

# Threat of fiscal dominance? Workshop summary

Richhild Moessner and Philip Turner<sup>1</sup>

## Abstract

A long period of high public debt-to-GDP ratios will alter the interactions between fiscal policy, monetary policy and government debt management. But opinions differ on exactly how. Four perspectives were explored in this workshop: historical analysis of policies in financial crises; macroeconomic theory; the theory of sovereign debt management; and the quantitative assessment of recent central bank balance sheet policies.

Keywords: Monetary policy, central banks, sovereign debt management, policy coordination, Keynes, rational expectations

JEL classification: E43, E44, E63 and E61

---

<sup>1</sup> This is a summary of views expressed during the workshop, prepared under the responsibility of the authors. It does not necessarily reflect the views of the BIS. We are grateful to Bill Allen, Torsten Ehlers and Fabrizio Zampolli for helpful comments and discussions.

## Introduction

The massive expansion in central bank balance sheets to fight the worst financial crisis in living memory was at first widely regarded as exceptional and temporary. And indeed many central banks, uncomfortable with the volume and nature of their asset purchases, began from the second half of 2009 to talk about their “exit strategy”. But no early reversal proved possible. The balance sheet of the central bank may even come to be regarded as a second policy tool (that is, in addition to setting the short-term policy interest rate). This development will create very great challenges for central banks.<sup>2</sup>

This workshop focused on central bank purchases of government debt, which have been a key element of such policies. The fiscal policy context of governments needing to finance large deficits could have major implications for the consequences of such policies.

For many, a long period of large fiscal deficits and very high public debt-to-GDP ratios raises the spectre of fiscal dominance. It will in any case accentuate the links between fiscal policy, monetary policy and government debt management. The aim of this workshop was to analyse these macroeconomic interactions and to explore the controversial issues they raise from many different perspectives.

The workshop started with the historical record. Bill Allen’s paper looked at how the links between government debt management and monetary policy in the United Kingdom have evolved over the past 80 years. The workshop also covered some aspects of the history of monetary theory, and Geoff Tily put particular emphasis on the contribution of Keynes. Open market operations in long-term government debt were central to Keynes’s analysis of monetary policy in the *Treatise* and in the *General Theory*. Lex Hoogduin considered in addition the contribution of Hayek.

In the second session, the workshop explored some key points of macroeconomic theory. Fabrizio Zampolli reviews the theories that could justify using government debt management as an instrument of monetary policy. He reviews the argument for the irrelevance of open market operations under the New Keynesian paradigm. He considers too reasons why such operations may indeed trigger important portfolio rebalancing in the private sector. A key aspect of this highlighted by Bob Cumby is the choice that households make between bonds and money. Jagjit Chadha considers recent DSGE models incorporating financial frictions.

Papers in the third session of the workshop looked specifically at sovereign debt management. Government debt managers are often directed to take account of many objectives that are similar to those in the private sector. Examples include: minimising debt service costs; limiting refixing risks (ie the interest rate that must be paid to secure new funding); and reassuring financial markets of the country’s creditworthiness. Hans Blommestein and Anja Hubig refer to this as the “microportfolio approach”, and consider how this might change in a post-crisis world.

Debt managers could also be assigned quite different objectives derived from broader public policy considerations. But there are big disagreements about what such objectives might be. One could be tax smoothing in the face of macroeconomic shocks, the fiscal insurance theory: Alessandro Missale examines this perspective. The inherited structure of public debt could itself affect fiscal policy choices: Elisa Faraglia develops this line of reasoning. In the discussions, a large number of other possible policy objectives surfaced. One such aim could include the elastic supply of risk-free assets to serve as safe havens for private agents in a

---

<sup>2</sup> Caruana (2011) summarises four major policy risks created by enlarged central bank balance sheets: inflation; financial instability; distortions in financial markets; and conflicts with government debt managers. Hannoun (2012) argues that crisis-driven policy responses have put monetary policy frameworks under enormous pressure.

crisis. There are plausible financial stability grounds for this. Another aim could be to ensure that commercial banks have an adequate supply of shorter-term paper to meet liquidity risks.

A final session looked at recent balance sheet policies of central banks and their effects on government bond yields. Jagjit Chadha finds that UK quantitative easing had had a significant effect on the bond market. Torsten Ehlert takes explicit account of the specific pattern of US Treasury issuance, and finds that central bank purchases had limited the upward pressure on long-term rates of heavy government borrowing. Eric Swanson compares the effects of the Federal Reserve's recent balance sheet policies with the effects of its balance sheet policy in 1961. He finds that policy was constrained in the 1960s by fears that pushing the US long-term interest rate too low would lead to an outflow of gold. Morten Bech and Yvan Lengwiler find that central bank purchases of bonds not only reduced long-term interest rates, but also led to lower interest rate volatility.

## History: monetary theory and practice

Central bank balance sheet policies – with a specific focus on quantities, rather than interest rates, as instruments – have historically been key elements of standard monetary policy. This can be seen for example in the case of the United Kingdom. Until 1971, liquid asset and cash ratios were regularly applied in the United Kingdom as a policy tool to control monetary growth. The Bank of England managed sovereign debt at the time as one of its central tasks. Decisions about debt management were seen as an integral part of monetary policy and as having important macroeconomic consequences (Goodhart (2012), Sayers (1967) and Turner (2011)). In the late 1970s and early 1980s, for instance, a deliberate policy of *overfunding* the budget deficit (that is, issuing more long-term debt than needed for financing the deficit) came to be seen as a way of controlling the expansion of M3. Allen (2012) argues that short-term interest rate management proved to be ineffective in controlling M3; but issuing long-term debt to non-banks was effective.

Allen (2012) shows that several episodes in the United Kingdom since 1919 have demonstrated a close relationship between debt management and monetary policy. This relationship has two main aspects. The first is about prices: the objective of affecting interest rates at all maturities is important because different agents are affected by different interest rates. The second aspect is about quantities, notably the liquidity of the balance sheets of central banks. In the past, the Bank of England used a Liquid Asset Ratio to control bank lending. Their view was that, by selling less liquid, longer-dated government debt to banks, they could absorb their liquid assets and so tighten monetary policy. He explains, however, that the way that the central bank saw policy working was not necessarily the way it actually worked. The authorities could not determine whether banks or non-banks bought bonds – and in any case any sale would trigger a chain of portfolio adjustments. By mid-1985, however, banks were no longer constrained by a Liquid Asset Ratio, and “the Treasury’s willingness to use debt management to support monetary policy was exhausted”.

In the course of the Great Moderation of the 1990s, central banks in most advanced economies (but not in emerging market economies) abandoned quantitative monetary policy tools or targets. Central banks instead concentrated on the short-term interest rate as their sole monetary policy tool. Open market operations in long-term markets were no longer central. Sovereign debt management came to be regarded as having little to do with monetary policy.

The large scale of central bank purchases of government bonds since the onset of the 2007 crisis has undermined this separation. Quantitative easing in the United Kingdom since 2009 can be seen as underfunding the UK’s Public Sector Net Borrowing Requirement. This is the mirror image of the overfunding policy of the past that Allen describes. The aim today is to boost the growth of M3.

Tily (2012) reviews the theoretical (and frequently practical) contributions of Keynes to the debt management/monetary policy interactions in the United Kingdom that Allen analyses. Tily argues that uncertainty – not measurable risk – is the critical component of Keynes's monetary and macroeconomic theories. “The rate of interest twenty years hence”, Keynes wrote, “is uncertain ... [that is,] there is no scientific basis on which to form any calculable probability whatever. We simply do not know”. Because of this non-quantifiable uncertainty about the future, Keynes did not trust financial markets to produce the long-term interest rate the real economy required. In the 1930s, Keynes argued that the authorities underestimated their ability through debt management operations to control interest rates right across the maturity spectrum. The freedom to set short-term rates that leaving the Gold Standard gave was not enough. He thought that open market operations could have an effect on long-term interest rates both by changing the volumes of money and of bonds, and by influencing expectations in an uncertain world.

Hoogduin and Wierdsma (2012) discuss the policy responses to the current crisis from the perspective of the debate between Hayek and Keynes. Hayek believed that unemployment was not mainly caused by a lack of aggregate demand due to monetary or fiscal causes. In his view, it instead reflected disequilibrium in the real structure of the supply-side of the economy. Very low interest rates distort the choice between current and future consumption. A deliberate policy of keeping interest rates very low could also have distributional (and therefore political) implications. Such a policy shifts the burden of adjustment from debtors to creditors (especially pension funds). “What is the counterfactual?” asked one participant. If low interest rates avert widespread default by debtors, said one participant, creditors would be better off.

Another difference of view that one participant stressed was that Keynes, who shared Hayek's liberal belief in market forces to regulate *real* economic activities, believed that stronger State intervention was needed for *financial* markets, international as well as domestic.

Chamley, in his comment on these three papers in this volume, notes that changing the composition of government debt has a first order effect on the yield curve. But in a Modigliani-Miller world, private traders could undo the trading of the government, leaving aggregate real investment unaffected. He also stressed how the trading of government assets by the government or by the central bank can be a useful commitment device to a future policy, and so influence private sector behaviour now.

In the general discussion of the workshop, several participants agreed with Axel Leijonhufvud's much-cited view that the economy was self-stabilising only within certain limits, but not outside them (Leijonhufvud, 1968). It was argued that the Great Depression had taken the economy outside normal limits, and the same may have happened in the recent Great Recession. In that case, the economy needed to be guided back within normal limits. But it was unclear how long this would take or which policies would work best. The discussion also brought to the surface some dissatisfaction with our current models of monetary/financial linkages.

During the discussion, Lex Hoogduin also emphasised that Keynes linked liquidity to fundamental uncertainty (as distinct from quantifiable risk) and confidence. Having assets available which are perceived as safe increased confidence: liquidity and safety were closely linked. He argued that one could have government bonds as assets perceived as safe, and into which private agents could flee to safety in a crisis. One participant mentioned that a loss of safe assets had been experienced in many earlier crises in the emerging economies as confidence in the government eroded. This had led to a flight into safe assets abroad, and to domestic activity being driven to well below normal levels. Safe assets were useful as a crisis-related buffer. Another participant argued that it would be nice to have perfectly safe assets, but none existed. He thought that the zero risk weights on government bonds applied by financial regulators were not justified: they exaggerated public sector creditworthiness

over private sector creditworthiness. There was a need for searching for relatively low-risk private sector assets, and a great opportunity was being missed by not treating self-liquidating commercial bills as liquid assets for regulatory purposes.

## **Macroeconomics of debt management and monetary policy**

The second session of the workshop explored some macroeconomic theories on the links between monetary policy and government (or sovereign) debt management. Zampolli (2012) provides an overview of the literature on the macroeconomic effects of central bank open market operations and sovereign debt management. He discusses how economists' perspectives on portfolio balance effects have changed over the years. In the 1950s, both James Tobin and Milton Friedman regarded portfolio balance effects as very relevant for the working of monetary policy. The imperfect substitutability of assets (long-term bonds and capital, or bonds of different maturities) meant that open market operations that disturbed investors' portfolios affected the relative prices of assets. The "preferred habitat" approach of Culbertson (1957) provided a theoretical basis for imperfect substitutability: different bond holders have distinct preferences for certain maturities and there are limits to arbitrage by speculators.

In the 1970s, however, portfolio rebalancing effects had fallen out of favour as too partial equilibrium in character. Certain general equilibrium models, akin to Ricardian Equivalence, suggested the irrelevance of open market operations. The private sector could undo what the government debt managers did. And empirical work suggested only small quantitative effects in advanced economies with broad financial markets. New Keynesian models generally embody this "irrelevance approach".

The extraordinary balance sheet policies of central banks have forced a re-examination of this consensus. Zampolli therefore reviews some recent evolutions in the New Keynesian tradition based on frictions in financial intermediation and recent developments in the term structure theory of interest rates based on "preferred habitat" theories.

Cumby presented an analysis that looked at the choice households make between holding money and holding bonds (Canzoneri, Cumby and Diba (2012)). He showed how many striking conclusions follow from the fact that government bonds provide liquidity. He demonstrated how changes in fiscal policy will affect the natural rate of interest. Therefore the natural rate of interest will be very variable as governments try to cut budget deficits. He stressed that large deviations of the natural rate of interest from its steady state that result from fiscal adjustment would be very persistent.

Chadha drew on Caglar et al (2011) to explain the development of recent DSGE models that incorporate financial frictions. Such models allow for several interest rates and have liquidity premia in financial markets. Hence balance sheet measures have effects which they do not have in the basic New Keynesian model. The authors find that in these models the scale of quantitative easing needed to avoid a liquidity trap at the zero lower bound is large by historical standards, partly because most financial assets are close substitutes. One important drawback of current DSGE models of monetary policy is that they do not explicitly model default of households, firms or financial intermediaries (Goodhart and Tsomocos (2009), Galati and Moessner (2011)). It is not clear how this problem can be overcome in a satisfactory manner.

Stephen Cecchetti in his comments emphasised the importance of using macroeconomic models which incorporate financial frictions that create market imperfections both atemporally and intertemporally, in order for both private and public sector debt to matter. He also noted that while the commonly made modelling assumptions about rational expectations, information structures and optimisation can give unique equilibria, these assumptions are actually wrong and equilibria are not unique. Moreover, Cecchetti

suggested that representative agent macroeconomic models built on microeconomic foundations are not capable of addressing the questions in greatest need of being answered. He drew an analogy with theories about the level of the sea: concentrating on microeconomic foundations is like developing theories of fish movements and interactions, and ignoring the moon.

In the general discussion that followed, Christophe Chamley said that a critique of DSGE models is that in real life agents have to operate without the common knowledge that is typically assumed in such models. As a consequence, the rational expectations equilibrium in these models may not be a sufficiently realistic description of the real world economies. He cited the notion of “eductive” learning developed by Roger Guesnerie (Guesnerie (2005) and Evans et al (2011)). Agents decide on the basis of their assessment of what other investors will decide – about which they have imperfect information. If each agent has a sufficiently good knowledge of the structure of the economy and believes that other agents behave in a rational (ie self interested) way, the rational expectations equilibrium will soon prevail. It seems plausible to assume that agents will coordinate in this way if the structure of the economy is well understood and transparent. The alternative framework is “adaptive” or statistical learning. Statistical forecasts are continuously updated on the basis of forecast errors, which seems more plausible when the economy is more complex but sufficiently stable.

Chamley pointed out, however, that even the conditions highlighted by this literature may be too restrictive in practice. One possibility is the existence of strong strategic complementarities (ie when payoffs to an agent are affected by the decisions of others). This may lead to multiple equilibria even under common knowledge. In this case, agents may not necessarily be able to coordinate on a good equilibrium. They may end up in a socially sub-optimal equilibrium. Examples of lack of coordination due to strategic complementarities abound in macroeconomics. Critics can argue that the original mission of macroeconomics was the study of coordination failures and how policy could remedy that – something that the recent DSGE literature has mostly neglected, reneging on its original mission.

Even if the economy is sufficiently stable most of the time, there may be periods in which it undergoes severe changes, as during a crisis. In normal times, agents may be able to coordinate on the rational expectations equilibrium as most macroeconomic relationships can be easily predicted and are well understood. In the aftermath of a crisis, however, the working of the economy becomes too complex to understand and to predict. When the economy is in a deep recession, for example, there may be no investment because agents do not know whether there is an equilibrium with high investment. They do not know because the economy provides information only for small changes but not for large “jumps” which are the essence of multiple equilibria. These equilibria depend on agents’ beliefs about the true model of the economy and their beliefs about what other agents are thinking. Beliefs about the true model of how the economy works may determine the equilibrium and prove self-confirming.

Tily echoed these remarks, saying that this was one of Keynes’s original insights. Keynes held that the economy had to be viewed as a system of multiple equilibria – his was not a partial equilibrium model. Only the government, in his view, could act once business confidence had broken down. One participant said that the essence of the current crisis was a breakdown of financial relations and private credit supply following the greatest explosion of private debt – not government debt – since the Great Depression. How far public policies can help the process of expectation coordination, and so move the economy to a better equilibrium, remains a question of strong debate. Policymakers themselves are not omniscient; they too must learn about the complex economy.

## Sovereign debt management and economic theory

During the era of the Great Moderation in the 1990s, sovereign debt management came to be seen – for practical purposes – as being separable from monetary policy. Nevertheless, the logical link between debt management and monetary policy is inescapable – and in the past these two dimensions of official policy were seen to be closely linked.

Blommestein and Hubig (2012) look closely at the actual mandates of many Debt Management Offices (DMOs), namely to minimise borrowing costs subject to risk constraints. This is also a natural objective for any private sector manager required to engage in portfolio choice under uncertainty. But most governments are less liquidity-constrained than private borrowers. Because they can raise taxes and print money, they worry much less about refinancing risks. Even with fiscal and monetary policies taken as given, and not made subordinate to borrowing imperatives, the government with its own currency is still a dominant player in its own market. It can therefore directly affect the yield curve, and does not have to take interest rates as given. And governments have wider objectives than private agents: what difference does this make for portfolio choices of public debt managers? Blommestein and Hubig suggest that a different model may be needed for public debt managers in crisis times than in normal times.

Missale (2012) and Faraglia, Marcet and Scott (2012) look at the links between debt management and fiscal policy from quite distinct viewpoints. Missale (2012) looks at both the maturity choice of debt and the price indexation of debt from the perspective that medium-term fiscal policy should be guided by a kind of tax-smoothing rule. He argues that long-maturity debt provides the government with insurance against macroeconomic shocks. In particular, it reduces interest rate risk faced by the government, which would reduce government default risk. One participant at the workshop wondered whether the government needed such insurance: the government is surely the ultimate insurer? Another questioned this line of reasoning on the grounds that economic theory does not provide clear guidance on which sector in a given economy is best placed to undertake maturity transformation: should it be the government, the banks or households? The answer may depend on specific circumstances and can vary over time. For instance, issuing long-term rather than short-term government bonds to banks shifts interest rate risk from the government to banks. Banks would face reduced interest rate risk if they were to hold short-dated rather than long-dated government paper. How does one decide in what circumstances it would be better for government, not the private sector, to assume interest rate risks by issuing short?

Missale also argues that the absence of an accounting framework that correctly measures risk exposures precludes optimal debt management. He complains in particular about the excessive attention paid to current budget deficits in the evaluation of fiscal performance. This view recalls the work of Auerbach et al (1991), who suggested the use of generational accounting instead of a focus on fiscal deficits. Their approach might well be useful in designing and implementing a theory-based accounting framework suggested by Missale.

Faraglia, Marcet and Scott (2012) go in the opposite direction from that of Missale. They go from inherited debt to the path of fiscal policy. A government with debt has an incentive to “twist” interest rates to lower funding costs by promising a tax cut when bonds mature. This is a time-inconsistent promise and raises the issue of commitment in fiscal models. Their model does not assume complete markets, under which the buy-back strategy of the government has no implication for interest rates. With incomplete markets, the government has more power to “twist” interest rates. There is also a need for reflecting on making fiscal theory more realistic, and refining the assumption of commitment of a social planner to future tax rates made in this paper.

There is an interesting analogy between the micro versus macro approaches to debt management and the micro versus macro approach to financial regulation. Macroprudential frameworks are currently being developed (see Galati and Moessner (2011) for a survey),

and the development of a macro approach to sovereign debt management faces similar challenges. These include the question of which objectives government debt management should be assigned from a macro perspective. There is also the question of coordination with monetary policy. For example, Moessner in her comments in this volume asked whether they should provide longer-maturity assets perceived as safe, so as to make “safe assets” available in a crisis for private agents to hold, or flee into, and which pension funds and insurance companies can hold.

Another pertinent question is whether it would be better for debt managers to avoid the use of (often opaque) swaps in order to modify the maturity of their debt. In the United States, for instance, the Treasury does not use swaps. One participant argued that buying and selling government bonds at different maturities to modify duration would be more transparent; and it would also avoid the counterparty credit risk exposure of the swap contracts (see also Piga (2001)). During the general discussion, there was a lively debate about why sovereign debt managers should use interest rate swaps of different maturities. Another participant argued that governments had an advantage issuing at long maturities, so that it was cheaper to issue at long maturities and then swap to paying interest rates prevailing at shorter maturities. But the first participant replied that in that case the government had crowded out other borrowers at long maturities. It was mentioned that in the recent financial crisis there had been a heavy demand for short-term government paper so that it was easy for debt managers to issue short-term debt, and then use swaps to convert to long maturities. In this way, demand in the market could be matched. One participant argued that this amounted to trading swap margins.

Another pertinent question requiring further analysis was whether greater reliance should be placed on issuing index-linked debt. Historically, central banks had resisted the introduction of inflation-linked debt. The Radcliffe Report in 1958 recommended that the United Kingdom introduce such bonds. But it was only the prospect of nominal yields of nearly 16% on conventional 20-year bonds in 1981 that forced their introduction in the United Kingdom. They are now broadly accepted. Most economists welcome inflation-linked paper: giving investors protection against inflation risks helps make markets more complete and can lower long-term borrowing costs. But some still worry that it could increase fiscal vulnerability, in the case of an unexpected surge in inflation.

## **Recent balance sheet policies**

Central bank balance sheets in the advanced countries have increased by a factor of three or four in the past few years. In addition, central banks have bought, on a very large scale, the long-dated paper (government bonds but also mortgage-backed securities) that they would normally avoid. The impact of these policies on relative prices depends on asset substitutability. This will in turn depend on expectations about future relative prices. Perfect certainty of investors about the “normal” level of long-term rates would greatly limit the efficacy of such policies. But if expectations about the future path of interest rates become unanchored – whether they become more dispersed, more unstable over time or simply more uncertain – the investors will regard the short-dated and long-dated government bonds as imperfect substitutes. In addition, financial firms engaged in interest rate arbitrage face capital and other constraints. The crisis may have reduced the supply of interest rate arbitrage, especially from large international banks. In conditions of imperfect substitutability and constraints on arbitrage, shifting government debt issuance from long to short government bonds should flatten the yield curve. Central bank purchases of long-term government bonds have the same effect.

The consensus is that such policies have been effective, but there is disagreement about the size of such effects and about their permanence. Bernanke et al (2004) concluded from their analysis that:

*“We believe that our findings go some way toward refuting the strong hypothesis that nonstandard policy actions, including quantitative easing and targeted asset purchases, cannot be successful in a modern industrial economy. However, the effects of such policies remain quantitatively quite uncertain”.*

This is still the consensus emerging from the recent literature, namely that quantitative easing seems effective, but that the size of the impact is uncertain. And the relative importance of the channels through which quantitative easing operates – such as the portfolio rebalancing, signalling and bank reserves channels – remains unclear (Goodhart (2012), Krishnamurthy and Vissing-Jorgensen (2011)). For large-scale asset purchases, the relative importance of the scarcity (available local supply) channel associated with the traditional preferred habitat literature and the duration channel associated with interest rate risk have been studied in D’Amico et al (2011).

Blommestein and Turner (2012) argue that studies of the effectiveness of quantitative easing should also take account of the aggregate change in the structure and maturity of sovereign debt, including that due to changes in sovereign debt issuance by treasuries or DMOs. Many studies take the pattern of government debt issuances as exogenous. But there is evidence that decisions by debt managers on the maturity of debt issuance have, historically, not been exogenous with respect to monetary and fiscal policies.

It is interesting to consider what central banks could have done as an alternative to asset purchases. One possible alternative (or supplement) would be for monetary policymakers not just to announce the current desired level of short-term interest rates, but also to provide some form of forward guidance on future policy rates. Indeed, FOMC members decided to provide their forecasts of policy rates starting with their meeting in January 2012.

The three papers in this session discuss the impact of balance sheet policies. One question is whether the analysis should centre on the asset side of the central bank (ie the market prices of the assets the central bank buys) or on the liability side (ie the expansion in monetary reserves that follows from asset purchases). Some analyses stress the initial impact of asset purchases on market prices. Others suggest that it is the impact of increased bank reserves (the liability side of the central bank’s balance sheet) that stimulates an expansion in broad money.

Ehlers (2012) studies the effects of the Federal Reserve’s Maturity Extension Program (“Operation Twist 2”). He does not consider only the Federal Reserve purchases at each segment of the yield curve. He also carefully reviews the pattern of increasing issuance by the Treasury – which many other studies ignore. He finds that new Treasury issuance is a heavy counterweight to central bank asset purchases, which can be seen as offsetting the otherwise adverse impact on government bond prices of a pronounced increase in sovereign debt levels. Swanson (2011) discussed the findings of his Brookings Papers article, in which he compares the effects of the Federal Reserve’s balance sheet policy in 1961 (“Operation Twist”) with the effects of its recent balance sheet policies, and studies what can be learnt from the earlier experience for the recent episode. He points out that US fears in the 1960s that pushing the long-term interest rate too low would lead to an outflow of gold was a constraint on policy.

Bech and Lengwiler (2012) look in greater detail at the effects of quantitative easing, and the financial crisis more generally, on the dynamics of the yield curve. They consider short, medium and long maturities separately. They find that shocks hitting nominal long-term interest rates have increased in recent years: they find evidence that Federal Reserve purchases reduced the interest rate volatility at the long end.

Breedon, Chadha and Waters (2012) show that the first bout of quantitative easing in the United Kingdom lowered the net supply of long-term bonds by 14% of GDP and hence five-year forward, five-year maturity rates fell by just over half of a percentage point. They also find that these operations made all bond markets (including corporate bonds) more liquid. But they find little evidence for any broader consequences on other asset prices or monetary aggregates. Although the counterfactual is hard to assess – how much lower would asset prices or money growth have been in the absence of quantitative easing – the absence of a discernible effect on other possible transmission mechanisms has led most analysts to concentrate on the impact on bond yields.

Commenting on the article by Swanson, Reichlin noted that, in an event study analysis, expectations of future policy rates and how a policy is communicated, can both affect the market's reaction to the policy announcement (Reichlin, 2011). It was difficult to separate such effects and isolate the portfolio balance effect. Moreover, she noted that the results on the effects of balance sheet policies on interest rates other than government bond yields were less clear.

An issue raised during the general discussion at the workshop was that the effects of balance sheet policies should also be measured via changes in quantities, not just changes in prices. There was still much research to be done on this. For example, if people selling gilts to the Bank of England bought corporate bonds instead, and the proceeds of the corporate bond issues were used to repay debt to banks, then quantitative easing would help to ease strains on bank liquidity. It was necessary to measure the portfolio rebalancing effects of quantitative easing, and distinguish them from the signalling that the central bank intended to keep policy rates lower for longer.

## Conclusion

The workshop did not seek any convergence of view on current, difficult policy questions. Indeed, differences of view on methodology, on theory and on the interpretation of recent policies made for a very stimulating day. There was, however, broad agreement about the relevance of a fundamental question: how will the high public debt-to-GDP ratios that many advanced countries will face for many years change macroeconomic policies? Different answers to this question often lie behind disagreements about the frameworks that should guide the implementation of policies in the decade ahead.

## References

Allen, W A (2012): "Government debt management and monetary policy in Britain since 1919", this volume, pp 15–50.

Auerbach, A, Gokhale, J and L Kotlikoff (1991): "Generational accounting: A new approach for understanding the effects of fiscal policy on saving", *Cleveland Fed Working Paper* No 9107.

Bech, M and Y Lengwiler (2012): "The financial crisis and the dynamics of the yield curve", this volume, pp 257–76.

Bernanke, B, V Reinhart and B Sack (2004): "Monetary Policy Alternatives at the Zero Bound: An Empirical Assessment", *Brookings Papers on Economic Activity*, 2:2004, pp 1–78.

Blommestein, H J and A Hubig (2012): "Is the micro portfolio approach still appropriate? An examination of the analytical framework of public debt management", this volume, pp 141–55.

- Blommestein, H J and P Turner (2012): “Interactions between sovereign debt management and monetary policy under fiscal dominance and financial instability”, this volume, pp 213–37.
- Breedon, F, J S Chadha and A Waters (2012): “The financial market impact of UK quantitative easing”, this volume, pp 277–304.
- Caglar, E, J S Chadha, J Meaning, J Warren, J and A Waters (2011): “Non-conventional monetary policies: QE and the DSGE literature”, in *Interest Rates, Prices and Liquidity: Lessons from the Financial Crisis*, Editors: Chadha, J S and S Holly, Cambridge University Press, pp 240–73.
- Canzoneri, M, R Cumby and B Diba (2012): “Monetary policy and the natural rate of interest”, this volume, pp 119–34.
- Caruana, J (2011): “Why central bank balance sheets matter”, Keynote address at the Bank of Thailand–BIS conference on “Central bank balance sheets in Asia and the Pacific: the policy challenges ahead”, Chiang Mai, Thailand, 12 December, [www.bis.org/speeches/sp111216.htm](http://www.bis.org/speeches/sp111216.htm)
- Culbertson, J (1957): “The Term Structure of Interest Rates”, *Quarterly Journal of Economics*, Vol 71, pp 485–517.
- D’Amico, S, W English, D López-Salido, and E Nelson (2011): “The Federal Reserve’s Large-Scale Asset Purchase Programs: Rationale and Effects”, Federal Reserve Board, mimeo.
- Ehlers, T (2012): “The effectiveness of the Federal Reserve’s Maturity Extension Program – Operation Twist 2: the portfolio rebalancing channel and public debt management”, this volume, pp 245–55.
- Evans, G W, R Guesnerie and B McGough (2011): “Eductive stability in real business cycle models”. August. Mimeo.
- Faraglia, E, A Marcat and A Scott (2012): “Debt management and optimal fiscal policy with long bonds”, this volume, pp 177–212.
- Galati, G and R Moessner (2011): “Macroprudential policy – a literature review”, *BIS Working Paper* No 337, [www.bis.org/publ/work337.htm](http://www.bis.org/publ/work337.htm)
- Goodhart, C and D Tsomocos (2009): “Default and DSGE models”, contribution on VoxEU, <http://www.voxeu.org/index.php?q=node/4283> (accessed on 31 January 2012).
- Goodhart, C (2012): “Monetary policy and public debt”, *Financial Stability Review*, Banque de France, April.
- Guesnerie, R (2005): *Assessing rational expectations 2: “eductive” stability in economics*. MIT Press.
- Hannoun, H (2012): “Monetary policy in the crisis: testing the limits of monetary policy”, speech at the 47th SEACEN Governors’ Conference, Seoul, Korea, 13–14 February, [www.bis.org/speeches/sp120216.htm](http://www.bis.org/speeches/sp120216.htm)
- Hoogduin, L and P Wierdsma (2012): “Thoughts on policies and the policy framework after a financial crisis”, this volume, pp 83–90.
- Krishnamurthy, A and A Vissing-Jorgensen (2011): “The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy”, *NBER Working Paper* No 17555, October.
- Leijonhufvud, A (1968): *On Keynesian economics and the economics of Keynes: a study in monetary theory*, Oxford University Press.

Missale, A (2012): “Sovereign debt management and fiscal vulnerabilities”, this volume, pp 157–76.

Piga, G (2001): *Derivative and public debt management*, ISMA in cooperation with the Council on Foreign Relations, New York ([www.icmagroup.org](http://www.icmagroup.org)).

Reichlin, L (2011): “Comment by Lucrezia Reichlin”, *Brookings Papers on Economic Activity*, Spring 2011, p 189–195.

Sayers, R (1967): *Modern Banking*, Oxford University Press, 7th edition.

Swanson, E (2011): “Let’s twist again: A high-frequency event-study analysis of Operation Twist and its implications for QE2”, *Brookings Papers on Economic Activity*, Spring, p 151–187.

Tily, G (2012): “Keynes’s monetary theory of interest”, this volume, pp 51–81.

Tily, G (2007): *Keynes betrayed: Keynes’s General Theory, the Rate of Interest and Keynesian Economics*, Palgrave Macmillan.

Turner, P (2011): “Fiscal dominance and the long-term interest rate”, Financial Markets Group, London School of Economics, *Special Paper* No 199, May, <http://www2.lse.ac.uk/fmg/workingPapers/specialPapers/PDF/SP199.pdf>

Zampolli, F (2012): “Sovereign debt management as an instrument of monetary policy: an overview”, this volume, pp 97–118.