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**Article**

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Ignazio Angeloni\*

## Reversing the Great Monetary Expansion

Monetary historians writing later in this century may refer to its first two decades as the period of the Great Monetary Expansion. In those years, world central banks embarked on the biggest monetary easing ever recorded in central banking history.<sup>1</sup> The full panoply of monetary policy instruments was used, and new instruments were invented for that purposes: repurchase operations at all maturities, limitless extension of the collateral lists, outright purchases of all types of securities, announcements of future (expansionary) actions, and negative rates. Modalities varied a bit here and there but all in all, it was a globally consistent, strong and temporally sustained phase of monetary easing.

Initially, there were occasional references to “exit strategies” and to problems that may be encountered on the way back. But this was essentially lip service, academic concerns thought to be without practical relevance in the foreseeable future. Accordingly, they received little attention. Then even those ceased.

Now the problem is real. Inflation has returned, approaching double digits as we write and remaining persistently above central bank targets. Unexpected by most,<sup>2</sup> interest rates are being raised aggressively from very low or negative levels. The interest rate reversal is not finished: there is “more work to do”, according to Fed Chair Jerome Powell in March 2023. Given the proportion and the duration of the preceding expansion, the process will be lengthy. It will have impacts that cannot be foreseen in much detail or with certainty; but one is unfolding as we write, the failure of the Californian Silicon Valley Bank and its aftermath. After much complacency about the prospect that the expansionary era may last forever, the abrupt and strong change of direction raises controversies which may put the reputation and the popular support of central banks at risk.

This contribution discusses one aspect of the phenomenon: how to deal with the balance sheet of the European Central Bank (ECB). As the second-largest central bank by the size of the respective currency area, the ECB is part of the global process described above; in the aforementioned 20-year period, the ECB’s balance sheet increased tenfold, from €814 billion in 2001 to €8,564 billion in 2021, before descending to €7,956 billion in 2022. As we will see, even greater changes have occurred in the composition and average duration of its balance sheet. In this sense, the problem the ECB faces is no different from that of the US Federal Reserve or other major central banks. And yet, the ECB faces specific problems because of its particular conditions.

First, the ECB lagged behind in recognising the risk of inflation and reacting. Still in the late spring of 2022, the ECB weighed the possibility of a return to deflation alongside increasing inflation.<sup>3</sup> The ECB started raising rates in July 2022, after a sharp rise in both headline and core inflation (respectively, at 8.6% and 5.1%). The delay meant that the subsequent rate increase was more rapid and possibly more sizeable than it could have been. This complicates the “way back” because abrupt gyrations of interest rates may enhance volatility and expose the financial sector to extra risk.

Second, the ECB has specific fragilities stemming from being a multi-country central bank. The reversal of monetary and financial conditions is likely to have different effects in certain jurisdictions relative to others and possibly give rise to local fragilities. In a currency area, local fragilities may spill over more easily and create systemic stress, as seen during the sovereign crisis of 2010-2012. For the same reason, the composition of the ECB portfolio is also heterogeneous, composed of securities with different durations, dif-

1 Actually, according to the Financial Conditions Index of the Federal Reserve Bank of Chicago, the expansionary period in the US lasted 30 years, starting in the early 1990s.

2 Cecchetti et al. (2023, 4) note that: “the median participant at the final 2021 FOMC meeting anticipated policy tightening of 75 basis points over the following year. By the end of 2022, rate hikes totaled 425 basis points, an outcome that was a full 3 percentage points above the highest of the December 2021 participants’ projections.”

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3 Consider this quote from Philip Lane, chief economist of the ECB, in a speech given on 5 May 2022: “there has been a substantial and widespread shift in longer-term inflation expectations since early 2021, largely in the direction of re-anchoring expected inflation at the two percent target. This suggests that the euro area is unlikely to revert to the persistent below-target inflation trend that was so entrenched before the pandemic. At the same time, the most recent signals from surveys and market-based measures also suggest that the right tail of the distribution is expanding, which warrants close monitoring” (ECB, 2022). In May 2023, the 12-month inflation rate in the eurozone stood at 8.1% (this reading was not available when the speech was given). On that date, the US Federal Reserve had already raised its policy rate and announced a reduction of its Treasury and other securities portfolio (Federal Reserve, 2022).

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ferent idiosyncratic risk factors, and different sensitivities to shocks. The interest rate risk in the ECB balance sheet results from these different components, some of which are in fact characterised by a very high interest rate risk.

A third specificity of the ECB, whose relevance will become clearer below, is that the ECB operates in the unique institutional environment of the eurozone, in which there is no central fiscal capacity. The result is that the ECB is more “alone” in its macroeconomic management function, not being able to count on the support of a central fiscal authority. As a result, its responsibility tends to be overburdened; as the sole effective macro-policymaker of the eurozone, the ECB may more easily experience pressure from national politics and public opinion to intervene, even beyond what would be appropriate or effective.

### Interest rate control and balance sheet size

After the initial hesitation, the ECB joined the other major central banks in a decisive adjustment of interest rates. Starting in July 2022, it has proceeded with upward adjustments of its pivot rate of 50 basis points per each monetary policy meeting; at the moment, the pivot rate is the remuneration the ECB offers to banks using the central bank deposit facility. All in all, this has not given rise to fragilities in the banking or financial sector. Banks’ accounts are prospering as a result of the increased margin – lending rates have shot up, while the rates they offer on their clients’ deposits have barely moved. No fragility is seen, as this is written, either in the banking sector or in the sovereign debt market – notably that of Italy, the most vulnerable of all in the eurozone. Short- to medium-term interest rates in real terms, net of inflation over the same horizon, are still sizeably negative, suggesting that there is more “ground to cover” (the expression used by ECB President Lagarde in February 2023 to characterise the prospects of interest rates (ECB, 2023)).

The future path of interest rates may also be influenced by possible “bumps in the road”, unexpected obstacles and occasional episodes of financial market stress. Contagion from the US, linked to the failure of Silicon Valley Bank and its aftermath, may be one of those bumps altering the course of monetary policy. But all in all, the interest rate path engineered by the ECB so far from July 2022 seems broadly appropriate. Real interest rates in the short to medium term (the maturity that counts for monetary policy transmission in a European context) must return to positive. Hopefully, this will result from a combination of increases in nominal rates and a decline in expected inflation.

The question of how to deal with the ECB balance sheet is different. Before the era of Quantitative Easing (QE), the central bank securities portfolio was the mirror image of

market interest rates. To ease policy, central banks would buy securities and lower rates in tandem, along a path dictated by money market equilibrium. To tighten policy, central banks simply had to do the reverse. The “zero lower bound” and QE have broken this correspondence, decoupling the central bank portfolios, and the volume of liquidity held by banks, from interest rates. After exiting the zero bound of interest rates, the correspondence could in theory be re-established. In practice, however, the extraordinarily large liquidity created in the QE era pushes short-term interest rates down to an “effective lower bound” given by the rate on the ECB deposit facility, which in the meantime has become very high: 3% as we write, on a riskless basis. In this situation, liquidity and interest rates remain decoupled, as it is in principle possible for the ECB to increase the latter without reducing the former or otherwise move the two separately at will.

What may appear at first sight as a welcome additional element of flexibility, is in fact problematic. Before looking at this and considering the available options, let us take a look at the balance sheet of the ECB, and at how it has changed from the period preceding the Great Financial Crisis to today. A simplified and aggregate version is shown in Table 1. The most relevant changes can be summarised as follows.

The overall size of the balance sheet increased eightfold from 2006 to 2021, before decreasing somewhat in 2022. On the asset side, the major shift regarded the securities held outright, largely long-term sovereign bonds, and to a lesser extent, the lending to banks, mainly in the form of long-term repurchase operations (long-term refinancing operations and targeted long-term refinancing operations). The latter declined significantly in 2022, due to the non-renewal of outstanding operations, whereas the outright holdings of long-term securities increased slightly in 2022. On the liability side, the main counterpart of the increase in the balance sheet regards the deposits of banks, which rose from €0.2 trillion in 2006 to €4.3 trillion in 2021, declining to €4.0 trillion in 2022. The increase in non-bank deposits was also significant, consisting largely of government deposits and bearing a return close to that of bank deposits – which rose to €1.5 trillion in 2021 before decreasing to €1.1 trillion in 2022.

### Dealing with the size of the ECB's balance sheet

For the ECB, dealing with the size of its balance sheet can be reduced to a simpler question, that of whether, and in what way, to reduce the outright portfolio and, in parallel, scale down the deposits at the central bank. One is the mirror image of the other because deposits rose as a result of the securities purchases. The private sector now owns large amounts of deposits at the central bank yielding a market (but riskless) interest rate and correspondingly

**Table 1**  
**ECB balance sheet from pre-Great Financial Crisis to today**

in trillion euros

	End-year		
	2006	2021	2022
<b>Assets</b>	1.2	8.6	8.0
Foreign reserves	0.3	1.1	1.1
Lending to banks	0.4	2.2	1.3
short-term	0.3	0.0	0.0
long-term	0.1	2.2	1.3
Securities held outright	0.1	4.9	5.1
Other	0.4	0.4	0.5
<b>Liabilities</b>	1.2	8.6	8.0
Banknotes	0.6	1.5	1.6
Bank deposits	0.2	4.3	4.0
Non-bank deposits	0.1	1.5	1.1
Capital and reserves <sup>1</sup>	0.2	0.7	0.6
Other	0.1	0.6	0.7

Note: <sup>1</sup> Includes revaluation accounts.

Source: Consolidated balance sheet of the Eurosystem as at 31 December 2022.

lower amounts of (largely government) securities. On the remaining component, that of lending to banks, no special decision is necessary, because it will go down spontaneously as long as expiring operations are not renewed.

The question may be simple, but the answer is not. In an attempt to simplify: there seem to be essentially three alternatives for the ECB.

### Maintaining ample liquidity

The first alternative is to leave those amounts where they are and continue to conduct the management of interest rates by adjusting the rate on central bank deposits. This is what people sometimes call the “ample liquidity” policy. The advantage of this option is that no decision is needed, except to perpetuate the status quo. The stock ECB bond holdings would decline gradually if redemptions are not re-invested. The ECB has implicitly hinted at a preference, at least initially, for this option in mid-2022 when it decided to raise rates as a matter of urgency while postponing any decision on the reduction of the portfolio (the so-called Quantitative Tightening, or QT) at a later date. It has since then started reducing its securities reinvestments, to an amount that would, as we write, give rise to a net reduction of the securities portfolio (with the exception of that connected to the COVID-19 pandemic operations) of €15 bil-

lion per month, a very small pace of reduction if compared with the size of the outstanding amount. Finally, there is a potential analogy in the fact that the US Federal Reserve announced, already in 2019, its intention to continue the ample liquidity policy as it reins in the monetary expansion. The ECB should be tempted to follow its example.

There are three objections to this course of action.

One is that it involves large income losses for the ECB. The deposit rate directly impacts the ECB profit accounts, for a large amount because of the large stock of deposits. Each percentage point increase of the interest rate applied to roughly €4 trillion of deposits means that the before-tax net result for the ECB worsens by €40 billion a year. This is very large relative to the profits the central bank normally makes. Since the ECB results ultimately accrue to the constituent national central banks, the latter – and indirectly, the national taxpayers – will take a big hit for many years. One can imagine circumstances in which the ECB and the euro itself may lose popularity, and the independence of the ECB will be challenged as a result.

Another objection is that the ECB balance sheet would not stay still, but probably continue to increase. If new circumstances arise requiring ECB intervention, for example, like those that occurred recently in the pandemic period, new purchases may become necessary. Absent a pre-ordained exit strategy, the balance sheet would “ratchet up” potentially without limit. To some extent, a ratchet effect has already occurred in the last 10 years, as some have recently argued (King, 2021).

Finally, the third objection is linked to the special institutional status of the ECB. More than other banks, the ECB acts in isolation, without a central fiscal capacity at the EU level. In addition, the ECB faces a challenge that other central banks have never encountered: the risk of fragmentation (and eventual disgregation) of the currency. This policy burden is hard enough if the ECB retains its independence, but would become worse if the ECB’s independence was called into question. An ECB loaded with government securities acquired in a variety of external circumstances is conceivably more exposed to such risk than one with a lean balance sheet and well-focused on its price stability mandate. And conversely, in this latter condition, an independent ECB would be more self-confident and assured in intervening, as it has done in the past if the circumstances made that necessary.

### Starting sizeable outright bond sales

The second alternative, a polar opposite of the preceding one, is to accelerate the offload of the bond portfolio,

## Box 1

## A numerical example of ECB reverse repo

Consider the following stylised balance sheets of the banking sector, assuming a single bank (the bank,  $B$ ) and the central bank ( $CB$ ).

$$B_B + DF = D \quad (1)$$

$$B_{CB} = DF \quad (2)$$

The bank has government bonds  $B_B$  and deposits with the central bank  $DF$  on the asset side and client deposits  $D$  on the liability side. The central bank has government bonds  $B_{CB}$  on the asset side and  $DF$  on the liability side. Implicitly, the rest of the economy (public plus private non-financial sector) has bank deposits as assets and bonds as liabilities.

The net returns of the bank and the central bank can be written as

$$r_B B_B + r_{DF} DF - r_D D \quad (3)$$

$$r_B B_{CB} - r_{DF} DF \quad (4)$$

Where assets and liabilities are multiplied by the respective return. From now on we assume that  $r_D = 0$ .

Consider now a repo operation in which the central bank lends bonds to the bank against deposits. Let the amount of the repo (the “take up” of the repo operation) be  $x$ . The profit-loss equations are modified as follows.

$$\text{Net profit of the bank:} \quad r_B (B_B + x) + r_{DF} (DF - x) - r_A x \quad (5)$$

$$\text{Net profit of the central bank:} \quad r_B (B_{CB} - x) - r_{DF} (DF - x) + r_A x \quad (6)$$

Where  $r_A$  is the interest rate on the repo. The sum of the two net profits is equal to the (opposite of) debt service of the government,  $r_B (B_B + B_{CB})$ .

Suppose initially that central bank launches the repo operation with a fixed uniform interest rate  $r_A$ . At the same time, it announces that the interest rate on central bank deposits will be inversely related to the size of the deposit, or equivalently, directly related to the repo take up,  $x$ . So  $r_{DF}$  ceases to be fixed and becomes equal to  $\gamma x$ , where  $\gamma$  is a positive proportionality factor.

The bank must decide how much to take ( $x$ ) to maximise its net profit. The first and second order conditions are:

$$\frac{\partial}{\partial x} [r_B (B_B + x) + \gamma x (DF - x) - r_A x] = \frac{\partial}{\partial x} [-\gamma x^2 + (\gamma DF + r_B - r_A)x + r_B B_B] = 0$$

$$x = \frac{\gamma DF + r_B - r_A}{2\gamma} \quad (7)$$

$$\frac{\partial^2}{\partial x^2} [r_B (B_B + x) + \gamma x (DF - x) - r_A x] = -2\gamma < 0$$

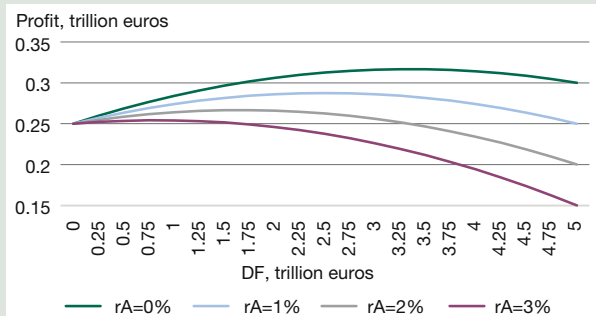
The function is quadratic and concave and thus has a unique maximum.

To get a sense of the orders of magnitude, consider an example in which  $DF=5$  (e.g. trillion euros),  $B_B=25$ ,  $B_{CB}=5$ ,  $r_B=1\%$ , and  $\gamma=0.006$ . The latter value implies that if  $x=0$ , meaning there is no take-up in the repo operation, the remuneration of the deposit facility is zero; if  $x=5$ , meaning the take-up exhausts all the initial amount, the remuneration is 3% (we assume this to be the initial value of the remuneration, without auction).

The net profits of the bank and the central bank are shown in Figures 1 and 2, for four alternative values of the repo rate ranging from 0% to 3%.

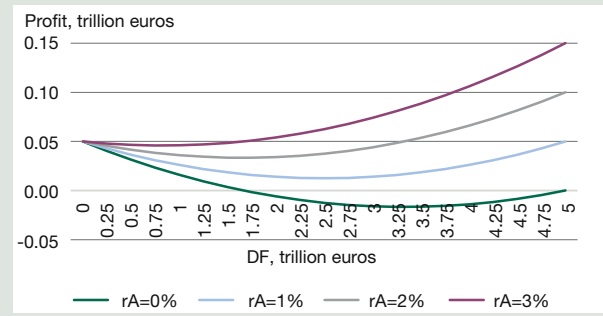
Box 1 (continued)

Figure 1  
Bank net profit



Source: Author's calculation.

Figure 2  
Central bank net profit



Source: Author's calculation.

In all cases, the net profit of the bank declines (pre-auction in the quantification assumed it was 0.4, or a profit of €400 billion) and the one of the central bank increases (pre-auction it was -0.2, or a loss of €200 billion). The bank profit remains positive, ranging in the four cases assumed between €250 billion euros (small take-up) to €320 billion euros (large take-up). The central bank profit turns from negative to positive in most cases (up to a maximum of around €150 billion).

The take-up  $x$  increases with  $DF$  (equation 7). Therefore, if the bank launches a discriminatory competitive auction, the banks with larger  $DF$  would bid for greater amounts.

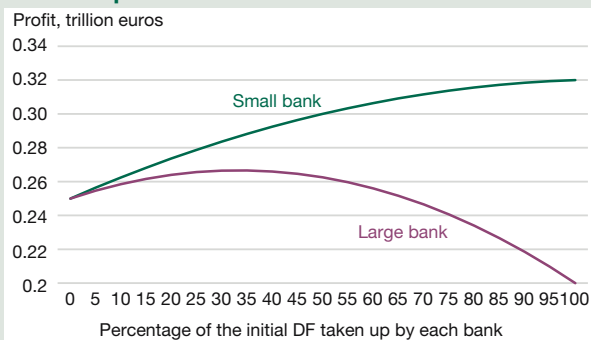
A higher  $\gamma$  tends to reduce the take-up. Note that this parametrisation is very simple and penalises particularly strongly the banks bidding for low amounts. A formulation with milder redistributive impact would be  $\gamma = \gamma_0 + \gamma_1 x$ .

Suppose now there are two banks, one large and one small. The small bank has  $D=2$  and  $DF=2$ ; the large bank has  $D=8$  and  $DF=5$ .

Suppose the central bank launches a fixed-rate auction with  $r_A=0.02$ . The deposit facility rate for each bank after the auction is still  $\gamma x$  but  $\gamma = 0.03/DF$ . The deposit rate is scaled by the size of the initial deposit. For both banks, if  $x=0$ ,  $r_{DF}=0$  and  $r_{DF}=0.03$  for each bank if they swap their entire amount of deposits.

The profit curves for the two banks are shown in Figure 3. The horizontal axis shows the percentage of the initial  $DF$  taken up by each bank. The large bank swaps in the auction 30% of its deposits, i.e. €1.5 trillion. The small bank swaps in all its deposits, i.e. €2 trillion.

Figure 3  
Bank net profit



Source: Author's calculation.

The deposit rate for the small bank is equal to 3%, and for the large bank to 0.9%. The market rate will be somewhere in between and there is scope for interbank transactions, the large bank offering funds to the small one until rates are equalised or another auction takes place.

also starting sizeable sales in the open market. This option would potentially eliminate the problems inherent in the ample liquidity policy and at great speed, allowing the ECB to return quickly to its pre-crisis balance sheet's size and structure. But this "full gas" alternative has other drawbacks. Selling bonds would crystallise the loss in the ECB balance sheet and concentrate them in a shorter period of time. The total amount of the losses, in present value, would be roughly the same, but concentrating them in a shorter period would magnify the shock. The second argument against this avenue is that the impact on the periphery bond markets would be stronger, precisely because it would be more concentrated. Here again, the gain in terms of speed may turn out to be unsustainable. This does not mean that some sales may not be feasible, and even advisable when market conditions are good. But this is preferably done on an opportunistic basis, only if and when the market demand seems ready to absorb the additional supply.

### Launching reverse repurchase operations

Discarding these two alternatives highlights the fact that part of the problem lies in the excessively high deposit rate. Limiting the excessive loss for the central bank requires that rate be kept at a lower level. A low deposit rate would also, other things being equal, encourage the demand for securities in the market, facilitating the reduction of the central bank portfolio. The problem is how to do that without lowering the level of short-term market rates, at a time in which the central bank is trying to raise these rates and the liquidity outstanding exerts downward pressure on market rates.

The ECB can accelerate the absorption of liquidity by reactivating the long-term liquidity-management instrument introduced by the ECB in 2014, i.e. the so-called targeted long-term financing operation, but in reverse. Through a new reverse long-term operation, the ECB would auction out rights to swap central bank deposits for long-term securities on a long-term basis. Auction participation would be encouraged by applying a specific deposit rate to each bank, varying inversely with the volume of outstanding central bank deposits of that bank. Swap rights may be calibrated also taking into account the balance of each bank at the deposit facility. Banks deciding not to swap out their central bank deposits would be penalised by a lower or even zero deposit rate.

The system-wide average rate on the ECB deposit facility (the key variable impacting ECB accounts) would be lowered alongside the decline of the deposit stock. The inter-bank deposit market may arbitrage out some of the interest rate differences across banks; but all in all, banks would

have little incentive to accept more liquidity if the penalty element given by the rate reduction is strong enough.

In the aggregate, a relief in the central bank accounts can only occur at the expense of banking sector accounts. However, the strong improvement in the accounts of commercial banks that is taking place due to the sizeable increase in lending margins makes it easier for banks to absorb the income reduction stemming from a decline in the return on the central bank deposit facility.

A numerical example of how the scheme can work is contained in Box 1.

### Conclusion

Three final points to summarise: while it continues to manage interest rates upwards to bring inflation down, the ECB should decide on a forward-looking strategy for its balance sheet.

There are arguments to rule out both extreme alternative options: doing nothing, which means leaving the balance sheet at its current size and operating with ample liquidity on a permanent basis, or accelerating the scaledown of its portfolio by large-size sales of securities on the open market. The current reinvestment policy, which foresees for the pandemic portfolio the full reinvestment of the principal, is too gradual and de facto closer to the first alternative.

Offering reverse repo operations at long maturity and accompanying them with a semi-automatic and selective reduction of the interest rate on the central bank deposit facility is a natural and market-friendly way to simultaneously reduce market liquidity, ensure the sustainability of both the banks and the central bank's accounts, and retain monetary control.

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