

Non-standard Monetary Policy Measures and the Balance Sheets of Eurosystem Central Banks

Sharon Donnery, David Doran, Ruth Gleeson and Konstantina Carroll¹

Abstract

The ECB's on-going non-standard monetary policy measures have led to changes in the composition and size of euro area national central banks' (NCBs) balance sheets. These changes have increased and broadened the financial risk exposures of central banks, and led to a substantial increase in potential interest rate mismatch risk. Nonetheless, the Treaty mandates the Eurosystem to implement monetary policy measures to achieve price stability, even if it results in losses for the Eurosystem or individual NCBs. This article examines the changes to central bank balance sheets and risks as a result of these non-standard measures. Given that the ability of central banks to generate income is a central aspect of independence, interest rate risk and the associated implications for central bank income are discussed, along with steps to mitigate some of these risks.

¹ The authors are Deputy Governor – Central Banking, and Head of Function – Financial Risk Management, Risk Analytics Manager and Risk Analyst in the Organisational Risk Division, respectively. The views expressed in this article are solely the views of the authors and are not necessarily those held by the Central Bank of Ireland or the European System of Central Banks. The authors would like to thank Glenn Calverley, Gabriel Fagan, Philip R. Lane, Maurice McGuire, Micheál O'Keeffe, Fergal Power and Peter Sinnott for helpful comments. Any remaining errors or omissions are our own.

1. Introduction

In normal times, central bank balance sheets are relatively straightforward.² The nature of the central bank function means that elements of its balance sheet liabilities are remunerated at almost zero cost (such as via banknotes) allowing it to generate income through the investment of assets. The spread of a central bank's investment yields over the cost of funding its liabilities is typically the largest contributor to its income. Other monetary policy related activities are clearly also important parts of the balance sheet, including assets, such as lending to banks, and liabilities, such as banks' deposits and their holdings of minimum reserves deposits with the central bank. In this traditional model, central bank balance sheets are typically exposed to four general categories of financial risk, namely: credit risk (reflecting exposure to monetary policy and investment counterparties and instruments); market risk (reflecting the fluctuation or volatility of market prices of assets held); liquidity risk (reflecting the possibility that low levels of liquidity when disposing of an asset will result in low prices and a capital loss); and currency risk (reflecting volatility in foreign currency exposures where they are held by the central bank).

Since the onset of the global financial crisis, however, the structure of central bank balance sheets has changed substantially, and altered some of the assumptions underpinning the traditional model. In both the euro area and in many economies around the globe, central banks have adopted non-standard or 'unconventional' monetary policy measures that are inter-alia intended to address the stressed financial market conditions arising from the crisis.

The most obvious implication of these non-standard measures on NCBs' balance sheets has been an increase in their size. Larger balance sheets have increased NCBs' exposure to credit risks, but also significantly increased exposure to interest rate risks.

Importantly, these new and expanded balance sheet items, along with their associated financial risks, have altered some of the traditional dynamics around the generation of central bank income.

This article considers these issues and their consequences for central bank balance sheets. The article is structured as follows: Section two examines the typical structure of central bank balance sheets in normal times; Section three considers the treatment of non-standard measures on central bank balance sheets; Section four reviews the impact of monetary policy and interest rate normalisation on central bank balance sheets; Section five examines how some of the increase in risks can be mitigated, while the final section concludes.

2. Central Bank Balance Sheets in Normal Times

A useful starting point for assessing the impact of unconventional monetary policy on central bank balance sheets is to consider a central bank balance sheet under normal financial market and monetary policy conditions. While euro area national central bank balance sheets can differ, they share common key components. Figure 1 presents a stylised balance sheet that illustrates the key entries in a typical central bank balance sheet.

On the liabilities side of the balance sheet, central banks are responsible for issuing currency and this provision of euro banknotes is reflected in the stylised balance sheet. Central banks also hold financial buffers in the form of capital and reserves, which also represent a liability on the balance sheet. Together, these liabilities are jointly termed 'free resources', as they are not remunerated.

The financial buffers form of reserves refers to profits which are retained by a central bank to act as a buffer against financial losses. This is separate to minimum reserve accounts, which are deposits held by credit institutions

² The discussion of central bank balance sheets in this article are largely common across all central banks, whether they are within the euro area or not. The stylised balance sheet discussion in this article focuses primarily on euro area central bank balance sheets, as other central banks outside of monetary union may have large foreign currency operations, which may make some of the dynamics discussed in this article less observable or distinguishable. Therefore, we use the terms 'central bank' and 'NCB' interchangeably in this article to refer to the balance sheet of a typical central bank in the euro area. For more information on the Eurosystem balance sheet, see <https://www.ecb.europa.eu/press/pr/wfs/2017/html/ecb.fs170711.en.html>.

Figure 1: Stylised balance sheet of a euro-area NCB under normal conditions³

Assets	Liabilities	
Investment assets	Banknotes	Free Resources
	Financial buffers (capital and provisions)	
Monetary policy operations (e.g. Main Refinancing Operation (MRO), or other term operations)	Minimum reserves/current accounts	
	Deposit facility	
	Government deposits	
± Net Target	Balance	
Other	Other	

with their central banks. Credit institutions are required to hold prescribed ‘minimum reserves’ with NCBs and these can also be used to influence the level of liquidity in the system and thus the transmission of monetary policy.⁴ Credit institutions can also hold additional deposits (or ‘excess reserves’) with the Eurosystem through use of the deposit facility, although recourse to this is usually relatively low during normal times when monetary policy is effected using a liquidity deficit. At certain times, emergency liquidity assistance (ELA) is another important feature of NCB balance sheets. In addition, NCBs may hold deposits from government, and others, which is also reflected as a liability on the balance sheet.⁵

Turning to the assets side of the balance sheet, there are effectively two key components – those relating to monetary policy operations and those relating to central bank investments.⁶ Credit institutions obtain liquidity from their NCB, which the NCB provides using monetary policy operations. During normal times, this liquidity is most often provided in the form of short-term repos (effectively secured loans) to banks - known as main refinancing operations in the euro area - and monetary policy is implemented by setting the

interest rate on these operations. The other main component of an NCB’s balance sheet, for the purposes of this analysis, concerns investment assets which are not related to monetary policy; that is foreign reserves, investments and gold holdings. While the objective behind these holdings can relate to an NCB’s national tasks, such as maintaining access to foreign currencies or preserving capital value, we focus here on their role as an income-generating tool to cover an NCB’s operating expenses, considering that the ability to generate income is central to ensuring the financial independence of central banks. Finally, within the Eurosystem, the NCBs and ECB have claims on, and liabilities to, each other, including due to cross border payments using a system known as TARGET2⁷, which are often reflected on a NCB’s balance sheet.⁸

Turning to the contribution of these items to the cash flows of an NCB, an important factor is the concept of ‘free resources’ mentioned previously. Effectively, the role of a central bank uniquely creates a large liability on the balance sheet – called ‘free resources’ - that requires no remuneration given the central bank’s requirement to honour the nominal (face) value of banknotes and currency in circulation. This

³ Certain elements are presented in a simplified manner, and may not be matched exactly as represented in Figure 1. For instance, investment assets may not be fully matched by free resources.

⁴ Minimum reserves are remunerated at the main refinancing operations rate (MRO), while all reserves in excess of this are remunerated at the deposit facility rate (DFR).

⁵ For instance, see the liabilities of the Banque de France (Banque de France, 2017).

⁶ The Central Bank of Ireland currently holds assets on its balance sheet related to the liquidation of IBRC (see CBI, 2017).

⁷ Trans-European Automated Real-time Gross Settlement Express Transfer System.

⁸ An NCB’s balance sheet can also include other various assets and liabilities, which is referenced by ‘other’; however, for the purpose of simplicity, this analysis focuses on the above highlighted items. Some examples of other items that can often be found on an NCB’s balance sheet include receivables from the IMF, foreign currency balances, and fixed assets.

Figure 2: Income generation for a euro-area NCB under normal conditions

Assets		Liabilities	
	Rate		Rate
Investment assets	Return on investments (+)	Banknotes	0
		Capital (Buffers)	

$$\text{'Free resource' Income} = (\text{Investment Assets} \times \text{Yield on Investments})$$

Monetary policy operations (MRO)	MRO rate ¹² (+)	Minimum reserves	MRO rate (+)
Other assets	Mix rate (+)	Deposit facility	Deposit Facility Rate (DFR)
		Government deposits	(+)
		Other liabilities	Mix rate (+)

$$\text{Other Interest Income} = \sum (\text{Assets} \times \text{Rate}) - \sum (\text{Liabilities} \times \text{Rate})$$

concept allows for income generation whereby funds generated by issuing banknotes are invested by the NCB in interest-bearing assets. The resulting income is known as seigniorage income.⁹ A central bank's financial buffers (capital, reserves, provisions and revaluation accounts where relevant) can also be included as contributing to this 'free resource'. As illustrated in the top half of Figure 2, the income generated as a result of these free resources is dependent on two factors: (i) the level of banknotes (and financial buffers); and (ii) an NCB's choice of investment assets and the subsequent financial performance (i.e. yield) of those assets over time.¹⁰ This yield is generally positive under normal financial market conditions and seigniorage is usually a significant source of income for the NCBs in the euro area.

In terms of liquidity providing monetary policy operations, the interest rate charged on these is typically positive. At the same time, certain liabilities represent an expense, in particular

those relating to credit institutions' minimum reserves and excess deposits. While the rate associated with the latter (the deposit facility rate), is normally less than that charged on monetary policy liquidity providing operations, monetary policy operations typically do not contribute to profitability during normal times.¹¹ This is because the level of excess deposits is generally close to zero, which means that the interest earned on liquidity providing operations tends to be largely cancelled out by the interest paid to banks on their minimum reserves (which is remunerated at the monetary policy rate). While other items on a NCB's balance sheet can lead to additional income or expense, the significant income earned from free resources during normal times means that traditionally central banks are profitable institutions.

In terms of accounting and financial reporting, NCBs and the ECB follow common Eurosystem accounting rules as set out in the relevant ECB guideline, as well as other

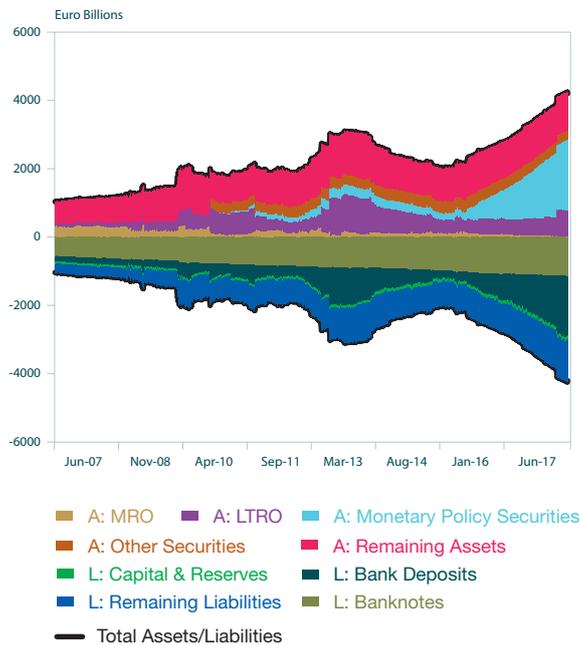
⁹ While there are differing definitions, seigniorage income as referred to in this article is the return generated by investing in assets that match certain liabilities that carry no cost of funding, such as banknotes/currency in circulation and reserves. Currency in circulation is not entirely cost free, however, insofar as there are, inter alia, costs of currency production, storage and distribution. For simplicity, however, we refer to these as free resources as they are not remunerated.

¹⁰ While most of the entries in the stylised balance sheet relate to monetary policy, there are important distinctions regarding the rate of return and cost of funds that applies to the respective assets and liabilities. It is important to note that central banks may differ in how they exactly apportion and offset assets and liabilities and their respective rates. Indeed, the stylised categorisation of entries on the balance sheet illustrated here is simplistic for illustrative purposes, such that different assets may be notionally apportioned against different liabilities when assessing the net return and generation of income from the central bank's operations.

¹¹ In some cases, the monetary policy rate is paid on a portion of a bank's deposits at the central bank (such as on the minimum reserve requirements) and the deposit facility rate paid on the remainder of excess liquidity placed with the central bank.

¹² The MRO rate is referenced for simplicity, but may also include lending at the overnight standing facility rate, amongst others.

Chart 1: Consolidated Eurosystem Balance Sheet as at 30 June 2017



Source: ECB Statistical Data Warehouse, Central Bank of Ireland calculations.

relevant accounting standards (e.g., IFRS or local GAAP) where applicable.¹³ Perhaps the most notable difference within the ECB accounting guidelines, when compared to IFRS, is the treatment and recognition of income. Under ECB rules, unrealised gains relating to marked-to-market securities (as well as currency and gold) are held in revaluation accounts and do not affect the profit and loss account (until such gains are realised).¹⁴ Such revaluation accounts are recorded on the liability side of an NCB's balance sheet at an amount equivalent to the increase in value of the corresponding asset. In contrast, unrealised losses are recorded on the profit and loss account once any relevant amounts accumulated in revaluation accounts are first eliminated. This asymmetric treatment is considered prudent in the case of central banks in the euro area, as under these rules

unrealised gains are not included in any income distribution.

An important element of Eurosystem financial reporting entails the sharing of income and loss between the NCBs and the ECB (in certain circumstances). For many assets and liabilities, in particular those deemed to be relating to the performance of the monetary policy function, such as issuing euro banknotes or implementing monetary policy operations, the income (or loss) is pooled and redistributed amongst NCBs and the ECB - the respective net results of which are reported in NCBs' annual accounts.¹⁵ While this concept is noteworthy when calculating the exact exposures and income of the NCBs, the concept does not alter the main income and expense drivers of the stylised central bank balance sheet outlined above.

3. Changes to Balance Sheet Composition due to Euro Area Non-standard Monetary Policy Measures

Since the onset of the financial crisis, monetary policy in the euro area, and indeed in many economies around the globe, can no longer be considered to be operating in normal times. Monetary policy measures implemented in the euro area to date include; (i) the introduction of fixed rate, full allotment for liquidity providing refinancing operations, (ii) the provision of long term liquidity to counterparties (Longer Term Refinancing Operations (LTRO) and Targeted Longer Term Refinancing Operations (TLTRO)), (iii) the provision of foreign currency liquidity, (iv) policy rates being set to the zero lower bound and even into negative territory for some rates, and (v) large scale asset purchases known as the expanded asset purchase programme (the APP or EAPP).¹⁶ Collectively, these monetary policy measures are known as non-standard measures.

¹³ Guideline (EU) 2016/2249 of the ECB of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34).

¹⁴ NCBs may also hold securities as part of their investment asset portfolio which are classified as 'held-to-maturity'. The intention is not to sell these underlying securities, apart from in certain situations as specified in the ECB's accounting guideline, and the balance sheet value of such assets remains static over time apart from any amortisation. Changes in market prices of these assets do not impact the balance sheet or profit and loss account.

¹⁵ This is performed on the basis of the NCB's capital subscriptions (referred to as the capital key). NCB's shares in the ECB's capital are calculated based on total population and GDP and are adjusted every five years, or once a new country joins the EU. See ECB 2015a for further information.

¹⁶ The Eurosystem has purchased sovereign and public sector bonds, covered bonds, asset back securities and corporate sector bonds under a number of different purchase programmes since the financial crisis emerged. See ECB (n.d.) for more information.

Figure 3: Stylised balance sheet of a euro-area NCB following non-standard measures

Assets	Liabilities	Free Resources
Investment assets	Banknotes Capital (Buffers)	
Monetary policy operations (MRO)	Minimum reserves/current accounts	
Monetary policy operations (LTRO/TLTRO)	Deposit facility Government deposits	
Securities held for monetary policy purposes (incl. APP)		
± Net Target balance		
Other	Other	

Each of these measures was implemented in order to repair and/or enhance the transmission of monetary policy.¹⁷ The move to fixed rate, full allotment and the increase in liquidity provision marked the beginning of non-standard measures and were introduced to address tensions within euro area money markets and the shortage of bank liquidity. Historically low interest rates have been introduced to help incentivise borrowing and expenditure that will generate economic activity and raise the inflation rate towards the target level. Long-term liquidity providing operations, such as the TLTROs, were initiated to incentivise the flow of credit between banks and the private sector through certainty of low cost borrowing. Finally, outright purchases of bonds were undertaken to address fragmentation of financial markets and to lower interest rates further out the yield curve.¹⁸

The most noticeable impact of the non-standard measures on the Eurosystem's balance sheet has been an increase in size. The consolidated Eurosystem balance sheet has increased to approximately €4,200 billion as at end-June 2017, from a pre-crisis level of approximately €1,000 billion in 2006 (see Chart 1). There has also been a notable change in the composition and structure of the balance sheet, with the more recent increase in balance sheet size being primarily driven by the asset purchases under the APP. The long term provision of liquidity shown under 'LTRO' has also added to the increase in size. These

elements have replaced the MRO operations as the primary source of liquidity provision to the banking system. The large levels of excess liquidity provided via these measures has had a subsequent effect on the liabilities of central banks, as credit institutions' recourse to the deposit facility has also increased significantly.

The non-standard measures described above in relation to the consolidated Eurosystem balance sheet have had a similar effect on size and composition of individual NCB balance sheets. Figure 3 presents a stylised balance sheet of a euro area NCB following the implementation of non-standard measures, highlighting the increased holdings of securities and the corresponding expansion in bank deposits as the notable changes when compared with the balance sheet under normal conditions.

The non-standard measures have also had the effect of lengthening the maturity profile of NCB assets. A substantial portion of refinancing operations in the euro area are now longer-term liquidity providing operations, with maturities as long as four years in the case of TLTROs since 2016, compared to operations between one week and three months previously. Even more significant are the purchases of assets under the APP, and in particular the public sector purchase programme (PSPP), under which eligible securities have a residual maturity of between one to 30 years.¹⁹ As at end-June 2017, the

¹⁷ See ECB 2015b for further information on the transmission of non-standard measures

¹⁸ See ECB 2015c for further discussion.

¹⁹ The minimum remaining maturity for eligibility had been set to two years, and was changed to one year at the Governing Council meeting in December 2016, to ensure the continued smooth implementation of the programme.

Figure 4: Income generation for a euro-area NCB under current non-standard measures²¹

Assets	Rate	Liabilities	Rate
Investment assets	Return on investments (Low)	Banknotes	0
		Capital (Buffers)	

$$\text{Seigniorage Income} = (\text{Investment Assets} \times \text{Return on Investments})$$

Monetary policy operations (MRO)	MRO rate (0%)
Monetary policy operations (LTRO)	LTRO rate (0% to -0.4%)
Securities held for monetary policy purposes (incl. APP)	Euro area bond yields (Low)
Other assets	Mix rate

Minimum reserves	MRO rate (0%)
Deposit facility	Deposit Facility Rate (DFR) (-0.4%)
Government deposits	
Other liabilities	Mix rate

$$\text{Other Interest Income} = \sum (\text{Assets} \times \text{Positive Rate}) + \sum (\text{Liabilities} \times \text{Negative Rate}) - \sum (\text{Liabilities} \times \text{Positive Rate}) - \sum (\text{Assets} \times \text{Negative Rate})$$

total remaining weighted average maturity for the PSPP purchases was 7.90 years (see ECB, n.d.)

The accounting treatment of these non-standard measures is an important feature that helps to minimise volatility that would otherwise be seen in central banks' annual accounts. In particular, securities purchased under the APP are held at amortised cost (see ECB 2015d), whereby the amortisation restores the asset to face value based on the remaining maturity of the asset - for example, if a bond were purchased below face value, the value of the asset would increase over its lifetime towards its face value. This accounting classification means that the Eurosystem APP securities are not marked-to-market, and underlying market movements will not affect their balance sheet value. A profit or loss associated with the value of an APP security would only be realised in the event of a sale of that asset. The ECB has stated, however, that while there are no accounting constraints on sales, they are not expected as normal practice for the foreseeable future.²⁰

One implication of this accounting practice is that the sole source of income associated with the APP is the generally fixed interest income earned on securities held until they mature. This has resulted in a significant proportion of central bank balance sheets now generating income that is fixed and relatively static given the longer-term maturities of the securities.

Furthermore, key policy rates for monetary policy have been set to historically low levels (at end June 2017, the MRO rate is 0% and the deposit facility rate is -0.4%), which directly affects the interest income and expense flows. The low interest rates along with the APP purchases has led to sustained downward pressure on bond yields, such that a low (and in some cases negative) interest rate may be earned on these fixed rate assets. While the interest income earned from liquidity providing open and term market operations (all effectively at the MRO rate) is also low, the negative deposit facility rate has enabled NCBs to achieve a positive income stream from monetary policy liquidity related operations. In addition, legacy holdings and investment

²⁰ See ECB (2017)

²¹ MRO and DFR have been at these levels since 16 March 2016.

portfolios have meant that NCBs have remained profitable to date under the non-standard measures. Figure 4 illustrates how these changes have affected the components of net interest income for NCBs.

4. Risks Associated with Monetary Policy and Interest Rate Normalisation

The non-standard monetary policy measures have had a substantial impact on the risk exposures of central banks. Pattipeilohy (2016) notes that the type of risk exposure depends on the design of the central bank balance sheet. In terms of the Eurosystem, taking the accounting treatment into consideration, there are two key risks to consider: (i) credit risk; and (ii) interest rate risk.

The increased outright holdings of bonds have led to a corresponding increase in credit risk for the Eurosystem. This has been partially managed by the risk mitigation measures implemented by the Eurosystem, including eligibility criteria, as well as issue and issuer purchase limits. Nevertheless, residual credit risk exposure naturally remains. In general, however, prudent limits and eligibility criteria are designed to ensure that these exposures are within the risk appetite of central banks in carrying out their role to preserve price stability. Ultimately, however, a successful programme would improve macroeconomic conditions, which, in turn, should reduce the probability of defaults in the euro area, as discussed by Andrade et. al. (2006) with respect to corporate bonds.

The second notable area of increased risk for the Eurosystem relates to the effects of changes in interest rates. As already noted, the holdings of bonds under the APP are accounted for at amortised cost meaning the typical form of interest rate risk, i.e., that affects the bonds' market price, does not apply, other than if an exit strategy incorporating bond disposal were being considered. The more relevant form of interest rate risk for the

Eurosystem relates to a potential mismatch in the sensitivity of the Eurosystem's assets and liabilities to changes in short term interest rates – particularly those assets acquired as part of implementing the non-standard measures. A large portion of the fixed income bonds bought under the APP have been acquired at a time of relatively low, and in many cases negative, interest rates. In contrast, a large portion of the Eurosystem's liabilities are primarily deposit based and linked to a variable rate, whereby the associated cost is the deposit facility rate or the MRO rate.

Despite the deposit rate being negative, the differential between this and the yields on purchased bonds does not pose a major concern for central banks at present; particularly given the large amounts of excess liquidity placed on deposit within the Eurosystem at negative rates. The ECB's December 2016 policy decision, to allow NCBs to purchase bonds at rates below the deposit facility rate, changes this dynamic somewhat, as it means that interest losses on some bonds purchased with negative rates cannot be offset fully by interest income from the deposit facility.

As economic conditions improve and inflation nears its target level, the deposit facility rate and the MRO rate are policy rates that are expected to rise over time. Given that central banks have effectively fixed the interest income on bonds purchased under the APP at low or negative interest rates, this points towards a potential widening spread between rising cost of funds on the liabilities and the low return on the assets. While this scenario is effectively a successful outcome, in that a normalisation of monetary policy should correspond with improved macroeconomic conditions, it nonetheless results in central banks' balance sheets being exposed to potential interest rate mismatch risks. The potential for increasing interest rate mismatches in the context of rising policy rates may result in the cost of associated liabilities being greater than the income from purchased assets, which would, in turn, affect the profitability of central banks. Discussion on this, as well as further considerations related to

Figure 5: Income generation for a euro-area NCB after policy rates increase

Assets	Income		Liabilities	Expense
Investment assets	Return on investments	— / ↑	Banknotes	0
			Capital (Buffers)	

$$\text{'Free resource' / Seigniorage Income} = (\text{Investment Assets} \times \text{Return on Investments})$$

Monetary policy operations (MRO)	MRO rate Variable	↑
Monetary policy operations (LTRO)	LTRO rate Static	
Securities held for monetary policy purposes (incl. APP)	Euro area bond yields Static	—
Other assets	Mix	

Interest Income: Relatively Static and Low

Minimum reserves	MRO rate Variable	↑
Deposit facility	DFR	↑
	Variable	
Government deposits		
Other liabilities	Mix rate	

Interest Expense: Increasing

$$\text{Other Interest Income} = \sum (\text{Assets} \times \text{Rate}) - \sum (\text{Liabilities} \times \text{Rate})$$

central bank income arising from non-standard measures, is included in the recent annual report of the Bank of International Settlements (see Box IV.D, BIS 2017).

Furthermore, this scenario of interest rate driven losses may be compounded by the low yield environment impacting on income from other areas of NCBs' balance sheets, such as the investment portfolios. The non-standard measures, in particular the APP, have helped to lower yields on a broad scale meaning that seigniorage income is likely to be reduced compared to pre-crisis levels.²² Depending on each central bank's own investment policies and risk tolerances, it may be the case that a portion of investment assets will be invested in low yielding assets during the period that the interest rate mismatch on the purchase programme assets arises. It could therefore take a number of years, in some cases, before sufficient investments are made at higher yielding bond rates before the net interest

rate losses on purchase programme assets are covered by investment income. Over the longer term, NCBs are expected to return to profitability.

These forward looking scenarios are illustrated in Figure 5, which shows how a stylised NCB balance sheet may look as interest rates rise and how this may affect the profitability of the respective central bank. As has been referenced, the MRO and DFR rates are likely to increase over time, meaning that while additional income is expected from monetary policy operations, this could be offset by increases in interest expense, in particular due to excess deposits. At the same time, since assets under the APP are held at amortised cost, the income on this is expected to be relatively low and static, which could, under certain circumstances, lead to increasing net interest losses. In terms of movements in the balance sheet, excess deposits may decrease over time and there is also the possibility of

²² However, this is dependent on investment decisions and the amount of banknotes in circulation.

reinvestment of maturing APP assets as rates and yields rise, which may increase the rate of return on this portfolio and improve the net interest income position. Nonetheless, a negative net interest income scenario, potentially leading to individual accounting year losses, is a plausible scenario which warrants consideration and potentially mitigating actions.

5. Addressing the Changing Risk Profile of the Central Bank Balance Sheet

The increased exposure to interest rate risks described above is a direct and necessary consequence of implementing non-standard monetary policy measures aimed at steering inflation toward its target level. In this regard, the risks are unavoidable in the first order insofar as a policy rate hiking cycle that can lead to the realisation of losses from interest rate risk will occur in a scenario where the monetary policy measures being implemented by central banks have been successful. These potential interest rate losses could be viewed as a comparatively small cost to be incurred in order to achieve the greater economic benefits from the successful implementation of non-standard measures and the associated objective of sustained price stability. There is, therefore, a reasonable degree of expectation that these losses will be incurred under certain scenarios.

Unlike commercial banks, however, a central bank cannot easily take offsetting financial market measures to hedge or prevent the expected losses from occurring, as to do so would effectively be to take a position against the stated monetary policy stance that has been communicated. This could, therefore, potentially hinder the adjustment of the monetary transmission mechanism towards the intended target. In this regard, it is worth noting that the objective of the Eurosystem is to achieve price stability. While central banks normally make profits, these are a second order objective and are incidental to, but in

some ways enabled by, the central bank's pursuit of its monetary policy objectives. Therefore, given the Eurosystem mandate, implementation of monetary policy measures that enable the Eurosystem to achieve its price stability objective is appropriate, even if it results in losses for the Eurosystem or an individual NCB.

This leaves a central bank with a limited choice of risk mitigation options, compared to a commercial bank. The absence of any risk mitigation action would mean that interest rate mismatch losses may occur and they may contribute to an overall accounting loss for a central bank in any given year where other sources of income are insufficient to cover the interest rate losses. The realisation of such accounting losses may have a number of effects on central banks, not least reducing the stock of capital and buffers and therefore raising questions around the speed and ability of the central bank to be recapitalised, and to remain fully independent when in need of recapitalisation.

5.1 Interest rate risk mitigation proposed by other institutions

These issues affecting central bank balance sheets in recent years, and potential steps to mitigate them, have been discussed by a number of institutions. Af Jochnick (2015) identified how some of these issues have affected the Sveriges Riksbank - explicitly stating that the Riksbank will probably make losses over the next few years and noting that many other central banks will come under similar pressures, particularly those that have bought large volumes of bonds with long maturities to stimulate the economy. The author also notes that this will not only have implications for the ability to pay dividends to the government, but that the losses will also affect the equity of the Riksbank.

The Riksbank further emphasised these issues in Floden (2016), where it is noted that that it is more likely that the Riksbank will

incur losses, rather than profits, on bonds purchased as yields continued to move lower. While this will result in lower profits and lower dividends being distributed to the government, the paper also notes that there are offsetting benefits to government finances – such as through the lower cost of borrowing that is also brought about by the monetary policy stance. Furthermore, the author highlights a counterpoint to these losses associated with the Riksbank's improved equity position, which increased from SEK 70 billion before the financial crisis to SEK 120 billion in 2016, which means that the Riksbank is in an adequate position to deal with projected losses.

Christensen, Lopez and Rudebusch (2013) identify these issues in the context of the US Federal Reserve's holdings of securities under their quantitative easing programme. The paper runs a number of stress-test simulations on the Fed's balance sheet in order to identify risks that may arise under various model-based yield curve scenarios. The authors identify the risk that as short-term interest rates rise, including the rate that the Fed pays on its bank reserves, the funding cost of its securities portfolio will increase - implying a significant increase in interest income risk with the knock-on effect of lower remittances to the US Treasury. Indeed, the authors further note that, in extreme circumstances, these remittances could fall to zero.

The Bank for International Settlements (BIS) has also considered some of these issues. Turner (2014), for example, notes that central banks have a growing maturity mismatch and that higher short-term rates could at some point lead to losses, and suggests that such losses can have political consequences that might weaken central bank independence. Similarly, Archer and Moser-Boehm (2013) note the potential for central banks to incur consequential risks in pursuing their monetary policy mandate that would otherwise be avoided or mitigated by a commercial bank. The foreword to the latter paper notes two accounting policies that are particularly suited

to central banks dealing with potential losses arising in similar such circumstances: (i) the use of revaluation reserves, especially in an asymmetric manner, treating unrealised gains and losses differently; and (ii) the use of general risk ("rainy day") provisions.

Vergote, Studener, Efthymiadis and Merriman (2010), in their paper on the ECB's financial accounts, discuss some of the mechanisms employed by the ECB to address risks and potential losses. The paper notes that financial losses have been offset mainly through risk provisions, partly because they can be built up faster than the general reserve mechanism. The authors state that, in addition to a general reserve, the ECB also set up a risk provision against exchange rate, interest rate and gold price risks in 2000. Since 2010, the scope of this provision has also included credit risk.

ECB (2012) provides further details regarding financial reporting in the Eurosystem, particularly in relation to provisions for potential losses. The paper notes that the accounting framework of the ECB, and those of a number of euro area NCBs, allow general provisions to be made for foreign currency, interest rate, gold price and credit risks. While stating that a provision of this type is used by the ECB, the paper also suggests that this general provision has enhanced the ECB's protection against financial risks, as it may be used to cover realised and unrealised losses.

These considerations are contextualised by discussions of the importance of central bank profitability for the reputation of a central bank and its ability to deliver on its mandate (for example, Archer and Moser-Boehm (2013) and Stella and Lonnberg (2008)). These discussions often point towards the benefits of taking action to mitigate potential losses so as to avoid volatility in central bank income, bearing in mind that the requirement for central banks to distribute a certain amount of their profits to their treasury may, in some cases, limit their ability to accumulate sufficient reserves. Ingram (2011) also supports the use of risk provisions by central banks. In particular,

the author discusses the importance of risk provisions and notes that such a provision is used by the ECB, and many NCBs, and that it enables the ECB to reduce the potential volatility in its distributable annual profits.

A number of euro area NCBs have also identified the growing risks on their balance sheets and have taken steps to mitigate these risks. Weidmann (2017), in his introductory comments at the financial statements press conference 2016, explicitly highlighted the growing maturity mismatch on the Bundesbank balance sheet, which could lead to losses. He noted that while exchange rate, credit and default risks are already factored into their risk provisions, the growing interest rate risk also needs to be addressed – and announced an increase in their risk provisions by €1.75bn (to €15.35bn), largely in reflection of these interest rate risks.²³

Many other euro area NCBs' annual reports mention the exposure to increasing risks and the role for risk provisions that address exchange rate, credit, gold, and interest rate risks, amongst others. De Nederlandsche Bank (2016a) explicitly addressed these risks. The introductory statement at the launch of their 2015 Annual Report states that “A future rise in interest rates will, for example, entail balance sheet risks for De Nederlandsche Bank's (DNB) future profitability. This is one of the reasons why we ... have decided to make a general risk provision in the coming years.” The 2015 Annual Report provides further detailed discussion around the assessment that quantitative easing has resulted in greater balance sheet risks for the central bank, wherein Box 1.1 states “... DNB is exposed to interest rate risk that is manifested when key interest rates are raised significantly and rapidly. As the purchased assets will be held until at least the end of March 2017 and the principal payments will be reinvested, the exposures and risks for DNB will increase further and will remain high for a long time. The low interest rates have also led to a decline in DNB's profitability. Moreover,

profitability is also declining because existing monetary programmes, such as the securities markets programme (SMP), which produce higher returns, are coming to an end” (De Nederlandsche Bank, 2016b).

5.2 Addressing these risks at the Central Bank of Ireland

The impact of the non-standard measures on the balance sheet of the Central Bank of Ireland (“the Bank”) has been similar to that described above for stylised NCB balance sheets. While the magnitude of risks will vary across NCBs, according to the bonds purchased and their yields, the increase in the Bank's balance sheet size due to non-standard measures has created an increased level of risk. As part of the Bank's on-going monitoring of its balance sheet risks, analysis was performed to identify the magnitude and type of risk exposures facing the Bank, before considering the materiality of those risks and how they may be mitigated or accounted for. In assessing the Bank's risk mitigation options, consideration was first given to both the accounting guideline followed by the Bank, and the profit distribution rules that the Bank adheres to.

As a member of the Eurosystem, the Bank complies with the ECB's Accounting Guideline.²⁴ Prior to year-end 2016, the Bank followed all mandatory aspects of the Guideline but applied accounting standards generally accepted in Ireland in instances where aspects of the Guideline were non-mandatory or silent.²⁵ In line with the mandatory elements of the Guideline, the Bank carries out an assessment of its financial risk on an annual basis. In recent years, this has resulted in the retention of a provision for credit risk, relating to impairments on securities held for monetary policy and investment purposes. Importantly, these provisions were established as specific risk provisions, requiring evidence of impairment, and are different to the ‘rainy day’ or general risk provisions described above.

²³ Deutsche Bundesbank (2016).

²⁴ Guideline (EU) 2016/2249 of the ECB of 3 November 2016 on the legal framework for accounting and financial reporting in the European System of Central Banks (ECB/2016/34)

²⁵ The Financial Reporting Standard applicable in the UK and Ireland is Financial Reporting Standard 102 (FRS 102).

With regard to building up the Bank's buffers in anticipation of a potential loss occurring from risks identified, the pre-emptive retention of profits in order to build reserves can be considered. The distribution of profit from the Bank to the Exchequer is governed by the Central Bank of Ireland (Surplus Income) Regulations (1943). The result of this regulation is that the Bank is required to transfer a minimum of 80 percent of its profits in any given year to the State, and thus a maximum of 20 percent can be transferred to its general reserve, where it would serve as a buffer against risks.²⁶ While such regulations are common practice and allow for a balance between building central bank reserves and providing a return to the exchequer, such profit distribution rules can limit the Bank's ability to create financial buffers in a speedy manner, particularly where material new risks develop quickly.

While these existing mechanisms have been used to create financial risk buffers to date, additional measures were considered to be necessary in light of the increased risk resulting from the non-standard measures. To enable the Bank to make provisions for a broader range of financial risks, should material risks be identified, the Bank prepared a general risk provision policy. On completion of a full risk assessment, the Bank identified additional material risks and identified a need to introduce an additional risk provision in its 2016 Annual Accounts in accordance with the policy (see Box 8, Central Bank of Ireland, 2017). The ability to incorporate such a provision into the Bank's accounts was further enabled by a move to follow all aspects of the ECB's Accounting Guideline, including those categorised as non-mandatory (See Note 36, Central Bank of Ireland, 2017). The inclusion of a category of provisions for 'foreign exchange rate, interest rate, credit, and gold price risks', otherwise known as a general risk provision, is explicitly addressed by the non-mandatory aspects of the Guideline.

The calibration of the provision for the 2016 Annual Accounts was based on a risk modelling exercise, involving scenario analysis, where a wide range of interest rate paths were considered, including extreme scenarios. The risk was measured over the medium term with reference to both value-at-risk and expected shortfall. This analysis was based on the Bank's balance sheet at year-end 2016, with a forward-looking dimension that made some allowance for asset disposals and maturities. The results of this analysis were then considered alongside expert professional judgement (see Note 33(ii), Central Bank of Ireland, 2017). As a result, a provision of €165m was set aside to cover the materialisation of the scenario described in Section 4, where rising interest rates could result in the generation of negative net interest income, due to the mismatch on the Bank's balance sheet.

6. Conclusions

Central bank balance sheets have changed in both size and composition since the financial crisis, through increased lending to counterparties and purchases of assets as part of non-standard monetary policy measures. These changes have transformed the traditional dynamics of central bank balance sheets, compared to more normal times, with significant implications for profitability and risks.

In particular, central banks that have purchased securities under quantitative easing-style asset purchase programmes are now increasingly exposed to potential interest rate mismatch risks. This risk arises from a potential widening in the spread between interest rates on assets and liabilities; namely where a sizeable portion of central bank liabilities are linked to policy rates which are expected to rise in the coming years and where a large amount of assets entail securities purchased at very low or negative yields. This interest rate mismatch implies that financial losses could arise in future years and, if other central bank investment

²⁶ Recent practice, since 2008, has tended to see the Bank retain the maximum allowed 20 percent of profits in order to build up the Bank's level of reserves in response to the expanded balance sheet size and associated risks that have arisen since the financial crisis. In some years, reported transfers to reserves have differed from 20 percent of profits due to the impact of actuarial losses and gains.

income were also suppressed due to low yields on investment assets, there is a risk of overall accounting losses in certain scenarios.

Given the importance of financial independence (and the need for central banks to generate income to cover their own expenses), central banks in many countries have taken various steps to mitigate these growing risks. While strong capital and reserves provide a source of resilience, the role of risk provisioning has grown in importance for central banks in recent years. In the euro area, both the ECB and many euro area NCBs have explicitly identified these growing risks and many have provisioned for interest rate risk within a general risk provision framework.

The Central Bank of Ireland has also identified increased risks in the course of its regular risk assessment of its growing balance sheet. In particular, an increased exposure to interest rate mismatch risk has been identified. As a consequence, and in compliance with ECB accounting guidelines, the Bank introduced an additional risk provision in its 2016 Annual Accounts, which falls under the category of provisions for 'foreign exchange rate, interest rate, credit, and gold price risks'. Following an evaluation of the potential impacts and likelihood of this risk, a provision of €165m was set aside in the 2016 Annual Accounts. In the event that the risks fail to be realised, the provisions will be released and added back to future profit and loss statements in accordance with the Bank's general risk provision policy. The Bank will reassess these and other financial risks as part of its ongoing management and mitigation of such exposures. Were the risks to materialise, the provisioning for the risks when they are initially identified helps the Bank to adequately deal with the losses when they occur and thereby supports the Bank's independence and helps to maintain a robust level of capital and financial buffers.

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