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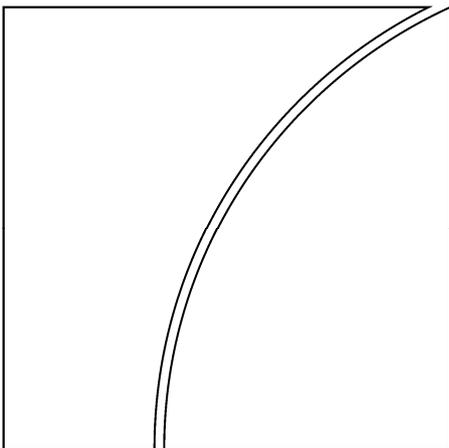
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Unconventional monetary policies: an appraisal

by Claudio Borio and Piti Disyatat

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Unconventional monetary policies: an appraisal

Claudio Borio and Piti Disyatat¹

Abstract

The recent global financial crisis has led central banks to rely heavily on “unconventional” monetary policies. This alternative approach to policy has generated much discussion and a heated and at times confusing debate. The debate has been complicated by the use of different definitions and conflicting views of the mechanisms at work. This paper sets out a framework for classifying and thinking about such policies, highlighting how they can be viewed within the overall context of monetary policy implementation. The framework clarifies the differences among the various forms of unconventional monetary policy, provides a systematic characterisation of the wide range of central bank responses to the crisis, helps to underscore the channels of transmission, and identifies some of the main policy challenges. In the process, the paper also addresses a number of contentious analytical issues, notably the role of bank reserves and their inflationary consequences.

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¹ Bank for International Settlements

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Introduction ²

The global financial turmoil that erupted in 2007 and the subsequent sharp downturn in economic activity have elicited an unprecedented response from major central banks. They have cut policy rates aggressively and adopted several measures loosely termed “unconventional monetary policies”. This approach to monetary policy has generated much discussion in academia and in the popular press. A number of key issues have become the subject of a heated debate. These discussions, however, are often hampered by varying definitions of such policies and disparate views regarding their transmission channels.

This paper addresses some of these gaps by providing a general framework to think about unconventional monetary policies. Their distinguishing feature is that the central bank actively uses its balance sheet to affect directly market prices and conditions beyond a short-term, typically overnight, interest rate. We thus refer to such policies as “balance sheet policies”, and distinguish them from “interest rate policy”. We obtain a unique classification scheme based on two criteria: how the policies alter the structure of private sector balance sheets and the specific market explicitly targeted. The framework helps to classify policies in a consistent way, to understand how they fit within the overall context of monetary policy implementation, to highlight the relevant transmission mechanisms and to see their close relationship with other government policies, such as debt management.

Beyond offering the general classification, we emphasise five substantive points.

First, the policy responses to the crisis are not really unconventional in their essence. It is the specific market segment chosen as the focus of central bank operations that is, for the most part, novel – at least by recent experience. Moreover, rather paradoxically, some of these policies would have been regarded as “canonical” in academic work on the transmission mechanism of monetary policy done in the 1960s-1970s, given its emphasis on changes in the composition of private sector balance sheets.

Second, a key feature of balance sheet policies is that they can be entirely decoupled from the level of interest rates. Technically, all that is needed is for the central bank to have sufficient instruments at its disposal to neutralise the impact that these policies have on interest rates through any induced expansion of bank reserves (holdings of banks’ deposits with the central bank). Generally, central banks are in such a position or can gain the necessary means. This “decoupling principle” also implies that exiting from the current very low, or zero, interest rate policies can be done independently of balance sheet policies.

Third, we argue that the typical strong emphasis on the role of the expansion of bank reserves in discussions of unconventional monetary policies is misplaced. In our view, the effectiveness of such policies is not much affected by the extent to which they rely on bank reserves as opposed to alternative close substitutes, such as central bank short-term debt. In particular, changes in reserves associated with unconventional monetary policies do not *in and of themselves* loosen significantly the constraint on bank lending or act as a catalyst for

² This paper was the basis for a keynote lecture at the of a keynote lecture at the 41st Annual Conference of the Money Macro and Finance Research Group, Bradford, 7-9 September 2009 and is forthcoming in *The Manchester School* journal. We would like to thank Morten Bech, Andrew Filardo, Spence Hilton, David Laidler, Robert McCauley, William Nelson, Francesco Papadia and Tony Courakis for helpful comments. Magdalena Erdem provided excellent research assistance. All remaining errors are ours. The views expressed are those of the authors and do not necessarily represent those of the Bank for International Settlements. Correspondence: claudio.borio@bis.org; piti.disyatat@bis.org

inflation. At the same time, reliance on bank reserves does raise important communication and interpretation issues.

Fourth, central bank balance sheet policies need to be viewed as part of the consolidated government sector balance sheet. The main channel through which they affect economic activity is by altering the balance sheet of private sector agents, or influencing expectations thereof. As a result, almost *any* balance sheet policy that the central bank carries out can, or could be, replicated by the government; conversely, anything that the central bank does has an impact on the consolidated government sector balance sheet. In other words, the central bank has a monopoly over interest rate policy, but not over balance sheet policy. This raises tricky questions about coordination, operational independence and division of responsibilities.

Finally, balance sheet policies can have a significant impact on the financial risks absorbed by the central bank. The extent depends on their characteristics and on how much they are relied upon. This, too, raises questions about operational autonomy and credibility, largely reflecting the impact of losses on the financial position of the central bank. The significance of these issues depends on factors such as accounting conventions, the rules for the distribution of profits to the government and for recapitalisation, and broader aspects of the relationship of the central bank with the body politic.

The rest of the paper is organised as follows. Section I outlines a framework for thinking about and classifying unconventional monetary policies. The framework is then used to provide an overview of recent central bank actions. Section II discusses the transmission mechanism of unconventional monetary policies, questioning the heavy emphasis given to the role of bank reserves in mainstream discussions. Section III highlights some broader policy challenges raised by balance sheet policy.

I. A framework for classifying unconventional monetary policies

A brief discussion of how monetary policy is implemented is a natural starting point for a framework to classify unconventional monetary policies.

Monetary policy implementation: interest rate policy and balance sheet policy

At its most basic level, the implementation of monetary policy has two core elements (Borio (1997), Borio and Nelson (2008), Disyatat (2008)). The first comprises mechanisms to *signal* the desired policy stance (“signalling”); the second comprises operations that involve the use of the central bank balance sheet to make that policy stance effective. Because these operations typically involve managing the amount of central bank funds in the system, they are generally known as “liquidity management operations”.

Before the recent crisis, monetary policy implementation across countries had generally converged on an approach in which the policy stance was defined *exclusively* in terms of a short term interest rate – henceforth referred to as “interest rate policy” (eg Markets Committee (2008)). In this approach, the corresponding policy signal generally takes the form of the announcement of a “policy rate”, which defines the desired level of the interest rate. In turn, liquidity management operations are designed exclusively to help make that interest rate effective: they ensure that a market “reference rate”, typically an overnight rate, tracks the desired interest rate level closely. As such, liquidity management operations play a

purely technical and supportive role. They neither impinge upon, nor contain any information relevant to, the overall stance of policy.³

The fulcrum of the implementation of interest rate policy is the market for bank reserves. This is a peculiar market. By virtue of its monopoly over this asset, the central bank can set the quantity and the terms on which it is supplied at the margin. As such, the central bank is able to set the opportunity cost (“price”) of reserves, the overnight rate, to any particular level, simply because it *could* stand ready, if it so wished, to buy and sell unlimited amounts at the chosen price. This is the source of the credibility of the signal.

Crucially, the interest rate can be set quite *independently* of the amount of bank reserves in the system. *The same amount of bank reserves can coexist with very different levels of interest rates; conversely, the same interest rate can coexist with different amounts of reserves.* What is critical is how reserves are remunerated relative to the policy rate. We refer to this as the “decoupling principle”.⁴ It is a principle that has far-reaching implications for the rest of the analysis.

There are two types of remuneration scheme. Typically, central banks remunerate excess reserve holdings – ie. holdings over and above any minimum requirements – at a rate that is *below the policy rate* (scheme 1 in Figure 1). As a result, banks seek to economise on them, keeping desired holdings to what is necessary for settlement purposes. The corresponding amount demanded is exceedingly interest-inelastic – effectively a vertical schedule. Supplying this amount is the fundamental task of monetary operations across all central banks, regardless of the policy regime. Failure to do so would result in significant volatility of the overnight interest rate. Any excess would drive it to the floor set by the remuneration on excess reserves (zero or the rate on any standing deposit facility), as banks seek to get rid of unwanted balances *by lending in the overnight interbank market*. Any shortfall would lead to potential settlement difficulties, driving the rate to unacceptably high levels or to the ceiling set by end-of-day lending facilities.⁵ Once the demand for bank reserves has been met, the central bank can set the overnight rate at whatever level it wishes by signalling the level of the interest rate it would like to see. Signalling acts as a *coordinating device* for market expectations.

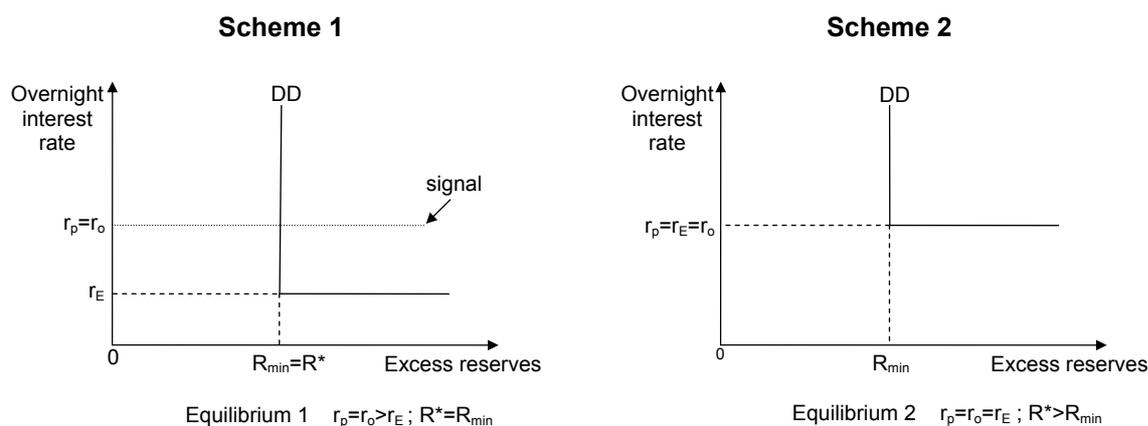
The implication is that, in setting the interest rate, no open market operations need be involved at all. In particular, the interest rate is not controlled by moving up and down a well-behaved, traditional demand schedule. This point, well known to practitioners for a long time, has recently been aptly captured in Paul Tucker’s observation on how central banks can steer interest rates: “(o)ne is to use OMOs [open market operations] adjust the quantity of reserves to bring about the desired short-term interest rate, implicitly or explicitly drawing on an identified demand schedule. *Neither in the past nor in the current review have we even*

³ In the past, in those cases in which explicit policy rate announcements were not made, central banks could also influence interest rates through quantity signals, such as through the pace of injection of liquidity in the system. In these cases, there was no clear separation between liquidity management and signalling functions. Even then, however, the policy would be designed to influence interest rates and, as discussed further below, it could be implemented without changes in the overall size of the balance sheet. See Borio (1997) for an elaboration of this point.

⁴ See, eg Borio (1997) for a detailed analysis of the market for bank reserves, including in the context of averaging provisions for reserve requirements. See Goodfriend (2000) and Disyatat (2008) for discussions focusing on the possibility of decoupling and Disyatat (2008) for an exploration of the analytical implications of policy implementation for broader aspects of monetary policy.

⁵ To simplify the argument, we are here abstracting from provisions that allow averaging in the reserve requirements over a given period (the “maintenance period”). The argument therefore relates to the last day of the maintenance period.

Figure 1: Reserves remuneration schemes¹



r^p = policy rate; r_o = overnight rate; r_E = rate on excess reserves; R_{min} = minimum amount of balances required for settlement purposes; R^* = amount of reserves in equilibrium.

¹ This figure describes the situation when there are no reserve requirements with averaging provisions. Consequently, the amount of reserves that banks need to hold overnight, R_{min} , is determined entirely by banks' settlement needs, including any precautionary element. This demand depends on the wholesale settlement arrangements in place, and is in effect *independent* of the interest rate. Under scheme 1, the existence of an opportunity cost of reserve holdings ($r_o - r_E$) implies that when excess reserves exceed R_{min} , banks will attempt to lend out this surplus. In so doing, they will drive the overnight rate down to r_E . At this point the opportunity cost is eliminated. Under scheme 2, there is no opportunity cost of holding excess reserves and banks will be indifferent about the amount of reserves they hold as long as the minimum for settlement purposes is satisfied.

briefly entertained the notion that this is realistic." (Tucker (2004, p. 12, italics added)). What is true of the Bank of England is also true, and has been true, of other central banks.⁶

Alternatively, central banks may decide to remunerate excess reserve holdings at the policy rate (scheme 2 in Figure 1). This sets the opportunity cost of holding reserves for banks to zero so that the demand curve becomes effectively horizontal at the policy rate. The central bank can then supply as much as it likes at that rate. Again, the interest rate level is delinked from the amount of bank reserves in the system. The Reserve Bank of New Zealand and the Norges Bank have operated under such a scheme for some time, well before the crisis.

This tight control over the market for bank reserves has a key implication: monetary policy can, and often is, implemented without calling for significant changes in the size of the central bank's balance sheet. Given a policy that is exclusively focused on setting a short-term interest rate, the overall size of central banks' balance sheets will be primarily driven by exogenous (autonomous) factors, such as the demand for cash by the public, government deposits, and reserve requirements. Typically, these factors move only slowly over time.

In an interest rate policy approach, the policy rate summarises the official policy stance and is the key communication device; its level, however, does not fully pin down the policy stimulus. A given policy rate may be associated with a wide configuration of yields and asset prices, and hence varying monetary conditions. For example, where long-term yields are a significant driver of private sector activity, a given short-term rate may be associated with

⁶ For formal theoretical treatments consistent with this analysis, see Whitesell (2006), Bindseil (2004), and Woodford (2000). Relative to actual practice, however, these analyses put too much weight on the symmetry of corridor systems, where standing facilities provide explicit ceilings and floors on interest rates that move in lock-step with the policy rate. For example, the same outcome prevailed in countries in which no corridor was present (see Borio (1997)).

relatively easy financial conditions – if the term structure is flat – or relatively restrictive ones – if it is steeply upward sloping.⁷ In normal times, when setting the policy rate the central bank internalises these broader conditions. And the primary avenue to influence them over and above the policy rate is through the communication of *future* policy intentions, ie future policy rates themselves.

In certain situations, however, the central bank may wish to affect broader financial conditions more directly, actively using its balance sheet to that effect. In contrast to interest rate policy, by their very nature such operations generally result in substantial changes in the central bank balance sheet – in terms of size, composition and risk profile. The reason is that they target market segments that go well beyond that for bank reserves and over which the central bank has far less control. We will refer to such operations as *balance sheet policy*.⁸

Before classifying the various forms of balance sheet policy, two general points deserve highlighting.

First, so defined, balance sheet policy is not that unconventional. The most familiar form is foreign exchange intervention. Here, purchases or sales of foreign currency seek to influence the level of the exchange rate separately from the policy rate. In the current crisis, however, balance sheet policy has also been employed to target term money market rates, long-term government bond yields and various risk spreads. The justification, underlying mechanics, channels of influence and balance sheet implications are analogous to those for foreign exchange intervention. It is the choice of market targeted that is atypical and in some cases unprecedented. It is this choice that makes the policies “unconventional”, *not the overall approach of seeking to influence specific elements of the transmission mechanism other than the policy rate*.

Second, as a corollary of the “decoupling principle”, balance sheet policy can be implemented *regardless* of the prevailing interest rate level. All that is needed is for the central bank to have the means to decouple the two policies. There are essentially two ways of doing this. One is to make sure that the market for bank reserves is fully insulated from those policy operations (scheme 1). In this case, central banks need to engage in offsetting transactions that “sterilise” the impact of the operations on the amount of reserve balances. This is how foreign exchange intervention is routinely handled. Alternatively, the central bank needs to make sure that any induced changes in the amount of bank reserve holdings do not have an impact on the market reference interest rate (scheme 2). Paying interest on reserves at the policy rate achieves this, as banks would be indifferent about the amounts held. Thus, so long as central banks have sufficient instruments, *the size and structure of their balance sheets can be managed separately from the policy rate targeted*.

Actual experience confirms this. Many Asian central banks that intervened actively in foreign exchange markets in recent years have attained their interest rate targets despite major expansions of their balance sheets. For example, Figure 2 shows how sustained accumulation of foreign assets has been accommodated on central banks’ balance sheets in Korea, Thailand and China. In all three countries, a key offsetting instrument on the liability side has been the issuance of central bank bills. In addition, the People’s Bank of China has

⁷ Indeed, the large macro-finance literature demonstrates that at least two and most probably three factors are needed to explain the term structure of interest rates, so that the short rate alone can never be sufficient to characterise overall financial conditions (Dai and Singleton (2000); Duffee (2002)).

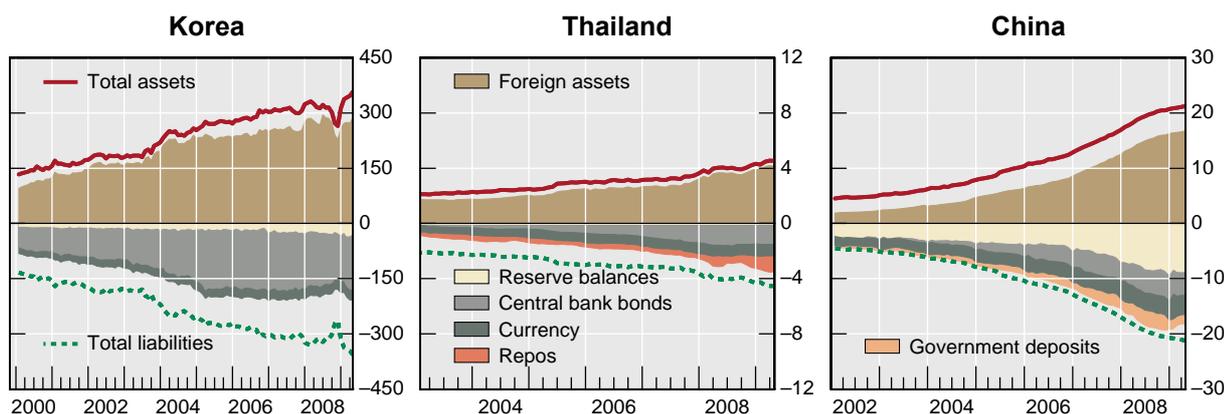
⁸ Moreover, if liquidity management operations are defined broadly to encompass all such changes in the balance sheet, regardless of whether they impinge on the supply of bank reserves or not, balance sheet policy can be thought of as elevating liquidity management operations from a passive to an active role. In this broad sense, there is some overlap between balance sheet policy and central banks’ lender of last resort operations to stabilise markets. See Cecchetti and Disyatat (2009) for discussions of the use of central bank tools from a lender of last resort perspective.

relied on higher reserve requirements while the Bank of Thailand has also heavily utilised repos to absorb liquidity. Similarly, during the current crisis the Federal Reserve, the Bank of England and the European Central Bank pursued balance sheet policy while rates were positive.

The decoupling of interest rate from balance sheet policy means that unwinding balance sheet policy and shrinking the central bank's balance sheet are not preconditions for raising interest rates. For example, central banks that pay interest on excess reserves simply have to raise this rate along with the policy rate to implement an interest rate tightening without changing the outstanding amount of bank reserves (scheme 2). For those that do not pay interest on reserves at the market rate (scheme 1), excess reserves must be withdrawn from the system before interest rate tightening, though this does *not* necessarily entail shrinking the central bank's balance sheet. As such, discussions of exit strategies can also be delineated along two separate dimensions: the appropriate level of interest rates, on the one hand, and the desired central bank balance sheet structure, on the other. The former is likely to be dictated exclusively by considerations about the traditional inflation output trade-off; the latter is likely to be influenced also by considerations about market impact, including the potential disruptions that an unwinding might cause.

Figure 2: Central bank assets and liabilities

In trillions of respective currency units



Sources: Datastream; national data.

Forms of balance sheet policy

Balance sheet policy takes a variety of forms. Absent an established framework, the wide range of possible permutations has resulted in sometimes conflicting characterisations of central bank actions, generating unnecessary confusion. To clarify the substantive distinctions, we classify the various types of policy based on two criteria: (a) the impact on the structure of private sector balance sheets, and (b) the market segment explicitly targeted. The former harks back to an old tradition in the economic literature, which analyses the effects of policy based on the assumption of imperfect substitutability between different types of financial claim (Tobin (1963, 1969), Friedman (1956)). The latter recognises that changes in the structure of balance sheets alone are not sufficient to determine the impact on prices and funding conditions: how the operations are carried out and communicated also matters.

We distinguish four broad categories of balance sheet policy: exchange rate policy; quasi-debt management policy, credit policy and bank reserves policy. Table 1 provides a schematic characterisation.

In the case of *exchange rate policy* the central bank alters the net exposure of the private sector to foreign currencies through operations in the foreign exchange market. The intention is to affect the exchange rate, its level and/or volatility, at any given level of the policy rate.

In the case of *quasi-debt management policy*, central bank actions targeted at the market for public sector debt alter the composition of claims on the public (government) sector held by the private sector. These claims include securities of different maturity as well as bank reserves held with the central bank. A primary intention is to alter the yield on government securities, thereby influencing the cost of funding and asset prices more generally. We use the qualifier “quasi” only to stress that the objectives may be quite different from those of debt management and to leave room for a substantive economic difference between bank reserves and other claims on the public sector, depending on their specific characteristics.⁹

Table 1: Typology of balance sheet policies

		Impact on private sector balance sheets		
		Change in net FX exposures	Change in the composition of claims on the public sector	Change in profile of claims on private sector and/or composition of claims on public vs private sector
Market targeted	Foreign exchange	★		
	Public debt/securities		▣	
	Private credit/securities			◆
	Bank reserves			
Exchange rate policy (★); Quasi-debt management policy (▣); Credit policy (◆); Bank reserves policy (shaded area)				

In the case of *credit policy*, central bank operations targeting specific segments of the private debt and securities market alter the composition of private sector balance sheets by changing the central bank’s exposure profile to private sector claims. This can be done by modifying the profile of a *given* amount of private sector claims held by the central bank or by modifying the composition between private and public sector (central bank and government) claims held by the private sector. Such changes can be implemented in a number of ways, including through modifications of collateral, maturity and counterparty terms on monetary operations, by providing loans or acquiring private sector claims, including equities. How individual private sector balance sheets are affected, of course, ultimately depends on the

⁹ This links back to that strand of economic thought that sees *all* monetary policy as reflecting changes in the (exogenously set) relative quantities of “money” and forms of government debt; see, in particular, Tobin (1963), but also M Friedman (1960) and B Friedman (1981). In Tobin’s framework, the key characteristic of (outside) money is that it pays interest at an exogenous (typically zero) interest rate. Note, however, that we do not explicitly include cash with the public in the analysis. Cash is purely demand-determined, automatically accommodated by the central bank, and plays no substantive role in policy implementation. This contrasts with that strand of the economic literature that treats the monetary base, comprising both cash and bank reserves, as the key monetary aggregate, seen as “outside money”.

decisions of individual economic agents. The primary intention of credit policy is to alter financing conditions for the private sector.¹⁰

In the case of *bank reserves policy*, the central bank sets a specific target for bank reserves *regardless* of how this is counter-balanced on the asset side of its balance sheet – such as through the acquisition of foreign exchange or domestic-currency denominated claims, be these on the public or private sectors. As a result, the ultimate impact on private sector balance sheets is not uniquely determined and depends on the asset counterpart to the reserves' expansion. The justification for such a policy will depend on views on the transmission mechanism, ranging from inducing an expansion in money and credit to limiting strains on the intermediaries, through the assurance of ample funding.

Four additional points are worth highlighting.

First, the analytical distinctions used highlight the economic substance of the operations. Altering the pricing of the asset underlying a transaction generally requires absorbing or shedding exposure to the corresponding cash flows. For example, reversed transactions, such as securities lending and repos, do not result in such a transfer and, to a first approximation, leave the prices of the underlying securities transacted unaltered.¹¹ They are *funding* transactions and are therefore classified as credit policy, even if the underlying asset is a public sector security (eg in a repo) or a foreign exchange claim (eg in a foreign exchange swap). Functionally, the asset transacted is acting as collateral.

Second, the impact of balance sheet policy on the size of the central bank's balance sheet will largely depend on how the operations are "financed". They will leave the size unchanged if increases in specific types of claim held by the central bank are financed by running down other claims; they will increase it if they are financed by issuance of central bank liabilities, be these in the form of collateralised (eg repos) or uncollateralised (eg central bank bills or bank reserves) obligations.¹²

Third, because balance sheet policies affect economic activity by altering the structure of private sector balance sheets, they need to be considered in the context of the consolidated government sector balance sheet. In principle, almost any balance sheet policy that the central bank carries out can, or could be, replicated by the government. The only claim that the government does not issue is bank reserves; and, as discussed below, issuing it in large quantities actually seriously weakens its "specialness". And the government could also lend to the private sector or purchase equities. Indeed, this is sometimes the case, even under normal market conditions. The management of public sector pension funds is an obvious example.

Finally, balance sheet policies have a varying impact on the risk absorbed by the central bank; however, by their very nature, they raise it compared with interest rate policy. Foreign exchange policy requires the central bank to absorb foreign exchange risk, and exposes it to

¹⁰ The use of the term *credit policy* here is different from that employed by Goodfriend (1994), which is broader, as it pertains to any "...changes in central bank's assets while holding the stock of high-powered money fixed." (Goodfriend (1994), p. 573). Essentially, Goodfriend equates interest rate policy with operations that change reserves and credit policy with everything else.

¹¹ The prices may change, however, if the assets are in scarce supply and trade at a premium (eg, when a particular security is highly prized for its collateral services at a time when access to funding is impaired).

¹² In some respects, the impact on balance sheet size is an arbitrary function of the accounting convention. For example, offsetting the impact on reserves via repos as opposed to FX swaps has different balance sheet implications. While functionally both are forms of collateralised borrowing and serve the same purpose, repo obligations are recorded on-balance sheet while FX swap obligations are off-balance sheet items. This is one reason why we do not base our classification scheme of balance sheet policies on their impact on the central bank's balance sheet but rather on their economic impact and intent.

varying degrees to market and credit risk (eg Borio et al. (2008)). Quasi-debt management policy exposes the central bank to interest rate risk. And credit policy, at a minimum, calls for the central bank to take on credit risk to some degree. This risk may be quite low, as when credits are fully collateralised and backed by guarantees. However, the exposures vis-à-vis the private sector will be incurred precisely when such risks are most acute, ie when private agents become reluctant to bear them owing to concerns with access to funding and counterparty risk.

The classification scheme outlined above can cast light on some of the terms widely used to describe central bank actions in the current crisis. The most common term is “quantitative easing”, first used to describe operations by the Bank of Japan during 2001–06. While this is closely associated, and indeed can be synonymous with, bank reserves policy (eg as used by Bernanke (2009)), in some cases the implied definition is broader.

One characterisation of quantitative easing is as a policy approach with three features (eg Ugai, (2006)): i) explicit targets for bank reserves; ii) a conditional commitment to maintain high reserves levels into the future; and iii) increased purchases of government bonds to facilitate the attainment of the target on bank reserves. Accordingly, quantitative easing is a mixture of bank reserves policy and quasi-debt management policy, together with a specific communication strategy about the future. Others define quantitative easing as a policy to reduce long term interest rates through the expansion of reserves (Spiegel (2001)). This corresponds to bank reserves policy plus quasi-debt management policy. In the current episode, the Bank of England described quantitative easing as the purchase of public and private sector assets using central bank money (Benford et al. (2009)). This amounts to a combination of bank reserves, credit and quasi-debt management policies. Yet others have termed “quantitative easing” any central bank operation that results in a rise in reserves, regardless of whether the latter is explicitly targeted or not (Auerbach and Gale (2009), Krugman (2009), Taylor (2009) and Kemp (2008)). This would not correspond to bank reserves policy in our classification.

Another term used extensively in the current crisis is “credit easing”. Bernanke (2009) coined it to describe the range of lending programs and securities purchases undertaken by the Federal Reserve since mid-2007. The term encompasses both the extension of credit to a wide range of private sector entities, bank and non-banks, as well as purchases of Treasury and government-sponsored enterprise debt. As such, it represents a mixture of credit policy and quasi-debt management policy. At the same time, even though much of the funding for these programs has been in the form of increases in bank reserves, the operations do not constitute bank reserves policy because the latter are not explicit targets but simply a by-product.

Finally, the ECB has adopted the term “enhanced credit support” to describe the various initiatives that have been implemented throughout the recent turmoil (Trichet (2009)). The primary focus of these actions has been to ensure the flow of bank credit via the conduct of long-maturity fix-rate full allotment tenders against a broadened range of collateral and via outright purchases of bank-issued covered bonds. Given the emphasis on bank credit and the significant impact that such measures have on the ECB’s exposure profile to private sector claims, they can be classified as credit policy.

Overview of recent actions

Our framework can be used to provide a more structured perspective on central bank actions in the current crisis (Table 2).

Table 2: Balance sheet policy during the crisis

Type of balance sheet policy	Measures	Fed	ECB	BoE	BoJ	BoC	RBA	SNB
Credit Policy	<i>Influence interbank market conditions</i>							
	Modification of discount window facility	✓ ¹		✓				
	Exceptional long-term operations	✓	✓ ²	✓	✓	✓	✓	✓
	Broadening of eligible collateral	✓	✓	✓	✓	✓	✓	✓
	Broadening of counterparties	✓		✓	✓	✓	✓	
	Inter-central bank FX swap lines	✓	✓	✓	✓	✓	✓	✓
	Introduction or easing of conditions for securities lending	✓		✓	✓	✓		
	<i>Influence nonbank credit market</i>							
	CP funding/purchase/collateral eligibility	✓ ³		✓ ⁴	✓ ⁵	✓ ⁶	✓ ⁷	
	ABS funding/purchase/collateral eligibility	✓ ⁸	✓ ⁹	✓ ⁴			✓ ⁷	
Corporate bond funding/purchase/collateral eligibility			✓ ⁴	✓ ¹⁰	✓ ⁶		✓	
Purchase of other securities	✓ ¹¹			✓ ¹²				
Quasi-Debt Management Policy	Purchase of government bond	✓		✓ ⁴	¹³			
Bank Reserves Policy	Target for bank reserves			✓				
Exchange Rate Policy	Purchase foreign currency securities							✓

Fed = Federal Reserve; ECB = European Central Bank; BoE = Bank of England; BoJ = Bank of Japan; BoC = Bank of Canada; RBA = Reserve Bank of Australia; SNB = Swiss National Bank. ✓ = yes; blank space = no.

¹ Reduce rate and expand term on discount facility; allow participation of primary dealers (Primary Dealer Credit Facility). ² Including fixed rate full-allotment operations. ³ Finance purchase of short-term certificates of deposit, commercial paper (CP) and asset-backed CP (ABCP) (Money Market Investor Funding Facility, Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility and Commercial Paper Funding Facility). ⁴ Asset Purchase Facility. ⁵ Increase frequency and size of CP repo operations and introduce outright CP purchases. ⁶ Term Purchase and Resale Agreement Facility for Private Sector Instruments. ⁷ Acceptance of residential mortgage-backed securities and ABCP as collateral in repo operations. ⁸ Finance purchase of asset-backed securities (ABS) collateralised by student, auto, credit card and other guaranteed loans (Term Asset-Backed Securities Loan Facility). ⁹ Purchase of covered bonds. ¹⁰ Introduce loan facility against corporate debt collateral. ¹¹ Purchase direct obligations of and MBS backed by housing-related government-sponsored enterprises. ¹² Purchase equity held by financial institutions. ¹³ Purchase Japanese government bonds to facilitate smooth money market operations; not intended to influence bond prices.

Source: National data.

The most extensive form of intervention has been *credit policy*. The first group of these measures was adopted mainly before the demise of Lehman Brothers.¹³ It centred on alleviating strains in wholesale interbank markets. In particular, to reduce interbank term spreads – seen as a barometer of strains – central banks increased the supply of term funding and took a number of steps to address potential impediments to the smooth distribution of bank reserves. These included broadening eligible collateral and counterparty coverage, lengthening the maturity of refinancing operations, and establishing inter-central bank swap lines to alleviate funding pressures in offshore markets, mostly with respect to dollar funding. In addition, many central banks introduced or eased conditions for lending out highly liquid securities – typically sovereign bonds – against less liquid market securities in order to improve funding conditions in the money market (Hördahl and King (2008)).

The second group of credit policy measures received more emphasis as the turmoil in financial markets deepened following the collapse of Lehman Brothers. It focused on alleviating directly tightening credit conditions in the non-bank sector. Prominent measures included supplying funds to non-banks to improve liquidity and reduce risk spreads in specific markets – such as those for commercial paper, asset-backed securities and corporate bonds. In addition, to support the mortgage market more directly, the Federal Reserve bought direct obligations of, and mortgage-backed securities backed by, housing-related government sponsored enterprises.¹⁴

During this phase, central banks also implemented *quasi-debt management* policies, through outright purchases of public sector securities to influence benchmark yields. Both the Federal Reserve and the Bank of England undertook high-profile and concerted purchases of government debt in sizeable amounts. The Bank of Japan also increased its purchases of Japanese government bonds, although the stated intention was *not* to influence long-term government bond yields, but simply to “facilitate smooth money market operations” (Bank of Japan (2009)).

At the time of writing, the Bank of England is the only central bank to have implemented *bank reserves policy*. As part of its Asset Purchase Facility, operations have been geared to increasing broad money through transactions that increase bank reserves.¹⁵ In this regard, “(t)he instrument of monetary policy shifted towards the quantity of money provided rather than its price (Bank Rate)” (Bank of England (2009)). While bank reserves have also increased at other central banks, including the Federal Reserve, the ECB and the Swiss National Bank, this was simply the by-product of operations on the asset side. The increases were not seen to have any particular significance and, as such, do not constitute bank reserves policy.

Finally, *exchange rate policy* has been undertaken in a number of emerging market countries. This was done partly to counter abrupt reversals of capital inflows and the subsequent downward pressure on the exchange rate (for example, Brazil, Hungary and Mexico). In addition, the Swiss National Bank set out a policy of intervening in the foreign exchange market to contain upward pressure on the Swiss franc, as part of its efforts to reduce deflationary risks and loosen monetary conditions.

¹³ For a detailed discussion of the measures taken during this first phase of the crisis, see Borio and Nelson (2008) and CGFS (2008).

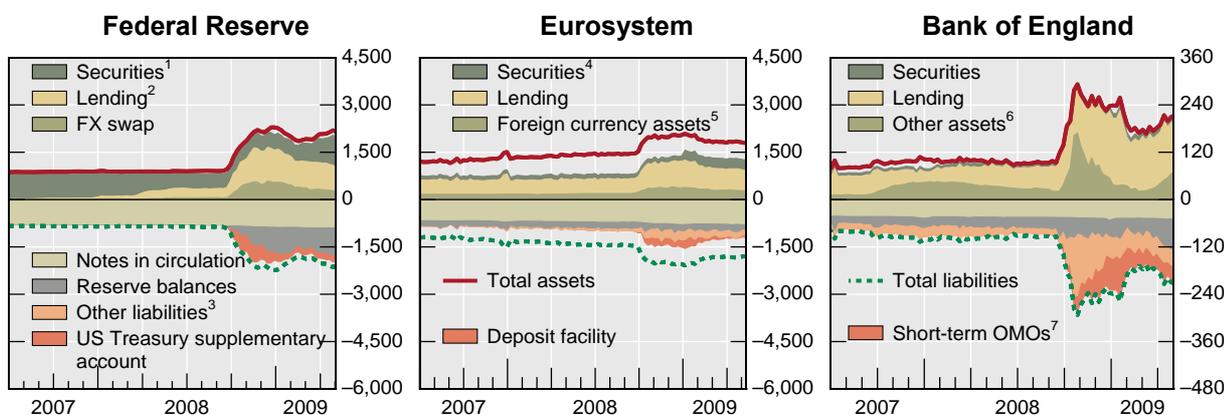
¹⁴ Strictly speaking, the Federal Reserve’s purchases of direct obligations of, and mortgage-backed securities backed by, housing-related government sponsored enterprises may fall under the category of quasi-debt management policy because of the quasi-sovereign nature of the claims. However, given that the intention is to provide direct support to the mortgage market, and that the main impact is a compression of agency mortgage yields relative to risk-free ones, here we consider it as credit policy.

¹⁵ The Bank of England does not have an explicit quantitative target for bank reserves but treats them as an important element in its quantitative easing strategy.

An important difference across countries has been the relative emphasis given to private versus public sector securities as well as to bank versus non-bank markets. The Federal Reserve has focused heavily on non-bank credit markets as well as on operations involving private sector securities. Examples include the Commercial Paper Funding Facility and the Term Asset-Backed Securities Loan Facility (part of “Lending” in Figure 3, top left-hand panel). By contrast, the Bank of England initially concentrated its Asset Purchase Facility primarily on purchases of government bonds (part of “Other assets” in Figure 3, bottom left-hand panel). And the ECB emphasised banking system liquidity, by conducting fixed-rate full-allotment refinancing operations with maturities of up to 12 months (part of “Lending” in Figure 3, top right-hand panel) and purchases of covered bonds. In the case of the Bank of Japan, substantial efforts were directed at improving funding conditions for firms through various measures pertaining to commercial paper and corporate bonds.

Figure 3: Central bank assets and liabilities

In billions of respective currency units



¹ Securities held outright (including TSLF). ² Repurchase agreements, term auction credit, other loans and CPFF. ³ Including to central banks. ⁴ Issued by euro area residents and general government debt in euros. ⁵ Including US dollar liquidity auctions. ⁶ Including US dollar liquidity auctions and asset purchase facility. ⁷ Open market operations, including issuance of Bank of England sterling bills.

Sources: Datastream; national data.

The varying emphasis reflects, in part, differences in financial structures. For example, more direct intervention in non-bank credit markets in the United States is consistent with that country’s predominantly market-based system; the greater focus on supporting banks in the euro area reflects a larger reliance on bank-based intermediation in the region.

As a by-product of these actions, especially following the Lehman Brothers failure, central bank balance sheets expanded substantially and their composition changed significantly (Figure 3). The use of the inter-central bank swap lines, for example, was a significant driver of balance sheet expansion for major central banks in the latter half of 2008.¹⁶ At the same time, central banks had to expand their capacity to reabsorb excess reserves to neutralise the impact on overnight interest rates of the much expanded operations (scheme 1). As reflected in the composition of central bank liabilities, this was implemented in a number of ways. The Bank of England and the Swiss National Bank began to issue central bank bills. The Reserve Bank of Australia relied increasingly on issuing term deposits, the ECB utilised

¹⁶ Amounts drawn under the swap lines appear as foreign currency claims on the assets side of the central banks’ balance sheets, and on the liabilities side as domestic currency liabilities to foreign central banks (as long as the foreign central bank does not make use of the foreign currency obtained through the swap).

its end-of-day deposit facility more heavily, and the Federal Reserve took in greater amounts of deposits from the Treasury. The Bank of England and the Federal Reserve also subsequently started to pay interest on excess reserves (effectively switching to scheme 2).¹⁷

II. The transmission mechanism of balance sheet policy

Main channels

In principle, the effects of balance sheet policy may be transmitted through two main channels.¹⁸

The first is a *signalling channel*. Much as the effect of current interest rate policy depends on communicating clearly the level of the rate the central bank wishes to see, the effects of balance sheet policy will depend on announcements of future operations. The communication of balance sheet policy is an integral part of their transmission mechanism. In this case, operations undertaken by the central bank, or their communication, influence public expectations about key factors that underpin an asset's market valuation. Those factors include expectations regarding the future course of policy, relative scarcities of different assets or their risk and liquidity profiles. For example, the announcement that the central bank is prepared to engage in operations involving illiquid assets may in itself boost investor confidence in those assets, thereby reducing liquidity premia and stimulating trading activity.¹⁹

The second channel works through the impact of central bank operations on the composition of private sector portfolios; for want of a better term, it can be referred to as "*broad portfolio balance channel*".²⁰ When assets (and liabilities) are imperfect substitutes, changes in relative supplies brought about by central bank operations materially affect the composition of portfolios and alter behaviour.

Several familiar mechanisms, amply covered in the existing literature, are intertwined in this channel. One strand of the literature has stressed mainly imperfect substitutability on the *asset side* of private sector balance sheets and is normally termed the "portfolio balance effect". Here, changes in the relative supply of *assets* held by the private sector call for equilibrating changes in relative yields (eg various forms of government paper versus "money").²¹ A second strand emphasises instead imperfect substitutability on the *liability side*

¹⁷ The Federal Reserve experienced some initial difficulty in maintaining the Fed Funds rate close to the rate paid on excess reserves primarily because government sponsored agencies, which make up a substantial portion of the market, are not eligible to receive interest on their reserve balances and were willing to lend funds out at a rate below the policy rate. At the same time, constraints on bank balance sheets limited the extent to which this difference could be arbitrated away.

¹⁸ See also Clouse et al. (2000), Bernanke et al. (2004), and Meier (2009) for a discussion of the signalling and portfolio balance channels in the context of unconventional monetary policy.

¹⁹ Our definition of signalling is thus broader than that used in the exchange rate literature. There, the term denotes signals about future changes in the policy interest rate itself, typically in a context in which the portfolio balance effect is assumed to be ineffective (ie assets denominated in domestic and foreign currency are seen as perfect substitutes).

²⁰ This can also be seen as a more general version of the "broad liquidity service" channel noted by Goodfriend (2000).

²¹ This is precisely how monetary policy was seen to work in the Brainard and Tobin tradition (eg Brainard and Tobin (1968) and Tobin (1969)) and is also the broad field in which battles between Keynesians and Monetarists were fought (eg Friedman (1957), Brunner and Meltzer (1976)). It is also the core channel in part

of private sector balance sheets, including its interaction with the valuation of assets (eg the valuation of collateral), in the presence of asymmetric information between those supplying and demanding funds. This includes various versions of the *credit channel*.²² Here, by providing funding at more attractive terms and larger quantities than market participants would, the central bank can boost the volume of lending and asset prices. A third, more recent, strand stresses the impact of policy actions on the risk preferences and risk tolerance of the private sector – the *risk-taking channel* (Borio and Zhu (2008)). In this context, easier funding conditions or the removal of risky assets from portfolios may reduce perceived risks and induce higher risk-taking – an effect that may be compounded by “search-for-yield” behaviour associated with lower yields on benchmark assets.

The various elements of the two channels inevitably interact. For example, by acquiring assets, simply standing ready to do so, or accepting them as eligible collateral, central banks can boost their liquidity services. The portfolios of holders then become more liquid – both directly, when the central bank buys the assets in return for cash or liquid government bonds, and indirectly, if the assets are easier to sell or pledged as collateral for borrowing. Moreover, the removal of risky assets off banks’ balance sheets obviates the need for distress sales to comply with risk-based capital constraints and frees up capital (that is, raises the ratio of capital over risk-weighted assets), which can help support credit growth. The combination of stronger balance sheets, higher collateral values and higher net worth, may help loosen credit constraints, lower external finance premia and revive private sector intermediation.

In exploiting these channels, central banks face a major challenge, namely the smaller degree of control they have over the relevant instrument in comparison with interest rate policy. Central banks can control very short-term interest rates closely because they are the marginal (monopoly) supplier of the reserve balances demanded by the banking system. This is not the case for other assets. As a result, their ability to influence those prices is much weaker. This, in turn, undermines the effectiveness of the signalling channel. All of these problems, for instance, have been amply documented in the context of exchange rate policy. Central banks may need to be willing to transact in large quantities or else pursue a much more targeted approach, playing a catalytic role. For example, by stepping into the market and reducing liquidity risk, the central bank may help bring private players back into it.²³ Limited experience in implementing several of the variants of balance sheet policy complicates matters further.

Differing emphasis on the transmission mechanism

The broad channels of influence across various types of balance sheet policy are similar. However, there are important differences in the nature of the underlying *intermediation role* played by the central bank and in the relative emphasis placed on the various elements of the transmission mechanism.

Credit policy derives much of its effectiveness from interposing the central bank (and hence indirectly the government) between private sector lenders and borrowers and, in so doing,

of the literature on the determination of exchange rates. By contrast, while still in the monetarist tradition, Laidler (2002) stresses the disequilibrium impact associated with the excess supply of inside money generated via the credit creation process.

²² There is an enormous literature on this type of channel. Notable examples include Bernanke and Gertler (1995), Bernanke et al. (1999), Greenwald and Stiglitz (1988), Kashyap and Stein (1994), Fazzari et al (1988) and Kiyotaki and Moore (1994). See also Borio and Zhu (2008) for a short review of the literature on the bank capital channel and its link to the credit channel more generally.

²³ This also means that the measure of success is not so much how far a given facility is accessed, but whether the existence of the facility improves prices, assists market functioning, and stimulates private trading activity.

improving credit flows. The underlying mechanism is a substitution of assets that differ in terms of both liquidity and credit risk, typically a claim on the public sector for those on the private sector. By transferring private sector risk to the central bank, the price of that risk may be reduced, leading to more accommodative financial conditions.²⁴ Credit policy thus entails a direct impact on risk premia on private sector assets by the central bank. In some cases, such as the ECB's fixed-rate full-allotment tenders up to one year, the central bank intermediates between banks and relies on the banking system to boost credit flows to the broader economy. In others, such as the Federal Reserve's CPFF and TALF, the central bank bypasses the banking system altogether and intermediates directly between investors and borrowers in key markets. By its nature, the impact of credit policy is likely to be narrowly circumscribed to the markets in which the central bank intervenes. There may, however, be broader effects to the extent that the direct beneficiaries themselves play an important intermediation role.

By comparison, *quasi-debt management policy* is more indirect. The central bank seeks to affect risk (term and liquidity) premia on government sector assets (benchmark "risk-free" rates) and, in the process, affect asset prices and credit conditions for the private sector more generally. Quasi-debt management policy effectively entails the central bank intermediating between the government and the private sector.²⁵ Given the close substitutability between central bank and government liabilities, the portfolio balance effects may not be that large. Clouse et al. (2000) and Reinhart and Sack (2000), for instance, provide evidence that even sizeable changes in the composition of the public's asset holdings would have only small effects on yields. Thus to impart significant and sustained effect on yields, the volume of transactions may have to be quite large.

In contrast to credit and quasi-debt management policies, *exchange rate policy* does not place particular emphasis on credit flows. Instead, it focuses directly on the exchange rate channel of the transmission mechanism, by seeking to alter the relative prices of domestic and foreign goods. In doing so, the central bank effectively intermediates between the domestic and the foreign sectors. That is, the accumulation of foreign assets is funded by the issuance of some form of central bank liability. In the foreign exchange intervention literature, the portfolio balance effect is typically hard to detect given the high degree of substitutability among major currencies (eg Disyatat and Galati (2007), Sarno and Taylor (2001)).

Finally, *bank reserves policy* places direct emphasis for its effectiveness on the banking system as a conduit. Changes in the size or composition of liquid assets in the banking system are expected to act as a catalyst for credit flows or higher risk appetite that, in turn, may affect yields and asset prices further. The central bank intermediates between the banking system and some other sector of the economy. The other sector can be either the private sector (bank or nonbank) or the government, depending on the asset that is accumulated as a counterpart to the expansion of reserves. But just how effective can this policy be?

²⁴ The reduction in the external finance premium that occurs when the central bank intermediates private sector transactions reflects the fact that on the borrowing side, the central bank itself will not be subject to such premia, while in the lending side, it may be more willing to ignore liquidity risk since the central bank will never be liquidity constrained.

²⁵ For example, outright purchases of government bonds financed by the issuance of some form of central bank liability simply replace a claim on the government with a claim on the central bank in private sector portfolios, and simultaneously result in an increase in the central bank's claim on the government that is funded by borrowing from the private sector. It is as if the central bank borrowed from the private sector to lend to the government. Quasi-debt management policy may also work through a fiscal channel, as advanced by Auerbach and Obstfeld (2005). This is based on the premise that the central bank's substitution of seigniorage for direct taxes may be expansionary since the former is much less distortionary.

Are bank reserves special?

The view that bank reserves play a special role in the transmission mechanism is the underlying justification for bank reserves policy. Its popularity also explains the outsized attention accorded to bank reserves in discussions of unconventional monetary policies.²⁶ Bank reserves may be seen as special, for example, in their ability either to act as a catalyst for bank lending or to contribute to market stability and confidence. By extension, this view implies that the structure of central bank *liabilities* matters greatly for the effectiveness of balance sheet policy – that is, the various forms of central bank liabilities are very *imperfect* substitutes. Financing, say, outright purchases of long-term government bonds with central bank short-term paper (bills) is not equivalent to, and would be far less effective than, financing with bank reserves.

While there may be plausible reasons for such a view, the underlying justification is sometimes premised on dubious grounds. We next outline some of the features of bank reserves that make them unique, though not necessarily of first-order importance for the effectiveness of balance sheet policy. We then draw out the implications of our analysis for the role of bank reserves in the transmission mechanism.

Apart from fulfilling any reserve requirements, bank reserves are uniquely valued by financial institutions because they are the only acceptable means to achieve final settlement of all transactions. From this perspective, reserves may play a special role during times of financial stress, when their smooth distribution within the system can be disrupted. At such times, financial institutions may wish to hold larger reserve balances to manage their heightened illiquidity risk. Indeed, this was the case in the initial stages of the current crisis, when the precautionary demand for reserves increased materially (Borio and Nelson (2008)). In such an environment, it may be possible that funding of balance sheet policy through reserves may, at the margin, contribute to financial stability. This appears to be one of the main considerations behind the Bank of Japan's policy of expanding bank reserves under its quantitative easing policy during 2001-06 (Shirakawa (2009), Baba et al. (2005)).

Nonetheless, the setting just described is quite special. Where the central bank provides facilities that allow a broad set of counterparties to obtain funding directly from it on relatively flexible terms, the unique role of reserves in reducing liquidity risk is greatly attenuated. For example, short-term government paper would play very much the same role: it is generally marketable, eligible as collateral for central bank operations, subject to very little market risk and has a zero regulatory capital weighting (Table 3). This makes it very a close substitute for bank reserves in terms of liquidity services. The same applies to short-term central bank paper. In fact, to the extent that short-term paper pays interest at market rates, it can easily dominate bank reserves, all things considered.

A second reason why funding through bank reserves may be seen as special is because the corresponding expansion of the central bank's balance sheet is necessarily financed through banks, as these may be the only institutions to hold reserves. This may be seen as desirable if the objective of balance sheet policy is to expand the size of the banking system (ie. broad money). For example, *other things equal*, the purchase of assets directly from the non-bank private sector funded by issuing reserves increases aggregate banking system deposits.²⁷ This objective has been emphasised by the Bank of England in the current crisis. By contrast, funding through a marketable security, such as central bank bills, opens up the

²⁶ Goodfriend (2000, 2002), for example, makes a tight connection between his "broad liquidity services" channel and bank reserves. Similarly, Bank of England (2009) and Benford et al. (2009) emphasise the importance of reserves expansion in the monetary transmission mechanism.

²⁷ That said, it is not necessary to fund asset purchases with bank reserves to engineer an expansion of bank deposits. The key is that the purchases are conducted directly with the non-bank public.

possibility that the banking system is by-passed altogether: the securities may end up in the non-bank public's portfolio.

Table 3: A comparison of bank reserves and other forms of sovereign claims

	Bank reserves	Government/central bank short-term paper	Government long-term paper
Original maturity	Overnight ¹	1-12 months	Beyond 1 year
Remuneration	Possible ² (exogenous)	Yes (endogenous)	Yes (endogenous)
Market risk	None	Negligible/very low	Higher
Credit risk	None ³	Sovereign	Sovereign
Final settlement medium	Yes	No	No
Collateral/margin in private transactions	N/A	Yes	Yes
Collateral at central bank	N/A	Yes	Yes
Marketable	No	Yes	Yes
Settlement risk	N/A	Negligible ⁴	Negligible ⁴
N/A = not applicable.			
¹ Given their ability to affect immediate settlement, the maturity can also be thought of as being instantaneous. From the perspective of reserves as an investment asset, the maturity is overnight. ² Generally ranging from zero to the policy rate. ³ There is no credit risk on reserves since, like cash, they are essentially claims on itself. ⁴ With the use of delivery-versus-payment (DVP) systems, settlement risk has been largely eliminated. The risk that a party defaults after a trade but before settlement (pre-settlement risk) remains, though the replacement costs should be small in benign market environments.			

Whether this strategy is ultimately effective depends on whether the money stock is indeed increased *in equilibrium* and on whether this has an independent first-order impact on aggregate demand. We argue in the next sub-section that this is unlikely. What matters here, however, is that the uniqueness of bank reserves in this context has *nothing* to do with their intrinsic characteristic as an asset – their “moneyness”. It simply reflects the fact that holdings are restricted to banks. If, for instance, holdings of central bank bills were similarly restricted, the final effect would be analogous.

This is not to deny that there may be additional reasons to finance balance sheet expansion through bank reserves. Quite apart from legal restrictions on central bank issuance of bills, one can think of at least two such arguments.

One has to do with crowding out considerations vis-à-vis government issuance. By expanding reserves, as opposed to central bank bills, the central bank avoids competing directly with the government as issuer in the market. Restricting the maturity of central bank bills to the short end of the curve only alleviates, and does not eliminate, the competition. Moreover, it can complicate liquidity management operations, by increasing the rollover

burden.²⁸ These considerations weigh more heavily as the size of balance sheet policy expands substantially.

Another reason involves political economy considerations. Expansion of reserves may be preferable because the central bank has greater operational autonomy over it. Given the possibility of crowding out, the issuance of central bank bills typically requires government approval on an ongoing basis. This potentially opens up the central bank to political interference. The same is true of the alternative possibility, namely having the government issue short-term debt and deposit the proceeds with the central bank. Moreover, this alternative may be construed as deficit financing by the central bank (eg Tucker (2009)) and increases the overall size of the public debt – a consideration that may be especially relevant in jurisdictions with restrictions on it.

These arguments favouring the issuance of bank reserves would of course have to be weighed against specific drawbacks. In particular, a large expansion of bank reserves may result in less reliance on the interbank market for their allocation and, over time, may atrophy the market's functioning (Baba et al. (2005)).²⁹ This may be seen as undesirable.

But the general point stands: focusing on the specialness of reserves in balance sheet policy is misplaced. The point can be seen another way. What makes bank reserves special when implementing interest rate policy is the combination of their remuneration at a rate set *exogenously below* market rates (be this zero or positive) and their settlement services. This makes bank reserves powerful and unique: the implied highly inelastic demand curve is what obliges the central bank to meet the small demand for (excess) reserves very precisely, in order to avoid unwarranted extreme volatility in the rate (scheme 1). But in order to induce banks to accept a large expansion of such balances in the context of balance sheet policy, the central bank has to make bank reserves sufficiently attractive relative to other assets (scheme 2). In effect, this renders them almost perfect substitutes with other short-term sovereign paper. This means paying an equivalent interest rate. In the process, their specialness is lost. Bank reserves become simply another claim issued by the public sector. It is distinguished from others primarily by having an overnight maturity and a narrower base of potential investors.

Bank reserves, bank lending, money and inflation

The preceding discussion casts doubt on two oft-heard propositions concerning the implications of the specialness of bank reserves. First, an expansion of bank reserves endows banks with additional resources to extend loans, adding power to balance sheet policy. Second, there is something uniquely inflationary about bank reserves financing. We consider each in turn.

²⁸ Crowding out arguments may also be considered in relation to another alternative, namely having the government issue the paper and place the proceeds with the central bank. Large issuance could put pressure on private funding markets at the margin.

²⁹ Interbank activity need not suffer regardless of the size of reserves, as long as the central bank makes sure that there is an opportunity cost to holding reserves, by remunerating them at a rate below the market rate. This, however, is not possible when reserves are used as the main funding method for balance sheet policy. If so, either the interest rate target is still positive, in which case the only way to attain the target is by paying interest on reserves at the policy rate, or the overnight interest rate is at the zero bound. In both cases, there is no opportunity cost of holding reserves, hampering market incentives to trade.

Does financing with bank reserves add power to balance sheet policy?

The underlying premise of the first proposition, which posits a close link between reserves expansion and credit creation, is that bank reserves are needed for banks to make loans. Either bank lending is constrained by insufficient access to reserves or more reserves can somehow boost banks' willingness to lend. An extreme version of this view is the text-book notion of a stable money multiplier: central banks are able, through *exogenous* variations in the supply of reserves, to exert a direct influence on the amount of loans and deposits in the banking system.³⁰

In fact, the level of reserves hardly figures in banks' lending decisions. The amount of credit outstanding is determined by banks' willingness to supply loans, based on perceived risk-return trade-offs, and by the demand for those loans.³¹ The aggregate *availability* of bank reserves does not constrain the expansion directly. The reason is simple: as explained in Section I, under scheme 1 – by far the most common – in order to avoid extreme volatility in the interest rate, central banks supply reserves *as demanded by the system*. From this perspective, a reserve requirement, depending on its remuneration, affects the cost of intermediation and that of loans, but does not constrain credit expansion quantitatively.³² The main exogenous constraint on the expansion of credit is minimum capital requirements.

By the same token, under scheme 2, an expansion of reserves in excess of any requirement does not give banks more resources to expand lending. It only changes the *composition of liquid assets* of the banking system. Given the very high substitutability between bank reserves and other government assets held for liquidity purposes, the impact can be marginal at best. This is true in both normal and also in stress conditions. Importantly, excess reserves do not represent idle resources nor should they be viewed as somehow undesired by banks (again, recall that our notion of *excess* refers to holdings above minimum requirements). When the opportunity cost of excess reserves is zero, either because they are remunerated at the policy rate or the latter reaches the zero lower bound, they simply represent a form of liquid asset for banks.³³

A striking recent illustration of the tenuous link between excess reserves and bank lending is the experience during the Bank of Japan's "quantitative easing" policy in 2001-2006. Despite significant expansions in excess reserve balances, and the associated increase in base money, during the zero-interest rate policy, lending in the Japanese banking system did not increase robustly (Figure 4).

To be clear: this is not to say that central banks are powerless to influence bank lending. In situations where lending is initially limited by significant funding constraints at the bank level – either because of illiquid assets or inability to borrow – interventions that alleviate this will

³⁰ The money multiplier view of credit creation is still pervasive in standard macroeconomic textbooks including, for example, Walsh (2003), Mishkin (2004), and Abel and Bernanke (2005).

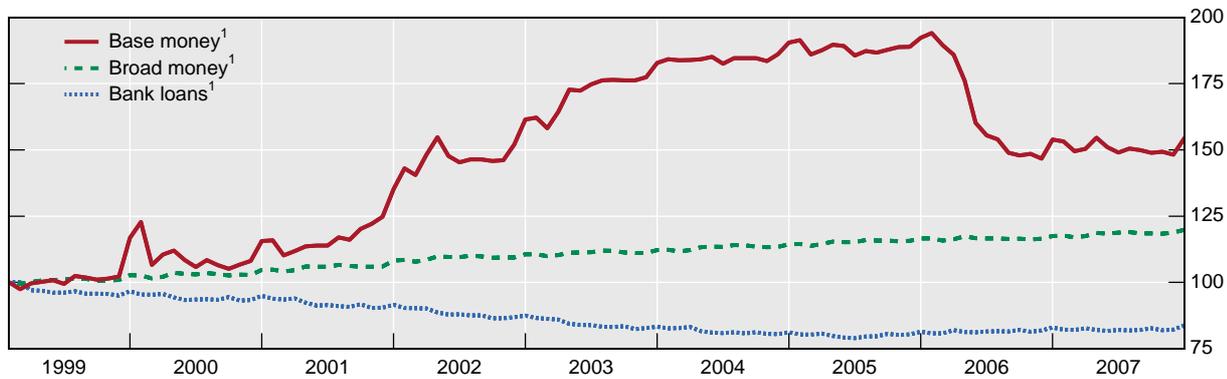
³¹ This perspective on credit creation has a long tradition, as elaborated in Moore (2006). Disyatat (2009) provides a detailed discussion of the role of banks in the transmission mechanism.

³² This can also be seen in another way. Since banks are able to create deposits that are the means by which the non-bank private sector achieves final settlement of transactions, the system as a whole can never be short of funds to finance additional loans. Loans are financed initially by deposit creation and a well-functioning interbank market overcomes the asynchronous nature of loan and deposit creation across banks. Depending on the non-bank public's preference for deposits relative to other assets, the ultimate counterpart to additional loans may be either deposit or non-deposit liabilities. More generally, all that is required for new loans is that banks are able to obtain extra funding in the market.

³³ And, of course, just as the private sector on its own cannot get rid of government paper, the amount of reserves in the banking system will remain the same regardless of the volume of new loans generated, absent a deliberate decision by the central bank to reduce it. Keister and McAndrews (2009) discuss these issues in the US context.

facilitate lending. Thus, contrary to the popular assertion that injections of excess reserves into the banking system are ineffective when the bank lending channel or money multiplier is “broken”, it is precisely in such situations that the likelihood of their having any significant impact is greatest. But the underlying mechanism is supplying banks with a liquid asset that liquefies their balance sheets at a time when the market is not prepared to do so. *Reserves simply constitute one possible asset among the many that can serve this purpose.*

Figure 4: The Bank of Japan’s quantitative easing



¹ Rebased to 1 January 1999 = 100.

Source: Bank of Japan.

A related issue is whether a strategy to increase the money stock, not through inside credit creation, but by purchasing an asset directly from the non-bank public, would be more effective (eg Congdon (2003), Benford et al. (2009)). In other words, does the choice of counterparty matter over and above that of the asset bought? We regard this as unlikely.

As long as arbitrage relationships work reasonably well, the identity of the counterparty to the original transaction should not have a material effect. Whether the asset is initially bought from the non-bank public or not makes little difference to the final outcome in terms of the equilibrium amount of deposits, the relative yields on assets, and funding conditions.³⁴ By construction, central bank transactions with the non-bank public have an immediate impact on the stock of deposits. But the amount of bank deposits in *equilibrium* depends on the endogenous choices of banks and the non-bank public, after the portfolio rebalancing takes place. And the exogenous force that determines this equilibrium is *what the central bank buys and how it funds it*.³⁵

Moreover, and paradoxically, for a given level of income, measuring the expansionary impulse on aggregate demand by the extent to which the money stock increases in equilibrium can be highly misleading. For a given funding method, the higher the substitutability between the asset purchased by the central bank and bank deposits, the

³⁴ One exception would be if the agent selling the asset was credit constrained and the sale relieved that constraint. But this hinges critically on what is bought. A long-term government bond, for instance, would also provide good liquidity services, especially at times of stress and flight to quality.

³⁵ Put another way, the initial increase in bank deposits simply reflects the accounting record of the settlement of central bank transactions with the non-bank public. The process by which these deposits are transferred among agents, and any associated impact on relative yields that may arise, constitute part of the endogenous portfolio rebalancing by the private sector in response to the actions of the central bank. For example, if bank reserves and short-term paper are, in the limit, perfect substitutes, the final impact on bank deposits and expenditures would depend exclusively on the assets purchased. The fact that reserves are only held by banks is not important for the final outcome as long as normal arbitrage relationships prevail.

larger is the impact on the volume of deposits but the smaller that on relative yields and hence expenditures. Under these conditions, the change in the amount of deposits gives a perverse signal of the effectiveness of policy.

Is financing with bank reserves uniquely inflationary?

The proposition that highlights the inflationary consequences of financing via bank reserves is closely related to the first. If bank reserves do not contribute to additional lending and are close substitutes for short-term government debt, it is hard to see what the origin of the additional inflationary effects could be. The impact on aggregate demand, and hence inflation, would be very similar *regardless* of how the central bank chooses to fund balance sheet policy. For example, it is not clear how inflationary pressures could be more pronounced in a banking system that keeps its liquid assets in the form of overnight deposits at the central bank compared to one that holds one-week central bank or treasury bills.

The same would apply to concerns about the “monetisation” of government debt, whereby the central bank purchases government bonds either in the primary or secondary market. Here the issue is whether the financing of government expenditures through the creation of bank reserves, *quite apart from the boost to aggregate demand associated with expansionary fiscal policy*, would lead to inflation or not. In answering this question, it is essential to distinguish the effects that operate through interest rate policy and those that operate through balance sheet policy, ie the choice of financing medium. The balance sheet policy effects will depend on the characteristics of the quasi-debt management operation and are, in general, likely to be less material.

Consider the two main possibilities. In the case where excess reserves are remunerated at a rate that is below the policy rate, their injection would push overnight rates down to the floor established by the remuneration rate on any deposit facility, possibly zero (scheme 1). This is tantamount to an easing of *interest rate policy*. As a result, any ensuing inflationary pressure can be largely attributed to the usual expansion of aggregate demand that accompanies such a move. In the case where excess reserves are remunerated at the policy rate or interest rates are already at the zero lower bound, so that the opportunity cost of excess reserves is zero, their expansion would not affect overnight rates (scheme 2). To the extent that any additional impact on inflation existed, it would result mainly from the effect on aggregate demand of a flatter yield curve that the quasi-debt management operation may induce. For example, if the central bank were to inject reserves through the acquisition of long-term government bonds, the net impact on yields and inflation would not be dissimilar to the rebalancing of government financing from long to very short maturities. In fact, such an “operation twist” can be achieved by the fiscal authorities themselves. In the end, whether government spending is financed with short-term debt – say one-week treasury or central bank bills – or bank reserves, the difference may well not be material.

More generally, inflationary concerns associated with monetisation should be largely attributed to the impact on aggregate demand via a fiscal policy that is accommodated by the monetary authorities, who refrain from raising rates. That is, it is not so much the financing of government spending per se (be it in the form of bank reserves or short-term sovereign paper) that is inflationary, but its accommodation at inappropriately low interest rates for a sustained period of time. Critically, these two aspects are generally not distinguished in policy debates because the prevailing paradigm has failed to distinguish interest rate from balance sheet policy. *Given the pervasive assumption of a well behaved demand for bank reserves, one is seen as the dual of the other*: more reserves imply lower interest rates. But, as we have stressed all along, this is not the case. And the decoupling of interest rate from balance sheet policy during the current crisis has simply confirmed this again.

There is, however, one important qualification to our analysis so far. This has implicitly treated *market expectations and beliefs as consistent with the underlying transmission mechanism*. But views about the workings of the economy differ and are a key driver of

economic outcomes. And this can complicate the transmission of policy. For example, what if economic agents do believe – as argued here, incorrectly – that bank reserves are truly special? We briefly discuss some of these complications in the next section, where we explore selectively some specific challenges raised by balance sheet policy.

III. Challenges of balance sheet policy

The implementation of balance sheet policy raises a number of specific challenges that have to be managed carefully. Here, we briefly consider four of them, drawing on the previous analysis: i) calibrating and communicating the stance of policy; ii) managing the relationship with the government's debt management policy; iii) managing the financial risk absorbed by the central bank and its possible implications for central bank operational autonomy; iv) ensuring a timely exit.

Calibration and communication

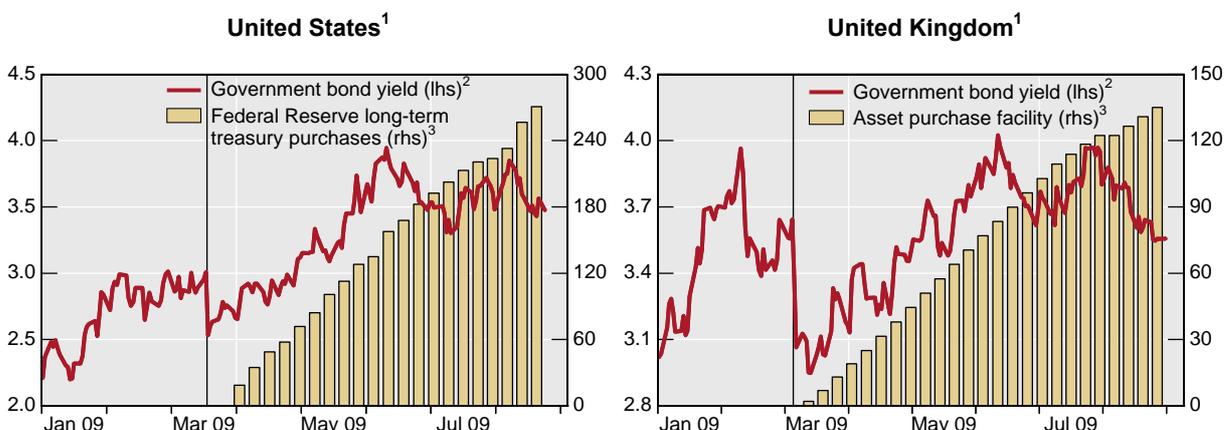
Calibrating balance sheet policy is exceedingly hard. Central banks have little experience to draw on and the effects are substantially more uncertain than those of interest rate policy. Absent a standard framework to quantify the various effects, it is very difficult to aggregate them so as to summarise the impact of policy. Determining how far to push policies is also complicated by difficult judgments about their longer-term impact on market functioning and political economy constraints on operational autonomy. All this, together with disagreement on transmission channels, undermines effective communication. And with liquidity management operations aimed at directly affecting monetary conditions, the official policy stance is no longer pinned down by the policy rate. The diminished clarity of the policy signal may potentially undermine central bank credibility, compounding financial market volatility. Indeed, there is a risk that innocuous liquidity operations are mistaken for policy changes.

Consider, for instance, quasi-debt management policies. The announcement of the first purchases of long-term paper undertaken by the Federal Reserve and the Bank of England had a strong impact on long-term yields. Over time, however, the effects seem to have waned and there is no guarantee that additional steps of a similar size will yield equivalent results. In fact, a sort of “law of diminishing returns” seems to have set in once the “surprise factor” associated with the original purchases waned (Figure 5). And while all central banks have been careful to argue that they have not been “monetising” public sector deficits, their communication strategies have diverged substantially. Some have emphasised the direct impact of purchases themselves in putting downward pressure on term premia, notably the Federal Reserve (Bernanke (2009)). Others have rather stressed the impact on the money stock as a basis for calibration and for assessing their expansionary effect, notably the Bank of England (Bank of England (2009)). In turn, there is a concern that markets may at some point, possibly based on the “wrong model”, become excessively concerned about the potential inflationary implications of these policies. Such an “inflation scare” would naturally undermine their effectiveness.

In the case of credit policies the main concern is that the markets may over time become unduly dependent on central bank support. These targeted policies seem to have been rather effective in improving conditions in the specific market segments involved, as reflected in risk premia (eg BIS (2009a)). At the same time, there is a fine line between acting as a catalyst, on the one hand, and purely substituting for private sector intermediation, on the other. In addition, policy interventions may distort the level playing field as between those receiving and not receiving the support. In order to guard against these risks, central banks can put in place certain safeguards. For instance, support facilities may be designed so that they are automatically self-liquidating, by charging interest rates that are above those that prevail in more normal times. Central banks may also monitor closely how far they are

becoming the marginal or even only counterparty in the corresponding market. Even so, the risks involved should not be underestimated. And they increase with the time the central banks perform the intermediation functions.

Figure 5: Central bank bond purchases



¹ The policy announcement day 0 (vertical line) is: for the United Kingdom, 5 March 2009; for the United States, 18 March 2009. ² Ten-year bond yields, in per cent. ³ In billions of national currency.

Sources: Bloomberg; national data.

Relationship with the government's debt management policy

Managing the relationship with the government's debt management activities is the quintessential challenge of quasi-debt management policy. Once it is recognised that these two policies are functionally equivalent, the demarcation between them is hard to draw. The main problem here is twofold (McCauley and Ueda (2009)). The objectives of debt management, such as minimising the cost of government debt, may sometimes conflict with those of monetary policy, notably when this is seeking to stimulate aggregate demand. For example, debt managers have a strong temptation to lengthen the maturity of the outstanding debt by issuing long when long-term rates look low by historical standards. By doing so, they can lock in a low financing cost. But this may be precisely the time when the central bank is seeking to buy long-term debt to boost economic activity. In addition, the government balance sheet generally dwarfs that of the central bank. Marginal adjustments to its debt management policies can easily swamp central bank actions. Historically, this has indeed been the case on numerous occasions, including recently (McCauley and Ueda (2009)).

The central bank has a number of options. At one end, it may avoid explicit coordination with the government, especially if the institution is particularly concerned with its operational autonomy. At the other end, it may agree on a joint approach to the purchases. In between, various degrees of coordination are possible. Ultimately, the effectiveness of such policies will depend on the extent to which debt management objectives become *de facto* subservient to the need to stimulate aggregate demand. The functional equivalence between the actions of the central bank and the government needs to be fully acknowledged. This raises tricky questions about the very meaning of operational independence in the context of quasi-debt management policies.

Financial risk, financial independence and operational autonomy

Balance sheet policies potentially raise significant financial risks for the central bank. Purchases of long-term debt involve duration, and hence market, risk. Credit policies, in addition, generate credit risk exposures. Exchange rate policies add exchange rate risk.

Since balance sheet policies can lead to substantial expansions in the central bank balance sheets, the attendant risks call for careful management. Indeed, to the extent that balance sheet policies are likely to be unwound when the economy is strengthening and long yields have risen, disposal of fixed-coupon assets would probably be associated with losses.

The concern is that the financial independence of the central bank may come into question and, with it, its operational autonomy. Moreover, as highlighted by experience with the management of foreign exchange reserves, the reputational risk associated with losses can be important (Borio et al. (2008)). The loss of operational autonomy could be especially dangerous in an economy that emerges from a protracted period of financial strains and depressed activity. As highlighted by historical experience, and confirmed by the recent financial crisis, such periods tend to see surges in government debt (Reinhart and Rogoff (2009) and BIS (2009b)). The temptation to inflate away the debt burden may become particularly strong. Thus, *for political economy reasons* the *longer-term* risks to inflation should not be underestimated. This puts a premium on mechanisms to insulate the central bank from such pressures. Various approaches to these issues have been adopted thus far. For example, the Bank of England's asset purchases were governed *ex ante* by an exchange of letters with the UK Treasury and held in a special account supported by a government indemnity against losses. By contrast, the Federal Reserve's asset purchases have been undertaken with far less formal coordination with the US Treasury.

Beyond these common elements, the severity of these risks is country-specific. It is influenced by a range of factors. They include accounting arrangements (eg how far marking-to-market is employed), rules for the distribution of profits and possible recapitalisation, and broader aspects of the institutional and political environment, such as a country's deep-seated tolerance for inflation, strongly affected by its historical experience. Up to a point, financial risks can be managed. For example, the use of prudent haircuts and collateral or the issuance of government guarantees can mitigate credit risk. In the end, however, financial risks are part and parcel of balance sheet policy.

Exit strategies

The possible long-term collateral damage in terms of market functioning and central bank operational autonomy of balance sheet policies underlines the need to put in place clear exit strategies (BIS (2009b)). Critically, and as highlighted in the previous analysis, as long as central banks have the necessary tools at their disposal, exit policies can be decoupled. In other words, one can decouple decisions concerning the timing and speed of the exit from balance sheet policy, on the one hand, from those concerning the exit from the low (or zero) interest rate policies, on the other.

The main practical difficulty in ensuring an effective decoupling has to do with communication and the complexities associated with the public having different views concerning the transmission mechanism. In such an environment it is hard for the central bank to send unambiguous signals and technical operations may acquire a misleading significance. For example, under scheme 2, mopping up excess reserves through highly substitutable short-term paper – for technical liability management purposes or to set the stage for a return to scheme 1 – may be incorrectly interpreted as a tightening and lead to unintended market reactions.

A priori, it is unclear how the various decisions should be timed. Nonetheless, it is possible that the institutional inertia associated with certain facilities (eg the maturity of some lending facilities) and concerns with untoward market reactions (eg from the sale of government securities) may lead to faster adjustments in interest rate policy. More generally, interest rate adjustments appear easier to engineer.

The main concern surrounding exit policies, however, is not technical, but one of timing: can the timing and pace of the exit be properly judged? This concern is a familiar one, as it also

applies to interest rate policy. One possibility is that exit occurs too early, hampering an incipient recovery. However, as suggested by historical experience, the main risk is arguably exiting too late and slowly (Borio (2008) and BIS (2009b)). After extended periods of support, central banks can be especially cautious, given the perceived risk of generating unwelcome and damaging market reactions. And political economy pressures are overwhelmingly in the direction of delaying exit. At the macro level, the concern is that such a delayed exit may risk accommodating the build-up of a new set of financial imbalances or else lead to inflationary pressures. At the micro level, it may weaken unnecessarily the ability of markets to work effectively without official support and may distort the level playing field.

Conclusion

In the wake of the current financial crisis, monetary policy will probably never be the same again. Central banks have been forced to review their implementation frameworks and to try out policies that, only a few years back, were not on their radar screens. They have been operating in uncharted waters, outside their “comfort zone”. In the process, unconventional monetary policies have become the focus of much discussion and heated debate. In this paper, we have provided a unified framework to think about and classify unconventional monetary policies, considered the analytical issues they raise, with particular reference to the transmission mechanism, and briefly assessed some of the key policy challenges.

We have stressed several analytical points. First, unconventional monetary policies fall under the broader category of balance sheet policy, whereby the central bank uses its balance sheet to affect asset prices and financial conditions beyond the short-term interest rate. Thus, they are not unconventional in their essence, with foreign exchange intervention being a very familiar form of such policies. Second, balance sheet policies can be decoupled from interest rate policies. This reflects the fact that the level of the short-term interest rate can be set independently of the amount of bank reserves in the system. Third, the main channel through which balance sheet policy operates is by altering the composition of private sector balance sheets, exchanging claims that are imperfect substitutes for each other. By altering the risk profile of private portfolios, such as through the purchase of less liquid or risky assets or by being prepared to lend at more attractive terms than the markets, the central bank can reduce yields and ease financing constraints. Fourth, because of this, in our view the outsized role often attributed to banks’ excess reserves in discussions of balance sheet policy is not warranted. Since excess reserves are very close substitutes with short-term claims on the central bank or the government, what the central bank buys and the credit it extends are more important than how these operations are financed. Finally, balance sheet policy should be considered in the broader context of the consolidated public sector balance sheet. Importantly, central banks have a monopoly over interest rate policy, but *not* over balance sheet policy.

While we have not examined in depth the effectiveness of balance sheet policies, it would be hard to deny that they have helped to stabilise conditions and cushion the fall in aggregate demand. There is evidence that central bank purchases of government bonds have lowered their yields, although they seem to be subject to “diminishing returns”, once the surprise factor wears off. And policies targeting interbank markets or private sector securities have been successful in narrowing risk spreads and supporting borrowing activity there.

At the same time, balance sheet policies raise a number of challenges for central banks. As central banks move away from the simplicity and well-rehearsed routine of interest rate policy, they face much trickier calibration and communication issues. As they substitute for private sector intermediation, they may favour some borrowers over others, tilting the level playing field, and could risk making the private sector unduly dependent on public support. As they purchase government debt, they come under pressure to coordinate with the public

sector debt management operations. And as their balance sheets expand and they take on more financial risks, central banks risk seeing their operational independence and anti-inflation credentials come under threat in the longer term. As a result, questions about coordination, operational independence and division of responsibilities with the government loom large.

These costs suggest that unconventional monetary policies should best be seen as special tools for special circumstances. The costs also point to the need for appropriate governance arrangements, designed to limit the risk that the central bank anti-inflation priorities are undermined in the medium term. And they put a premium on early exits, as soon as economic conditions permit.

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