rational expectations differ from adaptive expectations since they do not restrict economic agents to base expectations of economic variables only on historical values of the variable (Macesich, 1987). Adaptive expectations assume that economic agents form their expectations about the future according to some rule, based on the historic values of the economic variable (often visible through the inclusion of Autoregressive terms in the specification). As such, it causes persistence in economic variables and therefore also persistent erroneous forecasts. When expectations are formed rationally, all information available to economic agents is utilised in an efficient manner – not only previous values of the economic variable under consideration.

Dave (2011) adds that if rational expectations are present, expectations and realisations are linearly related, while adaptive expectations assume that expectations are realisations from the previous period, weighted by the expectational error of the previous period. In addition, he adds that expectations can be formed according to a regressive mechanism where expectations are adjusted based on movements away from its mean. Therefore, regressive expectations can be thought of as "*adaptive learning*" (p.223) on the part of economic agents. He finds more support for the latter type of expectation hypothesis in firm-level data.

3. RATIONAL EXPECTATIONS IN PERSPECTIVE

3.1 Background

To understand the place of rational expectations in economic thought, Kantor (1979) presented a brief review of Keynesianism followed by Monetarism and New Classicalism. The reaction of Rational Expectation to Monetarism and its contribution to New Classical Theory is therefore paramount to understanding its place in and influence on economic theory.

The Keynesian approach addressed situations of high unemployment equilibrium caused by wage rigidities. However, its macroeconomic policy was based on the trade-off presented by the Phillips curve (Kantor, 1979). The breakdown of the Phillips-curve relation called for alternative approaches to stabilisation policy. The influence of Keynes should, however, not be underestimated. White (2009) concludes that one of greatest achievements of Keynes was the establishment of a framework that allows the simultaneous determination of a number of economic variables, including output, interest rates and prices. This formed the backbone of macroeconomic models still used today in policy decisions.

It was during the breakdown of the Phillips-curve relation that Monetarism gained popularity. Monetarist policy consists of five key points (Friedman, 1982): (i) targeting of growth in a monetary aggregate; (ii) long-run monetary growth targets that are consistent with no inflation; (iii) gradual, systematic adjustment of growth in monetary aggregates that is pre-announced by the central bank; (iv) avoidance of discretionary policy, and (v) no manipulation of interest rates or exchange rates. Therefore, Monetarism advocated the use of monetary rules and maintaining the credibility of the central bank in its fight against inflation (Macesich, 1987).

Goodfriend and King (1998) described the monetary transmission mechanism of Monetarism as based on the Quantity Theory of Money, where nominal income is influenced by the stock of money supply and its velocity, with *money rather than credit* the main channel through which interest rates and the real economy are influenced. This is in stark contrast to the view of the Austrian economists, and more specifically to *The theory of money and credit*, written by Ludwig von Mises in 1912.

Von Mises argued that intervention of government in the credit-creating abilities of the financial system will cause imbalances over time that will end in an economic crisis (White, 2009). More specifically, by keeping interest rates artificially low, people's preferences are distorted and saving is sacrificed in favour of consumption. The decline in interest rates persuades an increase in capital spending (investment) and therefore in borrowing. Since saving declines and borrowing increases, an imbalance is created that leads to a temporary increase in employment, wages and consumption. However, there is not only an imbalance in savings and loans – there is also an imbalance in the real side of the economy, since unprofitable business expansions have been financed by the artificially low interest rates. The end result is, however, a credit contraction and even banking collapses (Spitznagel, 2009). Von Mises pleaded for market forces to determine interest rates. If not, he stated that the magnitude and duration of the catastrophe will be "*stronger, the longer the period during which the rate of interest on loans has been below the natural rate of interest and the greater the extent to which ... processes of production that are not justified by the state of the capital market have been adopted*" (Von Mises, 1953).

Monetarists' arguments follow that of the neoclassical school of thought with the Quantity Theory of Money as a key relationship explaining the influence of monetary policy on the economy. They recognised that the nominal interest rate (r) consists of the real (or natural) interest rate (i) and an expected inflation premium (p^e). In other words:

$$r_t = i_t + p_t^e \qquad (1)$$

However, expectations were viewed as adjusting incompletely to changing circumstances, causing wages and prices to adjust sluggishly to monetary changes.

Kantor (1979) noted that the breakdown of the traditional Phillips-curve relation had another important consequence – the role of expectations could no longer be ignored in macroeconomic analysis. Milton Friedman and Edmund Phelps predicted that the exploitation of the Phillips curve trade-off would lead to a breakdown of the relation and reasoned that the natural rate of unemployment should rather depend on the demand and supply of labour and other microeconomic considerations in the labour market (Mankiw, 1990). This Natural Rate Hypothesis changed the framework for stabilisation policy (Gordon, 1977). The natural unemployment rate, according to Friedman and Phelps, is the rate "*at which wages and prices will continue on their anticipated path irrespective of the implied inflation rate*" (Macesich, 1987, p.46) – also referred to as the non-accelerating inflation rate of unemployment (NAIRU). The work by Friedman and Phelps led to the expectations-augmented Phillips curve, although the expectations that were included in the formulation were adaptive of nature (Kantor, 1979). Equation 2 indicates the natural rate hypothesis (Gordon, 1977):

$$p_t = p_t^e + g\left(u_t - u^N\right) \text{ with } g' < 0,\ g(0) = 0 \text{ and } p_t^e = h\left(p_{t-1}, p_{t-2}, \ldots\right) \qquad (2)$$

where u and u^N indicate the unemployment and natural unemployment levels.

This critique of the standard Phillips curve relation paved the way for Lucas' (1976) critique of mainstream macroeconomic models that do not take expectations into consideration. He argued that since expectations change when policy interventions take place, the reaction of the economy to the applied policy would also be different, and this is overlooked by models that do not take cognisance of changing expectations (Mankiw, 1990).

3.2 The Rational expectations hypothesis

Even though the concept of rational expectations can be attributed to Muth (1961), it is generally acknowledged that the rational expectations hypothesis application to economic theory was made popular by Lucas' papers in 1972 (see Lucas, 1972a; 1972b). Other contributors include Sargent (1973, 1976), Sargent and Wallace (1975) and Barro (1976, 1977) (McCallum, 1982). While the Monetarists analyse the economy from a Marshallian framework – where there is a clear distinction between the short and the long run – rational expectations collapse the long run into the short run and follow in essence a Walrasian framework (Macesich, 1987). Here, Bray (1982) contributed by analysing price behaviour in asset markets where she concluded that the rational expectations equilibrium is a long-run rather than short-run solution.

Lucas postulated that the rational expectations hypothesis implies that every economic agent makes optimal use of information in forming expectations (Frydman, 1982). The following two assumptions are normally made: (i) the average estimate of the outcome by participants in the market is correct and these outcomes are based on 'correct' probability distributions, (ii) forecasting errors are uncorrelated in successive time periods (Macesich, 1987). While the assumption of rational expectations has little empirical implication, it has startling implications for policy effectiveness (Mankiw, 1990). Three papers need special mention here.

Firstly, Thomas Sargent's 1973 paper showed that the effect of a change in money on economic activity would only be temporary once rational expectations are included in the analysis. Therefore, by assuming rational expectations and not adaptive expectations in the Fisher nominal interest rate relation, the effect of money on output in the economy has no lasting effect (Blanchard, 2000).

Secondly, Sargent and Wallace's paper in 1975 showed that systematic monetary policy is ineffective in changing the paths of output and employment. The rational expectations hypothesis is applied to the expectations-augmented Phillips curve and the results showed that only unexpected inflation decreases unemployment. Since they argue that systematic monetary policy influences expected inflation, it has no influence on unemployment (Mankiw, 1990). This is because rational economic agents anticipate the effect of the policy action and make it part of the information set on which decisions are based (Kantor, 1979).

Thirdly, Lucas' 1973 paper showed that in a business cycle framework of imperfect information, market clearing and rational expectations, monetary policy will only be effective insofar that it distorts relative prices (Mankiw, 2006). Economic agents cannot always distinguish relative price movements from general price movements, and therefore monetary policy would only be effective if it surprises economic agents by distorting relative prices.

Lucas' (1976) critique formalised the attack against standard economic models used at that point in time. When rational expectations are assumed, agents' information sets are not limited to historic values – as is the case with adaptive expectations. This implies that the parameters in economic models will change in reaction to policy changes (Macesich, 1987). Sims (1987, p.4) summarised it neatly by stating:

> *"The lesson of rational expectations is that when we use a model in whose functional form is embedded agents' expectational rules, we are likely to make errors even in forecasting if we insist that those expectational rules are fixed through tie, and that we will make even more serious errors in policy evaluation if we pretend that those rules will remain fixed despite changes in policy which makes them clearly suboptimal."*

Parallel to the development of rational expectations in an economic framework, Eugene Fama (1965) developed a theory of expectation formation in financial markets also based on the work of Muth (1961). The rational expectations version of the financial market is known as the efficient market hypothesis (EMH). The EMH postulates that since expectations in financial markets are equal to the optimal forecasts, the prices of shares (assets) reflect all available information. Therefore, all prices are always correct and there will be no unexploited profit opportunities in an efficient market (Mishkin, 2007).

In an efficient market, the price of assets will follow a random walk, where the future price of the asset depends on the current price and a random disturbance term. Therefore, the price of an asset is unpredictable. This property of the EMH has been tested in various markets, including the stock market, bond market and foreign exchange market.

Since the EMH postulates that the price of an asset reflects all the information that is available and relevant to its price, it logically flows that financial markets would always price assets correctly and therefore there should be no such thing as asset bubbles. Initially, the evidence in favour of the EMH was overwhelming (Fama, 1970). However, the 1987 stock market crash in the USA was a clear sign that the market is not always efficient and academic economists have examined the flaws in the EMH (Anon., 2009c). Recent research has shown that markets are not always efficient (Mishkin, 2007), and evidence from South Africa confirms that the Johannesburg Stock Exchange is also not an efficient market (van Rensburg & Robertson, 2003).

3.3 The aftermath

A key ingredient in New Classical Theory is the application of the rational expectations hypothesis. However, not everyone who adheres to rational expectations is New Classical in their approach. The New Classical Theorists also assume that only real phenomena influence the economy (i.e. the neutrality of money) and agents consistently and successfully optimise so that equilibrium is reached (Macesich, 1987). Mankiw (2006) ascribed the development of New Classical Theory from three sources; (i) Monetarism, (ii) Rational expectations, and (iii) the real business cycle theories of Kydland and Prescott (1982) and Long and Plosser (1983). The latter departed from the first two by omitting monetary policy from the analysis.

The "marriage" of the Natural Rate Hypothesis and Rational Expectations is often viewed as the basis of the New Classical Theory. Pesaran (1982) summarised this approach in three basic aggregate relations, namely the aggregate supply function (equation 3), which is a reformulation of the expectations-augmented Phillips curve (as in equation 2), the aggregate demand function (equation 4) and money market equilibrium (equation 5) (all specified in natural logs). In addition, price expectations are formed rationally, according to equation 6:

$$y_t - \bar{y}_t = a\left(p_t - p_t^e\right) + \varepsilon_{t1}, \text{ with } a > 0 \tag{3}$$

$$y_t = b_0\left[r_t - \left(p_{t+1}^e - p_t^e\right)\right] + b_1 g_t + \varepsilon_{t2}, \text{ with } b_0 < 0,\ b_1 > 0 \tag{4}$$

$$m_t - p_t = c_0 y_t + c_1 r_t + \varepsilon_{t3}, \text{ with } c_0 > 0,\ c_1 < 0 \tag{5}$$

$$p_t^e = E\left(p_t \middle| \Omega_{t-1}\right), \text{ and } p_{t+1}^e = E\left(p_{t+1} \middle| \Omega_{t-1}\right) \tag{6}$$

Equation 3 implies that any deviation of output (y) from its natural level ($\bar{y}$) is a positive function of unanticipated changes in the rate of change in prices. Equation 4 implies that aggregate demand is a function of the real expected interest rate (in square brackets) and a vector of exogenous variables (g), which include fiscal policy. Equation 5 equates the public holdings of real money balances ($m - p$) to real income (y) and nominal interest rates (r), with the former exhibiting a positive and the latter a negative relationship with real balances. Equation 6 indicates that economic agents optimally exploit the information set (Ω) available to them. The white noise error terms (ε_i , with $i = 1, 2, 3$) are non-auto-correlated and mutually independent.

New Classical economists sought to improve the microeconomic foundations of macroeconomics and moved away from the Keynesian assumption of sticky wages in favour of imperfect information and technology shocks (Akerlof, 2002). Strydom (2010) concludes that:

"*These microfoundations were in fact describing the optimal behaviour of representative agents that were blessed with information á la neo-classical economics but concealed in mathematically elegant models relying on rational expectations*".

McCallum (1982) shows that the application of rational expectations was not limited to New Classical type models, but was also incorporated in New Keynesian sticky price models. The work of John B Taylor (1980) and Fischer (1977), which demonstrated that systematic monetary policy can have a stabilisation effect in the presence of rational expectations when the model is augmented with wage contracts, needs mention here. However, it was criticised by both McCallum (1982) and Mankiw (2006) for its underlying assumptions. Other New Keynesian research efforts focussed on deviations from rationality (or near-rationality) due to the cost of price and wage adjustments and due to market power (see Mankiw, 2006 and Akerlof, 2002 for a more complete discussion).

The combination of the New Classical view with the New Keynesian view is described by Goodfriend and King (1998) as the New Neoclassical Synthesis. Goodfriend and King (p.255) described the combination of these two views into the new consensus view as follows:

"*Building on new classical macroeconomics and the RBC analysis, it incorporates intertemporal optimization and rational expectations into dynamic macroeconomic models. Building on New Keynesian economics, it incorporates imperfect competition and costly price adjustment.*"

Within this framework, monetary policy affects the real economy in the short run and this consensus view has been accepted and applied in monetary policy research. The heart of the synthesis is the early Keynesian-type model of dynamic general equilibrium with nominal rigidities (Mankiw, 2006).

The current consensus model is described by Goodhart (2008) as consisting of three basic equations, which can be thought of as a restatement of equations (3) to (5). The restatement of the Phillips-curve relationship (equation 7), the aggregate demand function, or restatement of the old IS-curve (equation 8) and the Taylor rule, or restatement of money market equilibrium (equation 9):

$$\pi_t = \pi_t^e + b_1(y_t - \bar{y}_t), \text{ with } b_1 > 0 \tag{7}$$

$$y_t = E(y) + b_2[r_t - E(\pi)], \text{ with } b_2 < 0 \tag{8}$$

$$r_t = b_3(\pi_t - \pi^*) + b_4(y_t - \bar{y}_t), \text{ with } b_3, b_4 > 0 \tag{9}$$

with E indicating the expectations operator incorporating backward-looking and forward-looking elements and π indicating inflation. Equations (7) and (8) are derived using a dynamic general equilibrium model and Calvo pricing. Calvo (1983) showed how a rational firm sets its prices given that prices are not free to adjust for a certain interval of time. The optimal price

(p^*) is then dependent on the future path of the price level ($E_t p$) as well as the deviation of marginal cost (ψ) from its steady state level, i.e. (Goodfriend and King, 1998):

$$p_t^* \approx \frac{1}{\sum_{h=0}^{J-1} \beta^h \omega_h} \left[\sum_{j=0}^{J-1} \beta^j \omega_j \left(E_t p_{t+j} + \log\left(\psi_{t+j} / \psi \right) \right) \right], \tag{10}$$

with ω indicating the fraction of firms that adjusted their prices j periods ago, with $j = 0, 1, 2, ..., J-1$.

Goodfriend and King (1998) described the effect of monetary policy on the real economy in this consensus model as resembling that of productivity (aggregate demand approach) and fiscal shocks (mark-up tax approach) on the RBC. According to the former, real aggregate demand changes when money supply changes and is therefore influenced by monetary policy. However, this is only true when price levels and real marginal cost do not change. The second approach postulates that monetary policy has the effect of increasing the average mark-up of firms over real marginal cost, causing it to behave in a similar fashion as a tax on sales. This affects the returns on capital and labour and therefore real economic activity.

Goodhart (2008) remarked that this consensus model relies heavily on the existence of rational expectations by assuming agents that never default (i.e. perfectly creditworthy agents) in the transversality condition. As such, there is no risk premium in the model and no credit constraints, causing the model to be one of creditworthy agents with no banking institutions. This is echoed by Strydom (2010) who indicated that the current economic framework is unable to "*analyse the miss-pricing of risk*". Some of the sharpest critique has come from the fact that there is a lot of concern about modelling the prices of goods and services, while asset price formation is neglected (Anon., 2009b).

4. RATIONAL EXPECTATION AND SOUTH AFRICA'S MONETARY POLICY FRAMEWORK

How does South Africa's framework for monetary policy compare with the consensus model? In other words, how are rational expectations included in the South African monetary policy decision-making process? The core forecasting model of the South African Reserve Bank, as described by Smal, Pretorius and Ehlers (2007), serves as the basis for the subsequent discussion, since the forecast of inflation is a key input in the monetary policy decision taken by the monetary policy committee (MPC).

When assessing the structure of the model, it is evident that two of the key components of the current consensus model, namely the Taylor rule and the Phillips-curve relation, are also key components in the South African forecasting model. Within the South African framework, forecasts are done using a fixed repurchase rate, but simulations are based on a Taylor rule specification with "*equal weights assigned to the output gap and deviation from the inflation target*" (p.3). The wage equation included in the model is based on the expectations-augmented Phillips curve, while aggregate demand is modelled in a more expanded fashion, with separate equations for personal consumption, investment, import and export.

In the estimation and simulation of the model, the price level is assumed to be neutral in the long run, with growth not depending on prices. By imposing neutrality, inflation expectations converge on the actual inflation rate in the long run.

Inflation expectations are modelled using "*a hybrid rational expectations approach*" (p12), which corresponds to 'near-rational' expectations. The information set included in the formation of expectations includes past values of the inflation rate, as well as changes in the money supply and exchange rate as indicators of the state of the economy, and the budget deficit, as an indication of future policy. In addition, the inflation target is assumed to lead to low inflation expectations, in line with credibility of central banks proposed by Monetarism, and this is included as a forward-looking element in the model.

It should be noted here that Ehlers and Steinbach (2007) concluded that "*South African economic agents probably do not form their inflation expectations rationally"* based on an analysis of the Bureau of Economic Research (BER) inflation expectations survey as well as the Reuters Inflation Expectations (RIE) survey. They found that South Africans form inflation expectations using some form of learning. According to Bray (1982), expectations based on the learning method can eventually yield the same results as rational expectations; however, "*instability seems to be a real possibility*" (p.329).

Changes in the repurchase rate affect the economy through a number of transmission channels (Smal & de Jager, 2001). While the supply side is seen to be influenced via inflation expectations (which are assumed to be formed rationally, as explained above) and its effect on wages, it is especially the demand-side of the economy that is influenced. The main channels through which the repurchase rate influences demand are (i) via its influence on other interest rates and the availability of money and credit (which influence consumption and investment), (ii) via the effect thereof on the value of wealth (which influence consumption); (iii) via changes in the interest rate that are also seen to affect the exchange rate of the South African rand and therefore the demand for South African goods (via imports and exports).

The influence of interest rates on the exchange rate is based on the uncovered interest parity theory (UIP), which postulates that interest differences predict exchange rate changes, "*if the conditions of rational expectations and risk neutrality are satisfied*" (Smal, Pretorius & Ehlers, 2007, p.13). In the core inflation forecasting model of the South African Reserve Bank, the exchange rate, as the third transmission mechanism, is also modelled according to this principle.

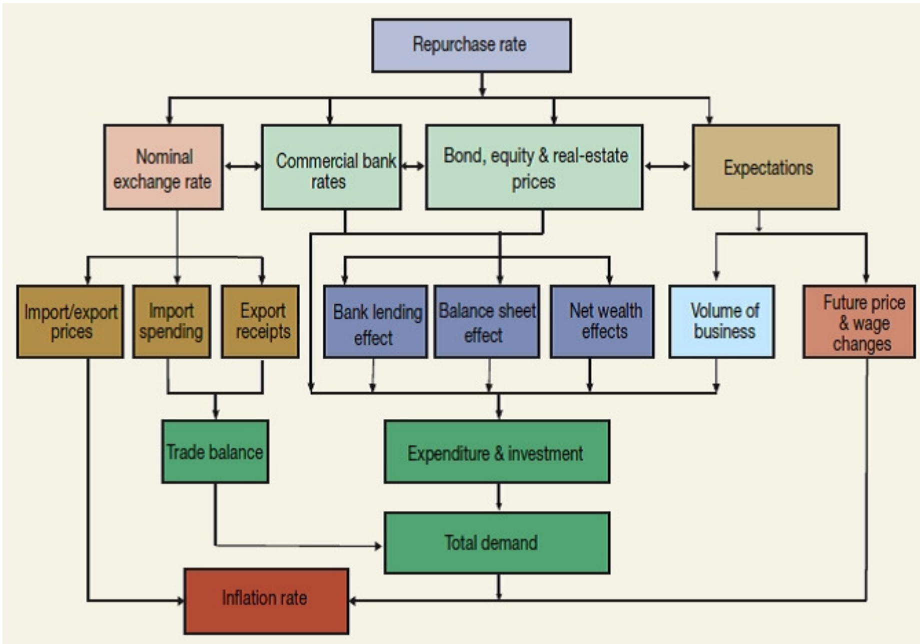

Figure 1: Reserve Bank's view of transmission channels of monetary policy action

(Source: SARB, 2011)

A noteworthy channel included in the discussion of monetary policy transmission is the effect on wealth (or assets). However, the model description uses the broad money supply (M3) as the proxy for assets[2], which is more in line with the Monetarist view that monetary policy influences the economy via the availability of money. While the South African Reserve Bank does not ignore banking institutions and credit completely through its view that interest rates influence money and credit, the modelling thereof focuses purely on the cost of credit and its influence on final consumption expenditure (not wealth) by households.

From the above, it can be concluded that there are significant elements of rational expectations and the consensus model for monetary policy evident in South Africa's monetary policy framework. And although the role of financial institutions as credit creators and that of assets are acknowledged, the modelling thereof follows a neoclassical approach.

[2] There is a note included in the documentation of the model to indicate that this is one aspect where improvement is "pending" (p.3). However, Hall, Honroyiannis, Swamy and Tavlas (2007) suggested that money supply still contains useful information for inflation forecasting in South Africa, based on the demand for money function, similar to that specified in equation (5), although they add that "*more resources [should be] devoted to developing inclusive measures of South African wealth*".

5. ASSET PRICES, CREDIT GROWTH AND INSTITUTIONAL IMPORTANCE

The critique against rational expectations has come from a number of sources. McCallum (1993) stated that a number of studies showed that the hypothesis is inconsistent with data on how expectations are formed, while it is now also accepted that the adoption of rational expectations does not necessarily lead to policy ineffectiveness in the short run, as Lucas postulated. These thoughts are echoed by Mandel (1995) who stated that "*models built on rational expectations do not reflect the real world* ...". However, the popularity of rational expectations remains evident in economic models and the long-run neutrality assumption continues to be a key component. McCallum (1993) ascribed this to the lack of a suitable substitute by stating that "*rational expectations continues to be the dominant hypothesis for the same reason as 10 years ago – the unattractiveness of available alternatives*" (p.4).

From a more philosophical point of view, Elliott (1985) stated that Austrian economists acknowledged that economic agents are faced with uncertainty in a free market economy. In such uncertainty, no individual can know for certain how others in the market will react, and therefore equilibrium in a dynamic economy is not a certain outcome. In the absence of equilibrium, information contained in prices does not reflect fundamentals – a stark contradiction to the efficient market hypothesis. Once there is uncertainty, expectations, as proposed by the rational expectations hypothesis, are not convergent. Frydman (1982) took this argument further and argued that if everyone has rational expectations, all individuals have an incentive to hold non-rational expectations in order to mislead the other participants about their actions.

In terms of the way forward, behavioural economists, in particular, have been instrumental in showing the deficiencies of the rational expectations hypothesis and searching for alternatives. This section focuses on two important propositions of rational expectations, namely that markets are efficient and the inefficiency of monetary policy. The former implies that the way in which the current consensus model treats asset prices as well as how they influence the economy, should be revisited and promising avenues that are currently explored are subsequently reviewed. In terms of the effect of monetary policy, the focus will be on the limited importance assigned to institutions in the current framework based on rational expectations, as well as the implication of near-rationality for policy effectiveness.

5.1 Asset prices

On the financial economics side, researchers have shown that markets are not always efficient. The evidence against the efficient market hypothesis is mounting, with research on small-firm effects, January effects, market overreaction, mean reversion of asset prices and excessive volatility in markets poking holes in the hypothesis (Mishkin, 2007). In South Africa, research evidence also indicates that asset prices are not formed rationally (for a summary of the research, see van Rensburg and Robertson, 2003).

Behavioural financiers in particular have been studying human tendencies to contribute to asset bubbles, by investing as if the same trend will always continue in the market. They show that price expectations in markets are often simply the extrapolation of the price history, which means that prices are not based on fundamentals leading to unsustainable prices (White, 2009). When the market changes, investors act irrationally, which contributes to the fall in prices, causing the asset 'bubble' to burst (Anon., 2009c). Key research in this regard includes that of Shiller (2001, 2002), who investigated the causes of excess volatility in markets, and Schleifer (2000).

Why are asset markets important to the economy and policy? Akerlof (2002) identified three channels through which asset prices influence the macro-economy, namely: (i) through its effect on wealth of economic agents and therefore consumption; (ii) through Tobin's *q*, which influences investment in the economy, and (iii) through its effect on causing bankruptcies of firms. In a rational expectations economy, all prices reflect fundamentals and therefore the possibility of sudden asset price declines is not considered.

When considering asset prices in the economy, the prices of real estate (or houses) and prices of shares on the local stock exchange are generally evaluated. It may be argued that house price bubbles are worse than stock market bubbles and that there is co-movement between international house prices and global business cycles. Based on research between the G-7 countries, Beltratti and Morana (2010) concluded that, in general, the effect of house price shocks on the macro-economy is greater than that of stock market shocks and that it has significant feedback effects on the stock market.

The reason why house price shocks tend to hold far-reaching consequences for the economy was explored by, among others, Oikarinen (2009) and von Peter (2009). Both these authors cited the link between house prices and bank credit as the main reason for the importance of house price shocks to the macro-economy, again highlighting the importance of financial institutions and credit creation to the influence of monetary policy (*á la* von Mises).

Oikarinen (2009) showed that house prices are affected by the availability of credit, since an increase in credit extension leads to an increase in the demand for housing, which causes the prices of houses to increase. This is particularly true when households are facing a borrowing constraint prior to the increase in credit availability. He found two-way causality between house prices and house credit, as well as a positive effect of house prices on other consumer credit and concluded that this is likely to increase boom-bust cycles as well as financial system fragility.

Von Peter (2009) focused directly on the link between asset prices and the banking system where banks act as intermediaries in firms' acquisition of property for productive purposes, financed by bank credit. A decline in asset prices, caused by a shock, causes wealth and consumption to decline and therefore also the general price level. If this decline is sufficiently large, banks start to experience defaults, causing an increase in losses associated with loans. As a result of a decline in the value of assets and profits, bank capital also decreases and a bank crisis occurs (von Peter, 2009). In response to the decline in bank credit, banks cut back on lending activities, since they find it increasingly difficult to obtain alternative sources of funds (Chen, 2001).

5.2 Institutions and near-rationality

The discussion above highlighted the importance of financial institutions in asset prices, credit creation and the distribution of financial shocks to the real economy. According to Goodhart (2009), even John Hicks acknowledged in later years that knowledge of history and institutions should form the basis for monetary economics. However, the modern macroeconomic models make little provision for the role of financial institutions – as is also evident in the South African monetary framework. Although banks are seen as the creators of money and credit in the economy, they are not included in an analysis of how prices and interest rates are determined. Here I would like to argue that the assumption that economic agents have rational expectations made the inclusion of institutions obsolete and that the focus of new classicalists on money as the main source of monetary influence has diverted attention from institutions. The third channel of how asset prices influence the economy, as described by Akerlof (2002) above, has therefore been neglected and subsequently monetary policy is seen as neutral in the long run.

In 2000, Olivier Blanchard wrote that macroeconomists should be concerned about imperfections that may be the source of new shocks to the economy. He mentions, for example, bank runs and how they influence not only money supply in the short run, but that they may also have a long-lasting effect on output due to the malfunctioning of the financial system. Fluctuations in economic activity caused by credit crunches and liquidity problems used to dominate early discussions of the causes of business cycles (*á la* von Mises), but again he notes that the current framework neglected these issues.

One person who has studied the role of financial institutions in the economy is Hyman Minsky (1982). Minsky built on Irving Fisher's ideas of 1933. Fisher explains that an upswing in economic activity is caused by profitable opportunities in the economy, which encourage more investment, rising prices and speculation. This is accompanied by an increase in debt finance, which increases money supply and prices. At some stage, 'over-indebtedness' is reached and economic agents cannot repay their debt, which causes a frantic sale of assets, price declines, bankruptcy and therefore a decline in economic activity (Bordo, Dueker & Wheelock , 2003).

In the same line as Fisher, Minsky identified stages of credit provision that threaten the existence of banks. According to Minsky, the last stage of credit provision is characterised by loans that are made to repay interest on other loans, and as soon as lenders recognise their mistakes, they would mistrust other lenders as well. This concern about the solvency of other lenders then leads to credit creation that is brought to a standstill, with serious consequences to the real sector of the economy (White, 2009). In a rational expectations framework, this will never happen, since "*all agents are perfectly creditworthy*" (Goodhart, 2009, p.826).

Another contributor to the argument of the importance of the banking system and defaults is Shubik (1999), and recent efforts by among others, Goodhart and others (see Goodhart, 2009 for more information) build on Shubik's work to model the interaction between risk aversion, default probabilities and the real economy. White (2009, p.17) acknowledged that "*the issue is how excessive credit and monetary creation can lead to imbalances outside the financial system, with significant macroeconomic implications*."

From a policy perspective, the argument whether financial stability and systemic risk should form part of monetary policy is a hotly-debated topic (see among others Blanchard, 2009; Bernanke & Getler, 1999, 2001; Kontonikas & Ioannidis, 2005; Gilchrist & Leahy 2002; Cecchetti *et al*., 2000) and one for another paper. However, the co-ordination between monetary policy and financial regulation has come to the fore with the procyclicality of financial institutions as one of the key concerns. Contributors to this research include, among others, van Vuuren (2011) on countercyclical capital requirements.

Another source of research focussing on the influence of monetary policy on the real economy comes from the behavioural economists. The concept of 'near-rationality' is essential to showing that monetary policy is effective in influencing the real economy (Akerlof, 2002). In this regard, Mankiw and Reis (2001) showed that the slow adjustment of prices and wages causes income to respond better to monetary shocks than staggered price/wage models, such as those by Calvo and Taylor. 'Near-rational' expectations, also called bounded expectations, imply that the private sector's (PS) expectation deviates from the modeller's expectation, but that there is a "*degree of correspondence between PS probability beliefs (however obtained) and those of the policy analyst herself*" (Woodford, 2008, p.8). One way to think of it is by imposing expectations based on rule-of-thumb, such as (Weder, 2001):

$$\xi_t x_{t+1} = (1-\lambda)E_t x_{t+1} + \lambda x_{t+1}^* \tag{11}$$

where $\lambda \in (0,1)$, $E_t x_{t+1}$ is fully-rational expectations and x_{t+1}^* is the rule-of-thumb scheme. Therefore, near-rational expectations are a weighted average of rational expectations and some rule-of-thumb. This rule-of-thumb may include naïve expectations ($x_{t+1}^* = x_t$), adaptive expectations ($x_{t+1}^e = (1-\alpha)x_t + \alpha x_t^e$), regressive expectations ($\Delta x_{t+1}^e = \alpha(q - x_t)$, with q the long-run fundamental equilibrium value of the variable, and $\alpha > 0$), extrapolative expectations (where expectations follow a distributed lag specification, i.e.

$x_{t+1}^{e} = (1-\alpha)x_t + \alpha x_{t-1}$), or some other form of learning (for example, by including other significant variables).

The small deviation from complete rational expectations to near-rational expectations, where prices and wages are slow to react to information, yields significant results even for expected monetary policy actions. Akerlof (2002) concluded that Mankiw and Reis resolved three paradoxes that are present in the rational expectations models with staggered prices/wages by using information stickiness in a near-rational model, namely (i) it explains the long lag between monetary action and income changes; (ii) it is consistent with the slow reaction of inflation to shocks; and (iii) deflationary policies lead to increases in output (not the adverse result of decreases found in staggered price/wage models).

CONCLUSION

The recent financial crisis has placed the framework according to which the macroeconomy is analysed under the spotlight and since the crisis has ignited in the financial sector, the link between financial markets, the macroeconomy and economic policy has caused widespread concern. It is now recognised that artificially low interest rates in the United States in reaction against the dot-com bubble – popularly known as 'The Greenspan Put' – led to a new wave of credit growth and created the environment for financial markets and investors to under-estimate macroeconomic risks and the risk associated with many financial assets, with the now-obvious consequences (Hume & Sentance, 2009).

This paper focussed on the influence that the rational expectations hypothesis had on the current framework according to which monetary policy and asset prices influence the macroeconomy. Together with monetarism, the rational expectations hypothesis forms the basis of the New Classical framework's – more specifically, the natural rate – rational expectations hypothesis. The emphasis has again been on money and changes in money supply that influence the real sector of the economy. However, the long-run neutrality of money and asset market efficiency remain key aspects of the theory.

Together with New Keynesian price/wage/information stickiness, the natural rate – rational expectations hypothesis forms the basis of the New Neoclassical Synthesis and the current consensus of how monetary policy influences the economy – most of which is also evident in the South African monetary framework. One of the greatest achievements of the rational expectations hypothesis is that it has brought about the explicit modelling of expectations into macroeconomic models. Elliott (1986) commented that the influence of the rational expectations hypothesis on policy must be applauded for "*it is better to have someone voicing a sound line, than to provide no voice at all*" (p.2).

However, the influence that rational expectations have on monetary policy effectiveness still remains a key concern. New expansions, such as near-rationality, have shown that systematic monetary policy has a longer lasting influence on the real economy. In this regard, it is necessary to note that once some form of learning is included in the way expectations are formed, the rational expectations equilibrium is a remote possibility that may not be reached. This is in stark contrast to the practitioner's view that convergence to rational expectations occurs, essentially forcing the neutrality of money in the long run.

Two key aspects that are also neglected is the influence of asset prices and institutions in the policy framework. Firstly, when assuming rational expectations, asset prices are assumed to reflect all available information and therefore it always represents the fundamentals underlying the asset. In this efficient market, asset bubbles cannot occur. The efficient market hypothesis has been discredited by a number of researchers and new research developments in this area focus on how asset prices influence the real economy. In this regard, the link between credit creation, banking institutions and asset prices comes to the fore, blowing new life into the Austrian view that excessive credit creation leads to financial instability, with dire consequences to the real economy.

Secondly, all agents are creditworthy in a rational expectations assumption and the role of institutions and defaults has been largely ignored in macroeconomic policy models. New developments in this field build on the ideas of Fisher (1933) and Minsky (1982) to include financial institutions, risk aversion and defaults into the framework. White (2009) states that "*new ways of thinking about financial problems can also have important institutional implications*" and therefore "*research into the functioning of the financial system remains a high priority*" (p.18).

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