Central banking and balance sheet risks

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The main risks of central banking are always related to the success of the policy implemented, ie whether the decisions made lead to price stability and whether other economic policies can be supported without prejudice to price stability. Central banking is also associated with financial risks. These are relevant particularly in situations marked by destabilising developments on the financial markets and in the economy and by central bank interventions in foreign exchange, money or capital markets. Although financial returns are not a primary central bank objective, financial independence is a prerequisite for an effective conduct of monetary policy aimed at maintaining price stability. This article examines the financial risks involved in Eurosystem activities from the perspective of developments in the Eurosystem balance sheet.

We can begin our assessment of the financial risks related to central banking with an analysis of central bank income formation. A central bank, like any economic unit, generates a profit when the return on its activities exceeds the costs of financing its debts. Although the European Central Bank (ECB) is responsible for the single monetary policy of the euro area, the consolidated balance sheet of all the components of the Eurosystem (the ECB and the national central banks) needs to be examined in order to obtain a comprehensive overview of euro area central banking. This is particularly so because the national central banks implement euro area monetary policy and the bulk of the Eurosystem's financial assets and capital are held on their balance sheets. This article first analyses the current composition of the Eurosystem balance sheet and then looks at its development over time. An analysis of macro- and micro-level risks related to central banking is followed by a brief comparison of developments in the balance sheets of the Eurosystem and the central banks of some other currency areas. The article concludes with a review of the main changes in the Bank of Finland's balance sheet that have taken place since adoption of the euro.

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Balance sheet of the Eurosystem

The bulk of the assets side of the Eurosystem balance sheet (Table) comprises foreign reserve assets (incl. gold), monetary policy operations and euro-denominated financial assets. Income on the foreign reserve portfolio is determined by changes in the value of the currencies involved and investment returns derived from foreign reserve assets. As exchange rates and the price of gold are subject to considerable volatility even under normal circumstances, variations in the external value of the euro have a highly significant impact on the annual income of the Eurosystem. In a longer-term perspective, however,

Table.

Consolidated balance sheet of the Eurosystem as of 31 August 2011, EUR billion

Assets		*Liabilities*	
Foreign reserve assets (incl. gold)	*606*	*Bank notes*	*850*
Lending and securities related to monetary policy operations	*700*	*Banks' reserve holdings*	*197*
Financial assets denominated in euro	*438*	*Deposits related to monetary policy operations*	*232*
Other assets	*328*	*Other liabilities*	*793*
Total	***2,072***	***Total***	***2,072***

Sources: European Central Bank and the author's calculations.

there is no reason to assume that the valuations of the reserve currencies will evolve so as to deviate from uncovered interest rate parity. In other words, in the long term, income on foreign reserve assets can be assumed to correspond to the risk-adjusted return on the euro-denominated investment portfolio.

The bulk of monetary policy operations consists of lending to euro area banks. These include both main refinancing operations with a weekly frequency and longer-term refinancing operations. During the financial market and sovereign debt crises, the Eurosystem has also purchased securities for monetary policy purposes in dysfunctional markets that are key to the transmission of monetary policy. In addition, Eurosystem central banks hold euro-denominated financial assets comparable to investment assets, the main part of which is placed in bonds issued in the euro area.

In the long term, the level of the policy rate is the main factor impacting on central bank income formation.

In general, the rate of return on credits granted to banks is very close to the prevailing policy rate. Bond yields, in turn, depend on bond maturities and risk premia. As monetary policy operations are mainly collateralised loans with very short maturities, the expected return from investing financial assets is higher than the return on monetary policy operations, in line with liquidity and credit risk premia.

The largest single liability item on the Eurosystem balance sheet is banknotes. As banknotes can be deemed as zero-coupon debt securities issued by the central bank, assets held as counterparts for banknotes have no direct funding costs. Basically, banks need to borrow money from the central bank so they can buy banknotes in order to meet the demand for banknotes on the part of households and businesses. The monetary income resulting from the central bank's right to issue banknotes can roughly be estimated by multiplying the volume of banknotes issued by the policy rate. Over the longer term, the level of the policy rate is by far the main single factor affecting the central bank's income formation.

In addition to cash, the demand for central bank financing also

increases with the minimum reserve requirements.[1] Deposits held by commercial banks with national central banks for the fulfilment of their reserve requirements constitute a neutral balance sheet item from the viewpoint of the central bank's income formation, as these reserve holdings are remunerated at the same rate of interest as the central bank charges for credits granted to banks in the main refinancing operations.

The Eurosystem remunerates banks' excess reserves[2] at the rate on the deposit facility.[3] As this rate is lower than the rate on credit operations, the central bank benefits financially when banks' deposits exceed their minimum reserve requirements. In other words, the banking sector as a whole makes a loss if banks borrow central more bank money than is needed to fulfil the reserve requirements. During the financial crisis, banks have prepared themselves for negative shocks by borrowing excessively from the central banks.

In addition, the largest liability items on the Eurosystem balance sheet include deposits held by governments with certain national central banks and central bank holdings of capital. National central banks may pay interest on government deposits, but at a rate lower than the market rate of interest. Capital, in turn, is a non-interest-bearing item, for which the financing costs can be derived from, for example, the central bank's profit distribution policy or the owner's (normally the government) financing costs.

Regular interest income from the above balance sheet assets exceeds the financing costs for the balance sheet liabilities. Accordingly, as a rule, central banking generates a profit, which covers the operating expenses of the central bank and of which a significant portion is distributed to the owner, ie the State. Nevertheless, central banking also includes elements that may cause considerable variation in annual income. The main risks are related to changes in the value of foreign reserve assets and the price of gold, interest rate and credit risks involved in monetary policy operations, and market risk associated with investment activities. Central banks prepare for the realisation of these risks and for safeguarding financial market stability by accumulating part of their earnings as risk buffers on their balance sheets.

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[1] Each bank is required to hold on its account with the central bank an amount of money for which the average may not fall below the minimum reserve requirement imposed on the basis of its liabilities.

[2] Banks are required to place funds in excess of their reserve requirements as separate overnight deposits under the deposit facility in order to earn interest thereon.

[3] The differential between the rate on the main refinancing operations and the rate on the deposit facility (available for placing funds overnight), has normally been 1 percentage point, but during the financial crisis and particularly after the zero interest rate constraint on nominal interest rates materialised, this differential has been 0.75 percentage point.

Evolution of the Eurosystem balance sheet

Growth in banknotes in circulation has dominated developments on the Eurosystem balance sheet.

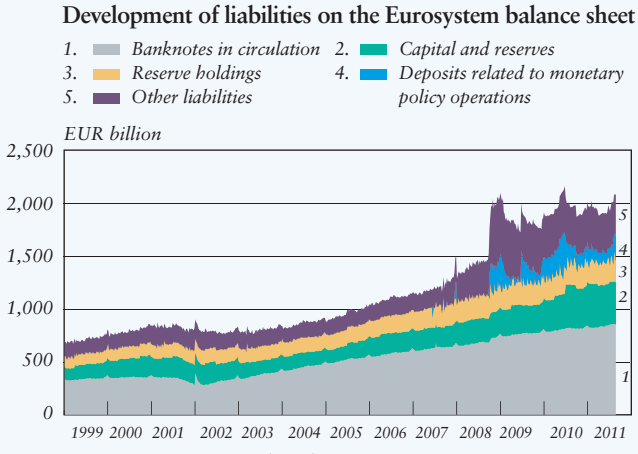
The main factors underlying the financial risks faced by the Eurosystem are most clearly visible when developments in the balance sheet are examined over time. Over the years, the evolution of liabilities (particularly banknotes in circulation) has dominated changes in the bottom line of the Eurosystem balance sheet (Chart 1).[4]

Since the introduction of euro cash until the onset of the financial market disruption (from January 2002 to August 2007), shifts in the demand for banknotes accounted for 90% of changes in the weekly balance sheet total of the Eurosystem.

[4] This is a fairly normal phenomenon in large currency areas. In the case of small currency areas, changes on the bottom line of the central bank balance sheet often reflect developments in foreign reserve assets.

Chart 1.

Development of liabilities on the Eurosystem balance sheet



Source: European Central Bank.

During the financial market crisis since autumn 2007, the increase of EUR 877 billion in liabilities on the Eurosystem balance sheet has been fairly evenly divided between banknotes, deposits related to monetary policy operations, items comparable to capital, and other liabilities.

The aftermath of the Lehman Brothers bankruptcy saw an exponential increase in overnight deposits placed by banks with the national central banks. The functioning of the financial markets was paralysed at that time, and part of financial intermediation normally handled by the money market was taken over by the Eurosystem. Under the crisis conditions, banks were not willing to provide credit to each other as previously, and therefore banks in need of money covered their entire liquidity requirements by borrowing from the central banks, while banks with surpluses deposited their excess funds with the central banks. However, the spread between the central bank lending and deposit rates provided banks with an incentive to normalise the functioning of the money market as soon as possible.

Since May 2010, deposits with a one week maturity accepted from banks to sterilise the liquidity injected through the Securities Markets Programme have increased the volume of deposits related to monetary policy operations.

Growth in other liabilities reflects both an increase during the crisis in governments' central bank deposits and, particularly in late 2008, a liability to non-euro area central banks related to the provision of foreign currency refinancing. The Eurosystem accepted slightly over EUR 50 billion worth of government deposits in August 2008, with the amount more than doubling in a year to about EUR 115 billion. During the financial market distress, several central banks began to grant foreign currency loans to their counterparties. At that time, besides euro-denominated loans, the Eurosystem financed its counterparties with loans in US dollars and Swiss francs. As this foreign currency liquidity provided to banks was acquired via swap lines with the US Federal Reserve and the Swiss central bank, the balance sheet counterpart for claims denominated in foreign currency was liabilities to non-euro area residents. Owing to the acute financial market crisis that followed the collapse of Lehman Brothers, lending in foreign currency increased to more than EUR 300 billion. Central banks have also previously cooperated by, for example, coordinating their foreign currency interventions. During the financial market dislocation that began in 2007, however, joint operations reached completely new dimensions, in terms of both operational models and the size of operations. The above foreign currency lending has had no material impact on the Eurosystem's financial performance, as the rate of interest charged on credits provided to counterparty banks is set so as to correspond to the payments made for the currencies to the foreign central banks involved.

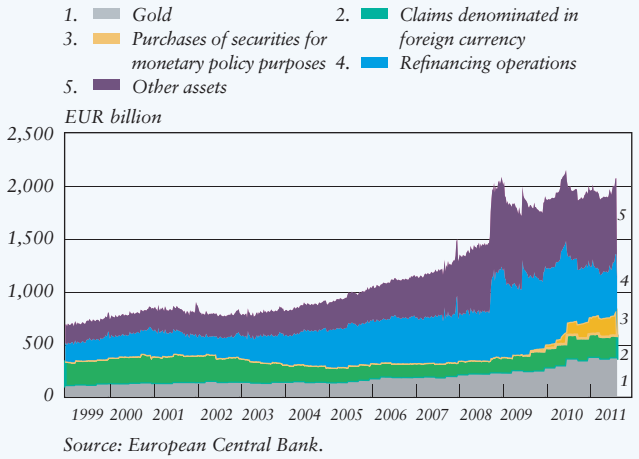
Analysis of the assets side of the Eurosystem balance sheet reveals that the Eurosystem's primary response to the rapid growth in banknotes in circulation in 2002–2007 and the consequent higher structural liquidity deficit in the banking system was to increase liquidity provision in credit operations (Chart 2).

As it was not considered appropriate to let these operations normally conducted with short maturities to grow manyfold,[5] the Eurosystem decided to increase its structural liquidity provision by

[5] The increased liquidity allotments in the weekly operations increased banks' allotment uncertainty, which, at a certain stage, began to be reflected in the effective tender rates.

Chart 2.

Development of assets on the Eurosystem balance sheet



Source: European Central Bank.

allowing the national central banks to augment their own financial assets. By paying for its investments with central bank money, a central bank creates liquidity, which in turn reduces the need for refinancing granted to banks through monetary policy credit operations. The Eurosystem's investments denominated in euro (other than claims related to monetary policy operations) grew by almost EUR 200 billion from 2002 to August 2007. However, this growth in part reflected the decision made by several national central banks to reduce the size of their foreign reserve assets by selling foreign currencies in exchange for euro. Converting foreign currency investments into those denominated in euro does not change the volume of euro liquidity in circulation, but significantly reduces the (foreign exchange) risks related to financial assets.

The most visible change on the assets side of the Eurosystem balance sheet at the beginning of the financial crisis was the surge in monetary policy credit operations from EUR 450 billion to more than EUR 800 billion in the few weeks after the bankruptcy of Lehman Brothers. With the easing of the most acute phase of the crisis, however, demand for excess liquidity declined significantly until summer 2009, when the banking sector again faced a situation of huge excess liquidity resulting from the provision by the Eurosystem to euro area banks of EUR 450 billion worth of refinancing with a maturity of one year.

Increasing the volume of refinancing and extending its maturity expose the Eurosystem to higher-than-normal credit and interest rate risks. The main instrument for managing credit risks to Eurosystem refinancing operations is collateral. Banks may borrow central bank money only against adequate collateral. The Eurosystem reduces its credit risk exposure by choosing eligible assets as collateral, by performing revaluation of collateral on a daily basis at observed market prices and by reducing the collateral values of underlying assets below their market values (a haircut).

However, the design of risk control measures is not a straightforward exercise. The volume of central bank financing can be assumed to be at its highest and the creditworthiness of banks and issuers of underlying assets at its lowest during a financial crisis where credit demand increases and the financial position of counterparty banks and companies worsens. This procyclicality of risks poses the central bank a dilemma. On one hand, the central bank could reduce its risk exposure by limiting the volume of its financing and by tightening is collateral requirements. On the other hand, by maintaining its financing, the central bank brings stability to the functioning of the financial markets and prevents sound banks from collapsing in the face of

temporary liquidity problems. Accordingly, acting as the provider of emergency finance for the banking sector requires from the central bank a readiness to accept a temporary increase in credit risk in times of crisis.

The rising price of gold has led to one of the most significant changes on the assets side of the Eurosystem balance sheet during the crisis since August 2007. The value of Eurosystem gold reserves has risen from about EUR 170 billion in August 2007 to more than EUR 360 billion in four years. As Eurosystem central banks have not sold much of their gold reserves, the rise in the price of gold is mainly reflected as unrealised gains in the revaluation accounts of the balance sheet. Although the higher value of the gold reserves has boosted the Eurosystem balance sheet, changes in the price of gold pose the main individual risks to the balance sheet, as measured by the Value-at-Risk method.

In order to implement monetary policy effectively, the central bank needs to ensure the functioning of the financial markets. From time to time, this may call for a specific transfer of risk overpriced by the market to central bank balance sheets. In principle, the expected return from such a corrective measure is positive, but like all risky operations, central bank interventions may also lead to losses. The wider the market disruption, the greater the necessary transfer of risk between the private sector and the central bank balance sheet, and the higher the potential for a loss.

In summer 2009, the Eurosystem began to buy securities for monetary policy purposes for the first time . At that time, the ECB established a programme for the purchase of covered bonds issued by banks. During a period of 12 months, euro area central banks bought EUR 60 billion worth of bonds under this programme. The purchases took place in both primary and secondary markets, with the aim of reactivating a market segment that is key to European banks' funding. The purchases under the programme came to an end in June 2010.

The rising price of gold has substantially enlarged the Eurosystem balance sheet.

In May 2010, the Eurosystem launched another purchase programme, under which euro area central banks purchased securities from secondary market segments that had become dysfunctional and that are key to the transmission of monetary policy. The Eurosystem's purchases of bonds during the first year of this Securities Markets Programme amounted to just under EUR 80 billion. There was a long break in purchases in spring and summer 2011, but they were reactivated in August, as euro area capital markets came under intense pressure. By early September, the cumulative amount of bonds purchased under the Programme totalled around EUR 140 billion.

The liquidity injected into the money market through securities

During episodes of market disruption, central banks seek to ensure the functioning of the financial markets by accepting onto their balance sheets assets with higher than normal risks.

purchases in connection with investment activities is in practice absorbed so that banks reduce their demand for central bank money in monetary policy credit operations. As long as the banking system continues to have a structural liquidity shortage, the liquidity created in the market via monetary policy-related securities purchase programmes could be absorbed automatically in the same way. The ECB wants to emphasise, however, that the purchase programmes do not aim at quantitative easing. Consequently, the central bank money created by securities purchases under the Securities Markets Programme is withdrawn from the market by weekly collections of deposits from banks. For the present, these deposit operations are executed as variable-rate tenders in which the rate on the main refinancing operations serves as the maximum bid rate. This means that the maximum rate at which the Eurosystem is prepared to remunerate banks' weekly deposits is the rate it applies when providing credit to banks. As the rates on these deposits have generally remained clearly below the maximum bid rate, the separate absorption of liquidity created via the purchase programmes has been financially profitable for the Eurosystem.

The success of the purchase programmes needs to be assessed relative to their objectives; in other words, it must be assessed whether the transmission of monetary policy has become more effective and whether the operational conditions of the financial markets have improved. It is still too early to evaluate the financial implications of the ongoing programmes for central bank balance sheets. Owing to market pressures, significant risk premia are included in the prices of securities purchased on the secondary markets in response to the market disruption. For this reason, the expected yield on these securities is markedly above the expected level of the policy rate. Contrary to purchases conducted via investment activities, securities purchased under monetary policy-related purchase programmes are not marked to market, but are recognised on the Eurosystem balance sheet as items that earn interest derived from the purchase price ('held-to-maturity portfolio'). This enables the Eurosystem to avoid exposure to market risks in connection with its monetary policy-related securities purchases; credit risk remains the only risk factor related to these securities that has an impact on the balance sheet.

Purpose of central banking: macro- versus micro-level risks

The financial risks related to central banking could, at their worst, be highly significant. The Swiss central bank, for example, had to recognise losses of SFR 26.4 billion in 2010. In this case, the source of the losses was the foreign reserve portfolio, which decreased in value as the franc

strengthened considerably vis-à-vis the reserve currencies.

However, a central bank's financial result often correlates negatively with the attainment of its policy objectives. When, for example, the external value of the domestic currency weakens, the central bank's foreign reserve assets appreciate in value. Devaluation may bring significant 'profits' to the central bank, but the success of the measure should be assessed on the basis of its macroeconomic implications. Similarly, a central bank that succeeds in stabilising prices at a low level earns less than a central bank whose nominal interest rates on assets denominated in its domestic currency are higher because of stronger and more volatile inflation. The central bank must therefore have the patience to make its key decisions mindful of their macroeconomic consequences, even in the event of its measures causing sizeable losses for itself in the short term.

The main risks to central banking are always related to the monetary policy implemented. Do the policy decisions help achieve price stability, for example? Drifting into an inflationary or deflationary spiral would cause significant welfare losses and random reallocation of wealth between lenders and borrowers. In the Eurosystem it is fully understood that policy rate changes must always be consistent with the objective of price stability. The impact that interest rate setting has on financial results never affects decision-making, although the interest rate level is the largest single factor that has an effect on central banks' financial results. Correspondingly, in decisions on monetary policy-related interventions (in the foreign exchange, money or capital markets), the main emphasis is always on the macroeconomic consequences of the decisions.

In conducting monetary policy operations, central banks focus primarily on the macroeconomic implications of their actions.

In providing credit to banks to cover their short term liquidity needs under normal conditions , the central bank need not devote much attention to interest rate or liquidity risk, and exposure to credit risk is also minimal. As financial markets head towards a crisis, the central bank must have the resources and readiness to take measures that increase the risks to its balance sheet in the short term but are warranted for longer-term and macroeconomic reasons. For example, commitment to a policy of low interest rates for a longer period of time may, under certain circumstances, be necessary from the viewpoint of monetary policy, although it significantly impairs the central bank's earnings capacity and exposes it to interest rate risks. During the financial market crisis, the Eurosystem implemented a number of measures to ensure the liquidity of the banking system, as a result of which a significant part of financial intermediation normally handled by the interbank money markets was transferred to central banks' balance sheets. These measures led to a

considerable mitigation of the banking sector's liquidity risks. In practice, the risk premium accrued on money market interest rates was reduced so as to correspond to several normal-sized reductions in the policy rate. By conducting an active collateral policy, central banks can seek to manage their credit risks up to a certain point. However, in calibrating risk control measures, one needs to also consider the impact of the measures on financial stability. A policy that minimises risks could act procyclically, and the central bank as the monopoly supplier of liquidity must be able to cover the banking sector's need for emergency funding in the event of financial stability being jeopardised.

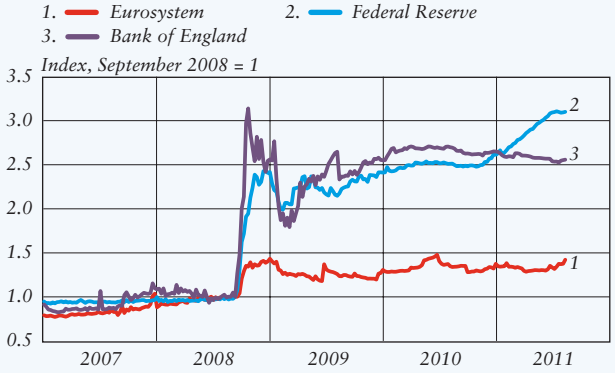
Central bank balance sheets from an international perspective

Public debate on central banks' non-standard monetary policy measures has often culminated in an analysis of changes in the size of central bank balance sheets. Despite an increase in the balance sheets of all major central banks as a consequence of the financial crisis, there are considerable differences in their development (Chart 3). The Eurosystem's balance sheet grew by almost half when peaking at the acute phase of the financial market crisis, compared with the level where it had been prior to the fall of Lehman Brothers. Following a reduction in the banking sector's excess liquidity demand, growth in the Eurosystem's balance sheet has been accounted for by the rising price of gold and the acceptance of deposits in relation to the Securities Markets Programme.[6]

The pace of growth in the Eurosystem's balance sheet has been moderate compared with the increases in the balance sheets of the Bank of England and the US Federal Reserve. Relative to the size of the economies, however, the central bank balance sheet totals differed markedly across the currency areas prior to the onset of the financial crisis. Therefore, a comparison of the growth rates of the balance sheets must also include an analysis of balance sheet changes relative to the size of the economy. The balance sheet totals of both the

Chart 3.

Developments in the balance sheets of the Eurosystem, the US Federal Reserve and the Bank of England



Sources: European Central Bank, Bank of England, US Federal Reserve and calculations by the Bank of Finland.

[6] Securities purchases, as such, do not enlarge central bank balance sheets, as banks could reduce their refinancing from the central bank by an amount equivalent to the liquidity created through the purchases. As the liquidity shortage is maintained by means of liquidity-absorbing operations, these operations enlarge the balance sheet of the Eurosystem.

Bank of England and the Federal Reserve relative to GDP at the end of 2010 were about 17%, ie around 10 percentage points larger than in September 2008. The corresponding euro area growth was 6 percentage points; however, the ratio of the Eurosystem's balance sheet to GDP, 22%, continued to be larger than those of the benchmark banks.

In the early phase of the financial crisis, the Federal Reserve's balance sheet was boosted by various liquidity facilities. However, the main explanatory factor behind the higher pace of growth in the balance sheets of the Federal Reserve and the Bank of England is that these central banks engaged respectively in a large scale asset purchase programme and quantitative easing.

Experiences of the Bank of Finland

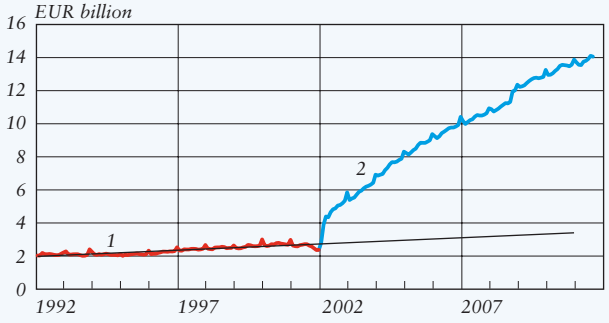
The Bank of Finland has been a member of the Eurosystem for a good 12 years. Belonging to a system of central banks in a large currency area has clearly changed the composition, dynamics and key risk factors of the Bank of Finland's balance sheet. Prior to the start of Stage III of Economic and Monetary Union, the Bank of Finland's foreign reserves were considerably larger than the amount of national markka banknotes it issued, meaning there was a liquidity surplus in the banking sector. As banks needed to deposit with, rather than borrow from, the central bank, monetary policy was mainly conducted by issuing liquidity-absorbing central bank certificates of deposit.

At that time, changes in the valuation of the foreign reserve portfolio was driving the Bank of Finland's annual financial result. When the markka strengthened (weakened), the Bank of Finland made imputed losses (profits). In the absence of domestic financial assets and net monetary policy lending, income on banknotes was determined by changes in the exchange rates of the reserve currencies and investment returns on these reserves. As the markka was the monetary unit of a small currency area and the foreign reserves were denominated in large and liquid currencies, the interest expenses for the Bank of Finland's certificates of deposit were often higher than the investment returns on the reserves.

Chart 4.

Bank of Finland's holdings of banknotes

1. *Markka banknotes prior to euro changeover*
2. *Euro banknotes on the Bank of Finland balance sheet*



Sources: Bank of Finland and calculations by the author.

Currently, Finland being part of the euro area, the Bank of Finland's assets are largely items related to monetary policy: monetary policy operations or intra-Eurosystem claims. In addition, the bulk of the Bank's financial assets are held in investments denominated in euro, with less than a third of investment assets denominated in foreign currency. This change has materially reduced variations in the Bank of Finland's annual financial result.

The main change in liabilities is the replacement of interest-bearing certificates of deposit by banknotes (Chart 4). Demand for euro banknotes is higher than the previous aggregate demand for the currencies of the countries that adopted the euro. As euro cash is allocated to each national central bank's balance sheet according to its capital key (determined by population and GDP), the increase in banknotes on the Bank of Finland's balance sheet has been faster than in other euro area countries, because the cash-to-GDP ratio was lower in Finland than elsewhere prior to monetary union. The importance of the introduction of euro cash for the Bank of Finland's balance sheet and its sustainability can be evaluated by comparing the Bank's euro banknote share with the trend-growth-based volume of markka banknotes prior to the euro changeover. According to this assessment, the non-interest-bearing item on the Bank of Finland's balance sheet is currently, thanks to the euro, more than EUR 10 billion higher than prior to the changeover. If income on banknotes is estimated to accrue at a nominal interest rate of 4%[7] in the long term, the Bank of Finland can expect to earn extra annual income of about EUR 400 million on euro banknotes, compared with the time prior to the euro changeover.

The single monetary policy of the Eurosystem is formulated and will continue to be formulated so as to ensure price and financial stability. Decision-making is primarily guided by macroeconomic considerations, for which reason the financial results of the national central banks may vary significantly over time. Despite the primacy of policy objectives, central bank independence in decision-making can best be ensured if financial risks do not become unreasonably high relative to the resilience of the Eurosystem balance sheet. Consequently, the Eurosystem has retained an increasing share of its monetary income on its balance sheet as a buffer against a variety of financial crises.

Keywords: monetary policy risks, Eurosystem balance sheet, Bank of Finland

[7] The 4% nominal interest is based on 2% real interest and inflation.