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New Perspectives on Quantitative Easing and Central Bank Capital Policies

Tobias Adrian, Christopher Erceg, Marcin Kolasa, Jesper Lindé, Roger McLeod, Romain Veyrune, and Pawel Zabczyk

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ABSTRACT: Central banks have come under increasing criticism for large balance sheet losses associated with quantitative easing (QE), and some observers have also argued that QE helped fuel the post-COVID-19 inflation boom. In this paper, we reconsider the conditions under which QE may be warranted considering the recent high inflation experience. We emphasize that the merits of QE should be evaluated based on the macroeconomic stimulus it provides and its effects on the consolidated fiscal position, and not simply on central bank profits or losses. Using an open economy DSGE model with segmented asset markets, we show how QE can provide a sizeable boost to output and inflation in a deep recession and improve the consolidated fiscal position—even if the central bank experiences considerable losses. However, the commitment-based features of QE and the possibility that upside inflation risks are bigger than recognized pre-pandemic call for more caution in using QE closer to full employment. We then consider how central banks might modify their policies for allocating profits to the government in light of large-scale losses. In short, we suggest that a more forward-looking and risk-based approach may be desirable in helping protect central bank financial autonomy and ultimately independence.

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Authors’ E-Mail Addresses:	TAdrian@imf.org; Cerceg@imf.org; Mkolasa@imf.org; Jlinde@imf.org; Rmcleod@imf.org; Rveyrune@imf.org; Pzabczyk@imf.org

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Contents

Introduction

Central banks spent much of the decade after the Global Financial Crisis focused on how to achieve their goals in an environment of limited policy space and asymmetric downside risks. Unconventional monetary policy tools—including quantitative easing (QE) and forward guidance—were incorporated fully into the central bank arsenal with the expectation that they would frequently be used. Policy strategies were modified to better address asymmetric risks from the effective lower bound. The view that the Phillips Curve was flat meant little need to take account of upside inflation risks in implementing these strategies. For example, in the United States, the Federal Reserve adopted an asymmetric form of average inflation targeting that promised to make up for persistent inflation undershoots of its target, but not overshoots.

The recovery from the COVID-19 pandemic involved many surprising developments that suggest some need to rethink this pre-pandemic playbook. The rapid surge in inflation points to the potential for significant nonlinearities in the Phillips Curve and underscores the need to take more account of upside inflation risks (Gopinath, 2022). While QE was likely instrumental in supporting recovery from the COVID-19 pandemic, it may have been continued for too long, and contributed to overheating and the post-COVID-19 inflation boom. Additionally, central bank forward guidance about QE may have inhibited a timelier liftoff of policy rates (Orphanides, 2023).

QE also exposed central bank balance sheets to much greater maturity risk. Heightened exposure to duration risk is an intended outcome during times of depressed demand, aiming at easing financial conditions by reducing term premia. As part of the mechanics of QE, central banks exposed themselves to this risk in order to reduce it in the marketplace. As a result, in a rising interest rate environment, many central banks have experienced large losses. While central banks can operate with realized losses and negative capital, the public backlash against these losses can be difficult to manage. In some cases, a weak central bank balance sheet or persistent decline in its remittances to the treasury could potentially undermine central bank credibility and independence.

In this paper, we consider whether and how the use of QE might be refined considering the pandemic experience (Gopinath, 2023). A key question is what the appropriate circumstances are to use QE.[1] During the period following the Global Financial Crisis, QE was used initially when economies faced very deep recessions but was later also used to boost inflation and inflation expectations after unemployment had declined close to historic lows. Is QE likely to be warranted in the latter circumstances? We also consider how the modalities of QE might be adjusted to minimize some of the risks, including through the use of escape clauses.

We argue that the right methodological approach to address these questions about the merits of QE should take a broad-based societal perspective rather than focus on the balance sheet losses often highlighted in the financial press. This should involve assessing the macroeconomic benefits against the *consolidated* fiscal costs, as well as take account of other factors affected by QE that may matter for societal welfare (e.g., distributional effects). The consolidated fiscal costs include central bank losses, but also “subtract out” the benefits to government’s fiscal position from any initial central bank profits from QE, as well as the effects on government tax revenue, expenditure, and debt-servicing costs. These benefits to the government can be

[1] QE may be used to reduce financial stress and improve market functioning—as in 2008–2009 and during the early phases of the pandemic—or to provide macroeconomic stimulus after policy rates have been reduced to their effective lower bound. Our paper largely focuses on the latter case.

sizeable, and more than offset central bank losses. Hence, it is misleading to simply focus on central bank losses when considering the costs of QE.

To be sure, the central bank would not be expected to take account of the effects of QE on the government's consolidated fiscal position when using QE any more than it would when adjusting the policy rate. In either case, its decisions about how and when to use its tools should be governed by its mandate(s), and hence aimed at ensuring macroeconomic and financial stability. But understanding the societal benefits of QE is presumably very important to those legislative and executive branch officials with oversight of the central bank, who must decide what powers ("tools") to delegate to the central bank and the circumstances in which the central bank may utilize these tools (Tucker, 2018). In general, these societal benefits include the macroeconomic benefits, but also the consolidated fiscal costs and other factors such as distributional effects. Accordingly, providing an assessment of these societal benefits under different economic conditions should be helpful for this delegation choice.

Toward this end, our paper uses a quantitative model that can help gauge some of the key benefits of QE, including effects on the macroeconomy, consolidated fiscal balance, and central bank profits. While our model does not provide a full assessment of the factors likely to encompass the societal benefits of QE, it is nevertheless useful in capturing the salient considerations, and, in particular, underscores how a focus on central bank profits is problematic.

More specifically, we use an open economy DSGE model to help evaluate the benefits and costs of QE under different conditions, and also draw on related evidence in the literature. Our model builds on the framework of Kolasa and Wesolowski (2020), which incorporates bond market segmentation that allows QE to affect term premiums. The model also accounts for behavioral discounting as in Gabaix (2020) to mitigate the "forward guidance puzzle," incorporates bond market segmentation, and embed a nonlinear Phillips Curve as in Harding, Linde, and Trabandt (2022, 2023).

We show that QE is likely to have substantial macroeconomic benefits in a deep recession and liquidity trap, even while calibrating the model so that the effects of asset purchases on term premiums are quite modest from the perspective of the empirical literature. Moreover, the consolidated fiscal position of the government typically improves significantly, as the faster recovery in output boosts the primary balance, debt service costs fall due to lower interest payments, and increases in the price level lower the real value of existing debt. The central bank also typically makes profits, at least provided the yield curve is upward sloping. Interestingly, while central bank profits could turn significantly negative if the policy stance needs to be adjusted unexpectedly fast—as during the past two years—the consolidated fiscal position still tends to show considerable improvement.

QE is considerably less attractive when the central bank faces a "shallow" liquidity trap, where interest rates are pinned at zero mainly because inflation and inflation expectations are running well below target, even while output is close to potential and the unemployment rate is not very elevated. A number of countries faced such conditions prior to the pandemic. Our simulations show that while a "small dose" of QE is still likely to be beneficial if the economy evolves roughly in line with the modal outlook, even relatively modest shocks that put upward pressure on inflation (say from fiscal expansion) can make the QE counterproductive, causing the economy to overheat and contribute to increasing inflationary pressures.

Importantly, our simulations aim to capture how some of the "commitment" aspects of QE—including forward guidance that the policy rate won't likely be raised until well after QE ends—can amplify overheating. As emphasized by Orphanides (2023), the forward guidance typically associated with QE can make it difficult for

central banks to respond nimbly to overheating pressures. While this might seem inconsequential if the Phillips Curve was very flat, our simulations suggest more problems if the Phillips Curve is nonlinear and upside inflation risks more pronounced—risks which seem more material considering the recent inflation surge.

The central bank can also easily experience significant losses in these circumstances relative to a deep recession, though the implications for the consolidated fiscal positions may still be favorable. All in all, our analysis suggests substantial benefits of QE in a deep recession, despite some risk of sizeable central bank losses. But more caution is required when using QE in circumstances closer to full employment, and it is important to give thorough consideration to other approaches such as pushing interest rates negative before turning to QE.

While central bank losses should not serve as a litmus test for whether QE is desirable from a societal perspective, such losses may weaken the financial autonomy of the central bank and possibly undermine both its credibility and independence. Accordingly, we next turn to whether central banks should modify their capital policies—how they allocate profits between building their own capital and distributions to the government—to account for bigger and riskier central bank balance sheets. Current policies were typically designed decades ago when central bank balance sheets were small, cash-in-circulation the main liability, and central banks were almost always profitable (aside from those exposed to FX risk). But QE has exposed central banks to asset duration risk and resulted in big losses, with risks arising both from policy actions such as QE and from simply operating a floor system.

As is well-recognized, if a central bank has full operational independence, its monetary policy strategy and implementation should not depend on its capital or distributions to the government, and some central banks have operated effectively with negative capital for decades. But in practice, a weak financial position or inability to make profits and distributions to the government may affect operational independence. The central bank may be exposed to more political incursions, including on budgetary and personnel decisions. Or the central bank may feel compelled to view policy decisions with an eye to its balance sheet, possibly inducing it to put a “higher bar” on the use of QE. Hence central bank governance frameworks typically put a high weight on maintaining central bank financial autonomy. The importance of financial autonomy for independent decision-making has been underscored in a recent extensive survey of senior central bank officials in Adrian, Khan, and Menand (2024).

There are currently a wide range of approaches in distributing central bank profits to the government that depend on the legal framework. For instance, distributions in some countries depend on the level of central bank capital relative to the statutory minimum. If capital is below the minimum, central bank profits must go to building capital, while profits are distributed to the government once capital exceeds the minimum. In other countries, the allocation is determined through bilateral negotiations between the central bank and the government. But the broad aim is similar. If there are shortfalls, the central bank should rebuild capital either organically through profit retention or possibly turn to a government-sponsored recapitalization if capital falls well below the regulatory minimum. These approaches are aimed at supporting the financial autonomy of the central bank, and have the appeal of simplicity, but are not risk-based or forward-looking.

Our paper explores the merits of modest departures from existing frameworks that could potentially help reduce the risks to central bank autonomy that could come from a weak capital position or high variability in its distributions to the government (especially a prolonged suspension of distributions). Notably, QE tends to generate large initial central bank profits followed by sharp decline that could possibly translate into big cumulative losses. It seems natural to try to smooth through some of this volatility and retain some profits rather than fully distributing large upfront profits to the government.

Accordingly, we explore how central banks could modify their capital policies to take a more risk-based approach. A dynamic capital policy would involve quantifying key sources of risk and making profit allocation decisions to build capital to "provision" against shocks.[2] Central banks could use a range of models to conduct such balance sheet assessments. IMF staff have developed an approach based on the model of Hall and Reis (2015) that allows for an assessment of credit, maturity, and foreign exchange risk. Scenario analysis—or "stress tests"—can be used to gauge the risks posed by large balance sheets in the steady state due to shocks (from an inflation surge that requires policy tightening), as well as from prospective actions such as new QE programs. These tests could then help inform decisions about provisioning. A central bank experiencing large "windfall" gains from a decline in policy rates, for instance, might opt to hold on to some of these profits—and offset future potential losses rather than simply remit them all to the Treasury.

We see considerable appeal of a risk-based approach. Even so, this approach has significant complexities. For instance, in deciding how much of its profits to retain, should the central bank look at the modal outlook or to tail risks, which may require much higher provisioning? And governments may be averse to central banks building up a war chest through retaining a large share of profits.

Our aim in this paper is to simply to illuminate some alternatives to the approaches currently taken, while recognizing that there may be—for good reasons—substantial differences in the approaches ultimately taken (Tucker, 2018). Some central banks may view themselves as likely to have high operational independence irrespective of their capital position or their likely distributions to the government. Under these conditions, they may favor retaining a simple approach. Other central banks may regard financial weakness as posing risks to their ability to take mandate-consistent actions, including to use tools such as QE, and may see more appeal in risk-based approaches.

This remainder of the paper is organized as follows. Section 2 provides some background on how quantitative easing was used after the Global Financial Crisis, and on its effectiveness. Section 3 considers the lessons of the recent inflation surge for the future use of QE, while Section 4 considers how some of the modalities of QE might be adjusted to minimize risks to central bank credibility (e.g., through the increased use of escape clauses). Section 5 considers how central bank capital policies might be modified to account for the risks posed by bigger and more leveraged central bank balance sheets. Finally, Section 6 concludes.

Quantitative Easing Before the Pandemic

Quantitative easing (QE) became a key component of the toolkit of central banks during and after the Global Financial Crisis. Given the sharp downturn in activity, central banks lowered interest rates to the zero lower bound. The major central banks, including the Federal Reserve, Bank of England, Bank of Japan, and European Central Bank, also turned to QE—complemented with forward guidance—to provide support to the macroeconomy and boost inflation.

Quantitative easing involves central banks purchasing longer-term government bonds and financing those purchases through the issuance of reserve money. Because reserve money is a short-term liability, QE can be regarded as tantamount to shortening the maturity structure of public debt, which tends to lower term premiums

[2] In this paper, we interpret "provisioning," as involving the creation of financial buffers through the temporary suspension reduction in profit distributions to the government, which differs from its strict accounting definition in the International Financial Reporting Standards (IFRS).

through portfolio balance channels. In addition, central banks have also purchased private assets such as mortgage-backed securities and corporate bonds to lower risk premiums. While similar actions by Treasuries—such as swapping short for long-term debt—would presumably elicit similar effects through portfolio channels, an important argument for delegating QE to central banks is that it strengthens the impact through "signaling" channels, including by underscoring the central bank's aim to maintain accommodative policy.

QE was initially used in the context of a sharp economic downturn driven by a rapid tightening of financial conditions. The expectation was that the large balance sheet expansions associated with QE were temporary measures meant to address the exceptional circumstances of the Global Financial Crisis, and that balance sheets would gradually be "wound down" as conditions normalized. Central banks expected to maintain corridor-based operational frameworks, under the assumption that they would return to conventional interest rate policy as their primary policy tool.

These expectations were belied by the slow subsequent recovery in advanced economies and drag from the unfolding debt crisis in Europe, and major central banks launched an array of QE programs to spur recovery and nudge inflation closer to their targets. Moreover, even as financial conditions eased and economic recovery progressed, policymakers became increasingly concerned that a decline in the neutral rate of interest (r*) would severely limit policy space even as activity and employment fully recovered. As a result, central banks were very cautious unwinding QE, and only the Federal Reserve ended up reducing the size of its balance sheet. Other major central banks proceeded to expand their balance sheets in the 2016–2019 period—even as unemployment moved toward historic lows—given concerns that a continued downward drift in inflation expectations below target would further limit policy space and given concerns about downside risks. Thus, the Bank of England launched a QE program following the Brexit referendum in 2016, the ECB embarked in renewed quantitative easing in the fall of 2019, and the BoJ progressively expanded the breadth of its yield-curve control framework to include equity.

The upshot was that QE—in concert with forward guidance—de facto became the primary tool used by a number of advanced economy central banks for providing monetary accommodation through most of the period between the GFC and the pandemic. Central banks viewed QE as a good, even if imperfect, substitute for conventional monetary policy. Their views were well-grounded in substantial empirical and model-based evidence showing that QE had sizeable effects on term and risk premiums, especially in periods of financial stress, and could provide macroeconomic stimulus when conventional policy space was limited.

Importantly, the way that QE programs were structured and communicated to the public evolved considerably through time, as central banks sought to better link QE with policy objectives. In particular, central banks moved from using a fixed timetable for QE purchases that was insensitive to economic conditions to a more state-contingent approach in which the duration and pace of QE depended on economic conditions and progress on inflation—essentially a QE reaction function.

Central banks also aimed to improve effectiveness through deepening the link between QE and the reaction function for the policy rate. Intuitively, if policy rates were expected to react a lot to the decline in term and risk spreads induced by QE, QE would have little effect on bond yields and hence on activity. Conversely, QE effectiveness could be enhanced by convincing markets that the policy rate wouldn't be likely to react much. Based on this reasoning, central banks indicated that policy rates were unlikely to be raised until well after QE ended, and that policy rate adjustment was likely to be gradual even after liftoff. Because asset purchase programs were viewed as mainly operating through stock effects—and hence had to remain in place for a long time to have their intended effect—this communication, in effect, guided markets to expect that policy rates would be very low for several years.

Structural models helped central banks identify the potential benefits of adopting an interest rate reaction function consistent with gradual liftoff as well as quantifying the gains. For instance, the research of Engen, Laubach, and Reifschneider (2016) showed how the effects of a given-sized QE program on unemployment are much larger under a calibration of the Taylor rule implying a more gradual liftoff of policy rates than a standard Taylor rule. They argued that the Fed's communication after the Global Financial crisis evolved in a way consistent with this more accommodative form of the Taylor rule.

Central banks generally perceived that some degree of commitment could enhance the stimulus from QE (Bernanke, 2017). Using evocative language from Greek mythology, the president of Federal Reserve Bank of Chicago Charles Evans described this as "Odyssean" forward guidance: just as Odysseus tied himself to the mast to resist bewitchment by Circe, central banks could promise to keep policy rate low—at least to a point—even if economic conditions called for raising interest rates under their normal reaction function. These commitments were perceived as being relatively low cost to central bank credibility insofar as economic recovery was expected to be gradual, and there seemed little risk of an inflation surge given that Phillips Curve appeared very flat. Indeed, rather than liftoff earlier than markets anticipated, slow progress on inflation and the perception of pronounced downside risks led central banks to repeatedly push back the expected date of liftoff from the effective lower bound.

On the financial side, central banks typically made sizeable profits from QE. While it was recognized that QE required the central bank to take leveraged positions that in principle could result in losses if central banks had to raise policy rates sharply, such an outcome was viewed as unlikely. And even with long-term yields very low, the yield curve remained sufficiently upward sloping to keep interest margins profitable and generate ongoing central bank profits that were distributed to Treasuries. Given the boost to the economy and hence positive effects on government fiscal positions, the effects of QE were even more favorable from a consolidated perspective.

The perception that QE was an indispensable tool in delivering stimulus when conventional policy was constrained—as well as a widespread belief that a low r* was likely to seriously constrain policy space going forward—were key factors leading central banks to shift toward floor-based operating systems in the years prior to the pandemic. A highly attractive feature of a floor system is that it allows a central bank to rapidly scale up its balance sheet through expanding reserves when needed—while keeping the policy rate from falling too low—but also to tighten policy when appropriate without having to liquidate assets. Thus, the perception that the ELB was often likely to bind, and that QE was critical in such circumstances was a major catalyst in shifting away from the lean balance sheets and corridor systems that had been used for decades before the Global Financial Crisis.

Implications of the Inflation Surge for the Use of QE

Central banks in advanced economies largely followed the pre-pandemic playbook in deploying QE over the pandemic period. Large-scale asset purchases were initially used to support market functioning when financial markets came under severe pandemic-related stress in the spring of 2020 and were accompanied by a raft of liquidity-support measures. Once financial stresses eased, central banks indicated that they would continue to expand their balance sheets through QE operations to provide macroeconomic stimulus. QE was complemented by sharp interest rate cuts that pushed policy rates to their effective lower bound, and by

forward guidance suggesting that policy rates would remain tethered to their effective floor for a prolonged period (often several years).

QE was undertaken by a broader group of advanced economy central banks than had used QE before the pandemic, as well as a couple of emerging markets. Central banks at the time projected a very slow recovery in employment and return of inflation to target. For example, the ECB staff projections in September 2020 saw unemployment hovering near 9 percent by late 2022, and inflation just nudging over 1 percent. While forecast uncertainty was viewed as very high, the forward guidance of central banks was predicated on the belief that inflation was likely to remain well below target in most plausible scenarios, and that risks were skewed to the downside.

Thus, central banks felt comfortable in making longer-horizon promises about the policy rate path, and in omitting the “escape clauses” that had often accompanied QE prior to the pandemic. And markets broadly shared this pessimistic outlook: participants in the September 2020 NY Fed Survey of Primary Dealers saw only a 1 percent chance that the federal funds rate would rise above 2 percent by end-2023, which was still below the level viewed as normal in the long-run.

In the event, a rapid surge of inflation that began in 2021 forced central banks to tighten policy much earlier than expected. While the inflation appears to have been mainly driven by supply factors in many economies, especially outside of the United States, stronger-than-expected recoveries also helped boost inflation, making central banks feel confident that sharp tightening was warranted.

Given that QE heavily exposed central banks to maturity mismatch—they had bought assets when yields on long-term bonds were at record lows and often significantly negative—the sharp rise in interest rates and inversion of the yield curve has caused central banks to experience very sizeable losses. These losses, in concert with the inflation spike itself, have created a significant public backlash against QE—to the effect that central banks overdid their policy support, amplifying inflation pressure while accumulating losses that ultimately must be borne by taxpayers. Perhaps more subtly, central banks have been criticized for the modalities of QE, as forward guidance that policy rates wouldn’t be raised until QE ended may have delayed a more timely liftoff (see Orphanides, 2023).

This experience suggests the need to consider possible lessons for the future use of QE. Under what conditions is QE likely to be desirable to use, and when should central banks be more cautious about deploying it? And if central banks do decide to use QE, should they change the modalities of how they implement and communicate it?

In reassessing the benefits and costs of QE, it seems crucial to not simply fixate on the implications for central bank balance sheets—as often seems the case in political debates and in the press. QE should be evaluated by considering the benefits it can have in achieving core central bank stabilization objectives—including to lower unemployment and raise inflation in the context of a recession—as well as its consolidated fiscal costs. Critically, the latter should include not only central bank losses, but also sizeable initial gains, as well as the effects on government debt arising through lower interest payments, higher tax receipts, and lower expenditures.

From a broad perspective, there would still seem to be substantial benefits from using QE in a deep recession of the sort experienced in the wake of the Global Financial Crisis. For a given scale of QE, the effects on term and risk premiums would likely be larger than in a shallow recession, especially if financial conditions hadn’t completely normalized. And such QE would be unlikely to engender noticeably earlier or faster liftoff, resulting

in much of decline in term premiums translating into lower yields, and boosting its effectiveness. On the fiscal side, the stimulus to activity and reduction in yields should reduce government debt, and any adverse effects on central bank profits would likely be limited as long as policy rates remained fairly low for some time.

The more difficult question focuses on the merits of QE in a "shallower trap" or recession, in which inflation may be running considerably below target, but employment or output slack is very modest. In this situation, central banks may have well-grounded concerns about downside risks, including that inflation expectations could drift down and further limit policy space. But the recent inflation surge is highly suggestive of the potential importance of nonlinearities in the Phillips Curve that may reflect changes in price-setting when the economy is running hot or inflation is already running high, as in recent models by Benigno and Eggertsson (2023) and Harding, Linde, and Trabandt (2023). Such nonlinearities may reflect in part the presence of fixed factors of production at the sectoral level that can imply large effects of demand stimulus on key input prices (in the spirit of Lorenzoni and Werning, 2023). While QE in the pre-pandemic period was increasingly predicated on the belief that the Phillips Curve was very flat, recent experience suggests a material risk that QE could push the economy into a region of overheating if initiated in a shallow liquidity trap.

Illustrative Model Simulations

To provide more clarity about the conditions in which QE may be appropriate, it is helpful to draw upon simulations of a two country New Keynesian DSGE model with several key frictions that make it potentially desirable to use QE. First, building on Chen et al. (2012) and Kolasa and Wesolowski (2020), the model incorporates portfolio transaction costs and restricts some agents from trading both short- and long-term bonds. This segmentation of the bond market is critical for allowing large scale asset purchases by the central bank—or QE—to affect term premiums. Second, the model incorporates behavioral discounting as in Gabaix (2020). Allowing some agents to be myopic limits the traction that central banks can get from making commitments about future conventional policy after the effective lower bound no longer binds; without such discounting, central banks could simply rely on forward guidance and not have to worry about using QE (as emphasized in the "forward-guidance" puzzle, e.g., Del Negro et al., 2015). Finally, on the aggregate supply side, the model embeds a nonlinear Phillips Curve in which inflation rises more sharply with output when the economy is already running hot (with this "banana shape" reflecting convexities in price-setting as in Harding, Linde, and Trabandt, 2022 and 2023). The model is parameterized to be conservative in the effects of QE, and to imply standard effects of conventional monetary and fiscal policy shocks.[3] Further details on the model, including its parameterization, is provided in Adrian et al. (2024).

It is useful to assess the effects of QE in a liquidity trap generated by economic conditions of varying severity. In one case, QE is implemented in a very deep liquidity trap associated with a severe recession in which the output gap is deeply negative, and inflation well below target. Roughly speaking, this scenario would be similar to that prevailing in the aftermath of the GFC, where financial conditions had improved but unemployment ran far above its long-run level. The second scenario considers QE in a much shallower liquidity trap in which output is only modestly below potential while inflation runs about 0.8 percentage point below target. This is reasonably similar to the situation that a number of advanced economy central banks faced before the pandemic in which inflation seemed stuck well below target even as unemployment moved toward record lows.

[3] For QE, we calibrate the model to imply effects on output that are somewhat smaller than the empirical papers by academic scholars surveyed in Fabo et al. (2021). This meta-analysis notes that the effectiveness of QE is found to be notably smaller by academics than central bank economists, so by benchmarking our model to their evidence excluding central banks, we take a conservative view on the effectiveness of QE.

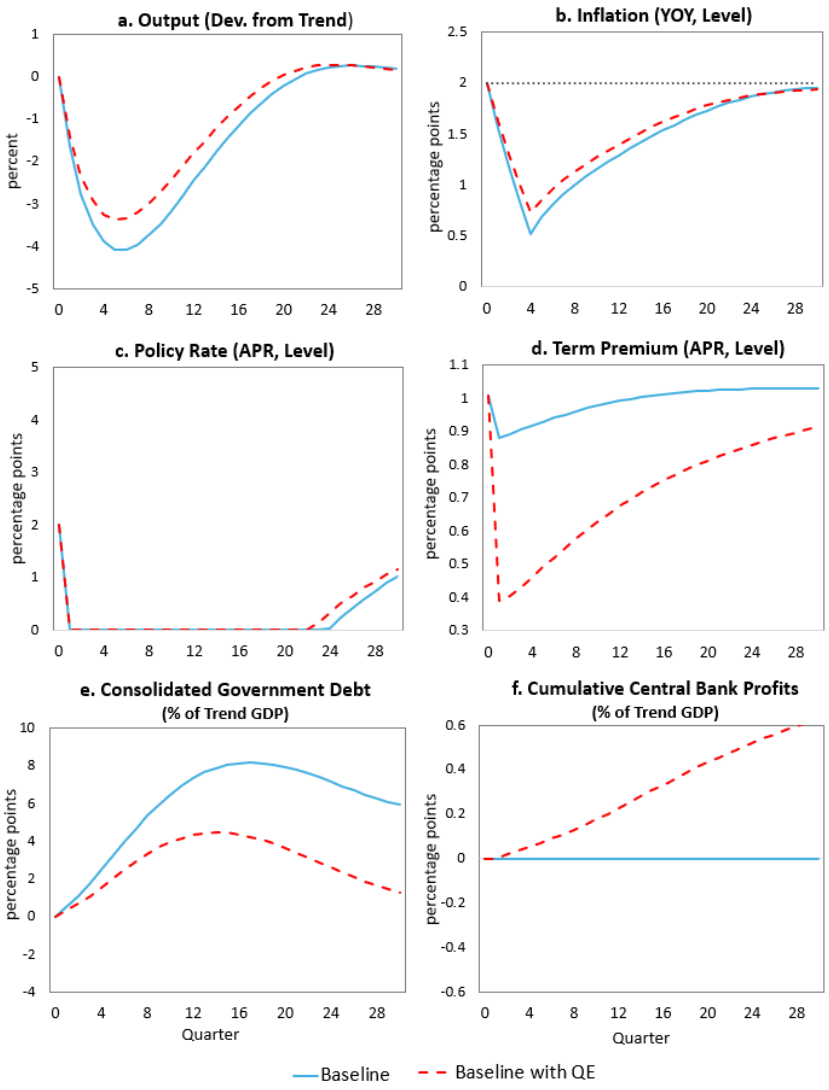
In either situation, the recession is driven by mix of supply and demand shocks (of varying size),[4] and the central bank is assumed to follow a Taylor-style interest rate reaction function subject to an ELB constraint (here assumed to be 0) on the short-term policy rate. QE is assumed to be implemented gradually, with the stock of assets held by the central bank peaking at 10 percent of baseline GDP after a year. This sequence of purchases reduces the term premium initially by about 50 basis points.

In the deep recession scenario, QE clearly has sizeable macroeconomic benefits. As seen in Figure 1, QE boosts output (upper left panel) about .8 percent relative to baseline after six quarters and inflation (upper right panel) 0.2 percentage points. This stimulus reflects that markets expect the central bank to progressively expand its balance sheet through asset purchases, so that the term premium declines persistently (middle right panel). The macro stimulus induces a slightly earlier liftoff of the policy rate (middle left panel). Even so, this offset is relatively modest, so that most of the decline in the term premium passes through to longer-term yields.[5]

[4] The deep liquidity trap is mainly driven by large negative demand shocks, with some contribution of favorable supply shocks representing additional wage moderation. The demand shocks used to construct the shallow trap are smaller while wage moderation drivers are amplified. The more sizable supply component in the shallow trap scenario allows us to achieve a larger inflation decline relative to target amid a moderate downturn in economic activity.

[5] While our focus in this paper is on monetary policy, fiscal stimulus can also play a critical role in supporting economic recovery and is likely to be particularly effective in these circumstances when conventional monetary policy is constrained by the effective lower bound.

Figure 1. Ex ante: Deep Liquidity Trap



Source: IMF staff calculations.

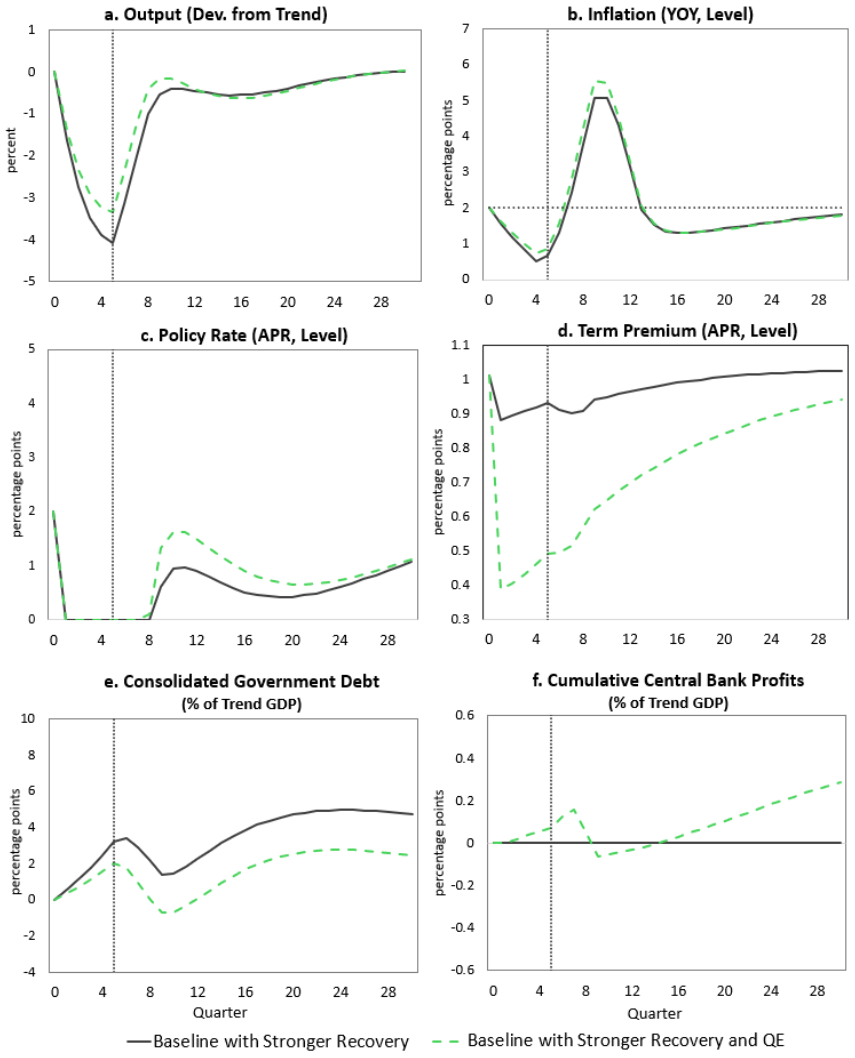
On the fiscal side, the strong stimulus to output boosts the government's primary balance substantially, reduces interest payments, and results in a large reduction in government debt. The central bank also makes profits, with the central bank's capital rising about 0.5 percent after five years (lower right panel). The central bank profits reflect that long-term yields—while declining substantially—remain well above the policy rate that is pinned at zero for several years and then rises only gradually to its long-run level. As a result, the consolidated fiscal position (lower left panel) improves substantially by about 5 percent of baseline GDP after five years (difference between blue solid line and red dashed line in panel e), of which the bulk reflects increased tax revenue. The consolidated position includes central bank profits, which are assumed to be remitted immediately in our model. In effect, QE more than pays for itself insofar as the macro stimulus is accompanied by falling government debt.

This "holy trinity" of significant macroeconomic benefits, a boost to government revenues, and positive central bank profits seems a reasonable characterization of the central bank experience with QE in the aftermath of the

GFC. Moreover, in a deep recession, the macro and fiscal benefits are likely to remain substantial even if there are shocks that occur after the implementation of a QE program that would call for faster policy rate hikes under normal conditions. In particular, given that the central bank would like to set a deeply negative policy rate if constrained by the ELB, modest-sized aggregate demand shocks—such as from fiscal expansion—would not push toward significantly earlier liftoff, and the benefits of QE from a macro perspective and consolidated fiscal perspective would be similar to those in Figure 1. Central bank profits would be diminished a bit, but still likely positive (if the policy rate does not have to markedly overshoot its steady state level).

Even so, as suggested by recent experience, very large shocks could materially affect the benefits of a given QE program, especially if they induced a rapid recovery and inflation surge that pushed the central bank to raise policy rates well above its normal long-run level. Under these circumstances, the central bank could face large losses. But even in these circumstances where the "ex post" benefits of QE are lower than envisioned, QE would still be likely to have significant beneficial effects, especially in the plausible case in which the stimulative shocks take some time to affect the macroeconomy. In this vein:

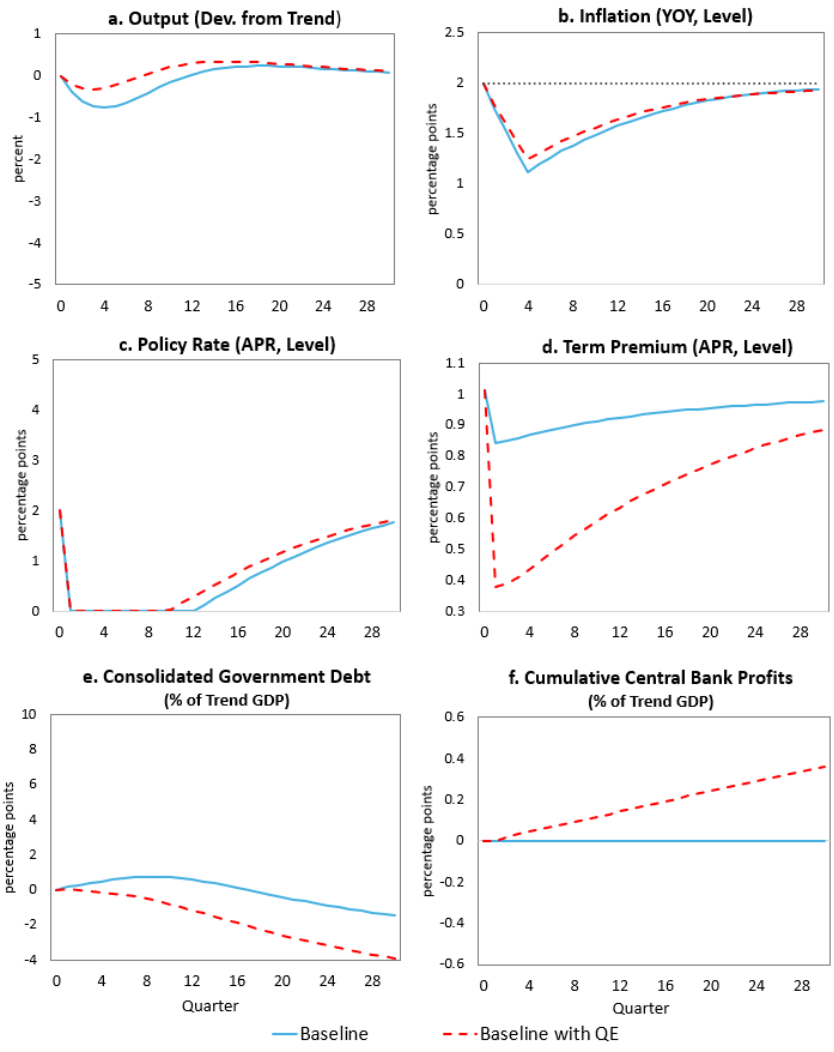
Figure 2. Ex post: Deep Liquidity Trap



Source: IMF staff calculations.

Figure 2 shows the effects of QE relative to a baseline (black solid lines) that is initially identical to the recession in Figure 1 but incorporates a much faster recovery in output and inflation driven by a mix of positive demand and adverse cost-push shocks, which materialize one and a half year after the initial shock. QE still provides substantial macro benefits, also from this ex post perspective—boosting output and inflation when the slack is high, and the welfare benefits are presumably highest. While the eventual overheating and overshoot of the inflation target require a sharp rise in the policy rate that pares back central bank profits significantly, the consolidated fiscal position still improves considerably. These results underscore the robustness of QE in a deep trap, and the importance of looking at the consolidated fiscal position in assessing the fiscal consequences.

Figure 3. Ex ante: Shallow Liquidity Trap



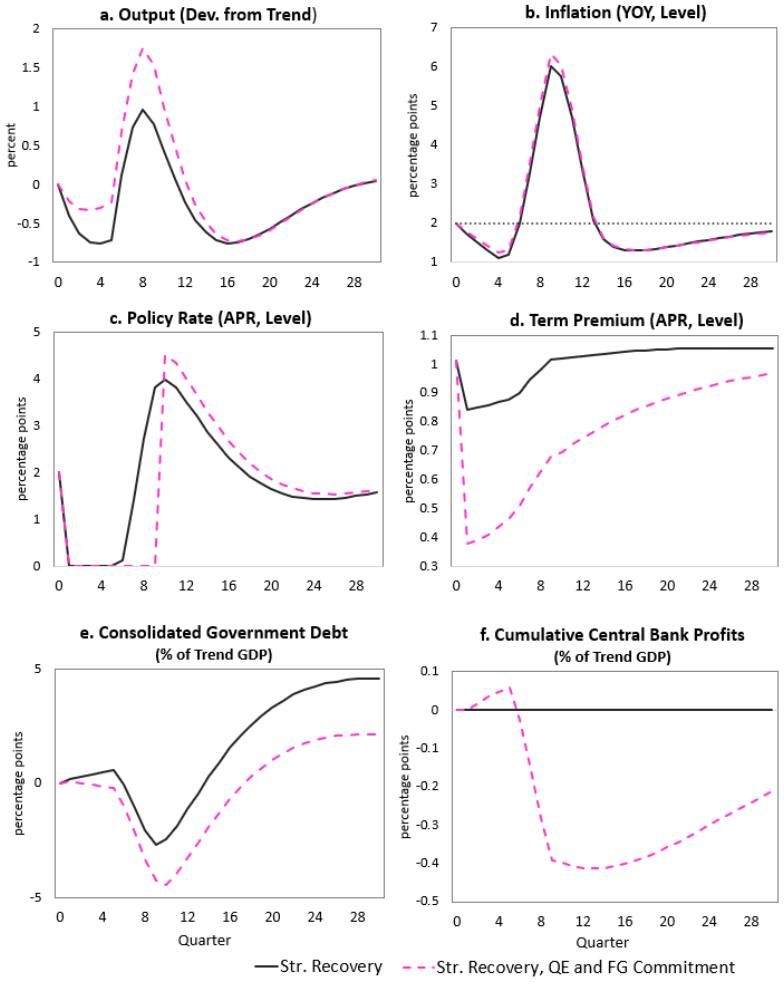
Source: IMF staff calculations.

Turning to the case of a shallow liquidity trap with a smaller economic decline and below target inflation shown in Figure 3, QE still appears beneficial provided that the economy evolves reasonably in line with the modal outlook (i.e., that it would stay close to baseline absent QE). As illustrated in Figure 3, the baseline without QE has a negative output gap of a little less than one percent, and inflation is about 0.8 percentage points below

target. A modest-sized QE program is helpful in closing the output gap in this scenario and in boosting inflation, and the implications for the consolidated fiscal position remain favorable. In fact, the central bank experiences some improvement in its capital position, as the yield curve remains upward sloping (with the policy rate only converging gradually to its long-run level).

However, there are several noteworthy differences between the effects of QE in a shallow liquidity trap compared to deep liquidity trap case considered earlier. First, a given-sized QE program has less "bang for the buck" in reducing long-term yields and hence in boosting output and inflation, reflecting that the stimulus from QE tends to cause policy rates to rise more quickly than in a deep liquidity trap. Thus, the output rise is only about two-thirds as large in Figure 3 as in Figure 1.

Figure 4. Ex Post: Shallow Liquidity Trap with Forward Guidance Commitment



Source: IMF staff calculations.

Second, there is more risk that QE can be counterproductive in a shallow liquidity trap if even modest upside inflation risks—such as from fiscal stimulus—materialize. This is illustrated in Figure 4, which shows the effects of QE against the backdrop of the same initial baseline as in Figure 3, but with stimulative shocks hitting a few quarters after QE is initiated. While QE is initially modestly beneficial as in Figure 3, its marginal impact is to

overheat the economy once it recovers faster than envisioned than when QE was first undertaken (comparing the blue line in Figure 3 with the black solid line in Figure 4).

Moreover, the commitment element of QE can additionally fuel the overheating and makes the central bank much less nimble in responding to the upside inflation surprise. As discussed in Section 2, QE typically involves some guidance about how long it is likely to last, as well as a conditional promise to delay hiking rates until well-after QE ends. The second simulation (pink dashed line) in Figure 4 aims to capture the latter channel by assuming the central bank keeps policy rates on hold for several quarters after the new shocks hit (although for a shorter period than originally envisioned, which can be seen by comparing blue solid with the pink dashed lines in panel c in Figures 3 and 4). In effect, the central bank may feel "locked into" keeping policy rates low even when it would otherwise raise them quickly, which accounts for much of the overheating effects of QE in our scenario. In practice, central banks may also feel quite constrained by the guidance they give about the likely duration of QE program, including both from concerns about credibility and financial stability. These risks associated with the low nimbleness of QE are clearly higher when upside inflation risks are more pronounced, as would be the case if the Phillips Curve is nonlinear and the QE is initiated reasonably close to full employment.

A third point to note about QE in a shallow trap is that it is more likely to result in central bank losses (lower right panel) given a greater likelihood that policy rates would eventually have to be raised well above neutral. In our simulation, it still turns out that QE reduces government debt from a consolidated perspective (lower left panel). However, the fiscal implications could be less favorable in the event the central bank felt it was necessary to shift its reaction function and act more forcefully. This would amplify central bank losses and could cause the consolidated fiscal position to deteriorate. Such an outcome would be more likely if the nonlinearities in the Phillips Curve were more pronounced—and lead to more persistent inflation effects—than in our model.

The Modalities of QE and Some Alternatives

The previous section has highlighted conditions under which QE is quite likely to be welfare-improving, and conditions under which more caution is required. But a closely related question involves the appropriate modalities of QE, including how central banks should communicate conditional commitments about the duration of QE or a QE reaction function, and about policy rate adjustment after QE. This issue seems particularly relevant given that upside inflation risks seem much more material than was recognized before the pandemic.

As discussed earlier, the macroeconomic benefits of QE hinge significantly on communication that: (i) reinforces the markets view that QE will remain in effect for a prolonged period (which should push down term premiums more); (ii) that policy rate adjustment will not begin until well after QE ends; and (iii) that policy rate adjustment is likely to be gradual after it commences. The inflation surge and heightened risk of nonlinearities in the Phillips Curve suggests a need for central bank communication to be clearer in recognizing the possible need to exit QE early and raise policy rates faster.

Such an outcome is considerably more likely in a shallow liquidity trap, where there would seem a particularly strong case for using "escape clauses" to signal conditions that could terminate QE early and call for faster policy adjustment, perhaps well before net purchases ceased. Without such escape clauses, central banks could feel somewhat constrained from responding as aggressively as needed to a surge in inflation and/or macroeconomic overheating due to concerns about a loss to their credibility; as Orphanides (2023) has argued in the case of the recent inflation surge, central banks could become "trapped" by their own forward guidance,

and their slow exit from QE could in turn generate macroeconomic instability. At the same time, such escape clauses may shorten agents' expectations about how long the central bank will keep policy rates at the effective lower bound, making QE even less potent in affecting long-term yields and economic activity in a shallow liquidity trap.

The17houldt is that the central banks could reasonably feel quite confident about using QE in a deep trap where the risk of early termination and rapid liftoff is quite small. Hence, a given-sized QE program would tend to impart larger macro stimulus "when it is needed most," have favorable fiscal effects and be less likely to adversely affect central bank balance sheets. In contrast, the benefits of QE in a shallow liquidity trap are likely to be noticeably smaller as markets recognize a greater chance that the central bank may have to depart from a gradualist approach to removing accommodation.

In deciding whether to use QE, central banks would also want to take account of the potential challenges of reversing it through QT. Acharya and Rajan (2023) argue that scaling down balance sheets may be more challenging that building them up, so that QT presents considerable risks to financial stability and market functioning. Forbes and Du (2024) are somewhat more sanguine based on the experience of QT thus far, but caution that significant problems may emerge as reserves decline further.[6]

Given that QE requires longer-term commitments to be effective that can be problematic to make in a shallow trap, central banks may give more consideration to negative rates, or to simply relying on forward guidance without tying it to QE. On negative rates, several central banks pushed interest rates to levels below zero for a prolonged period, with the ECB setting its policy rate at minus 50 basis points and Swiss National Bank holding their policy rate at minus 75 basis points for several years. Empirical evidence suggests that transmission was quite effective compared to conventional policy, with negative rates showing substantial passthrough to both lending and deposit rates (Brandao-Marques et al., 2024). These policy adjustments did not generate the financial stability risks that were often feared, suggesting some scope to push in this direction before turning to QE. Even so, moving rates to moderately negative levels may not deliver the stimulus needed to deliver on central bank mandates, and pushing much further on this dimension could well cause financial stability risks to surface.

How Should Central Bank Capital Policies be Modified to Account for Bigger and Riskier CB Balance Sheets?

While we have argued that the consolidated fiscal position is the appropriate way to assess the fiscal costs of QE from a societal perspective, it is important to safeguard against risks to the central bank's financial position. For a fully independent central bank, the capital position should have no bearing on its ability to carry out its mandated objectives. However, in practice, a weak financial position or inability to make profits and distributions to the government may increase the risk that the central bank is exposed to incursions on its independence. For instance, central banks might feel pressured to put a higher bar on the use of QE, or even in taking conventional policy actions (raising interest rates).

[6] Erceg et al. (2024) show that an exit strategy that relies more heavily on QT than policy rate hikes can have more adverse spillovers to other economies under some conditions (by generating sharper adjustments in exchange rates and term premiums).

The importance of financial autonomy as a core aspect of good central bank governance has long been recognized and incorporated into central bank laws. However, the capital policies of most advanced economy central banks were developed in an environment of “lean” balance sheets in which they faced little credit, maturity, or FX risk. Because their liabilities were largely non-interest bearing—consisting mostly of currency in circulation—central banks could invest in interest-bearing securities and almost always make a profit (Stella 2008). In this environment, capital policies seemed of little consequence, at least for advanced economy central banks not exposed to FX risk, and capital distribution policies were often quite mechanical.

However, the large losses central banks have taken in the wake of balance sheet actions—especially QE and FX accumulation—are raising interest in whether and how central banks might adjust capital policies going forward. How should they be adapted to manage much more heavily leveraged balance sheets? Central banks face greater balance sheet risks both because of discretionary actions such as using QE to fight recessions, but also because they have changed their operating frameworks toward floor systems. Floor systems require larger steady state balance sheets and hence are more exposed to shocks.

Current Capital Policies

As a prelude to addressing these questions, it is helpful to first delve a bit more into existing capital policies, where there is wide variation across central banks. Some central banks are legally required to maintain a minimum level of capital that may be specified as a fixed nominal amount in the domestic currency—such as 20 billion krona in the case of the Riksbank—or as a percentage of some component of monetary liabilities.

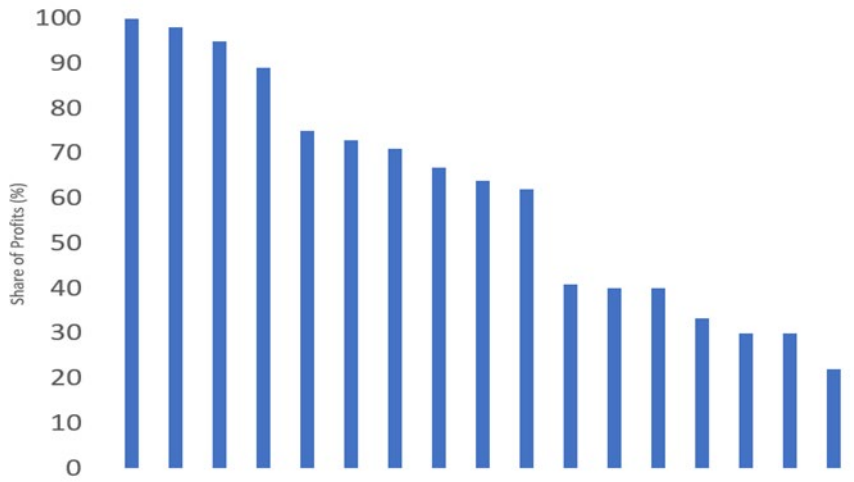
There is also wide variation in approaches to distributing central bank profits to the government. Some central banks make distributions that depend on the level of capital relative to the statutory minimum: in this case, all profits typically are used to build central bank if capital is below the minimum, while profits are distributed to the government once that level is exceeded. In other cases, the law establishes that a fixed percentage of the profits goes to reserves and the rest to the government—with the horizon sometimes extending to several years in an effort to smooth through short-term variability in profits. In other cases, there is no specific rule for distributing profits, and the distribution is the result of a negotiation between the central bank and the government. In practice, many central banks have distributed a large share of their profits to the government even in the past few years (see Figure 5).

A common feature of most capital distribution policies—including the setting of minimum capital levels when applicable and the approach to distributing profits—is that they typically are not risk-based. When capital shortfalls do materialize, they are addressed by organically rebuilding central bank capital through profit retention (mainly seigniorage) and sometimes complemented by recapitalizations by the government. Such recapitalizations may be required by central bank law but are often done by the government on a more discretionary basis.

While the mechanical approaches to profit distribution seem understandable given that most advanced economy central banks faced little balance sheet risk before the Global Financial Crisis, there is some precedent for more risk-based approaches. Notably, some small and highly open advanced economy as well as emerging market central banks have developed capital policies that provision against exchange rate risk. For example, the Norges Bank developed a risk-based approach in the early 1990s after experiencing sizeable foreign exchange losses (Stella, 2008). During the past couple of years, a number of central banks have moved towards more risk-based provisioning to account for greater balance sheet risks after the massive balance sheet expansions during COVID-19, including by some euro-system central banks. For instance, the

Bundesbank stopped paying remittances to the German Ministry of Finance in 2020 to help build buffers to withstand losses, and the Netherlands Central Bank did so in 2021.

Figure 5. Distribution of Central Bank Profits to the Government
(Average over 2019–2022)



Note: The central banks of the following countries were included (listed in alphabetical order): Australia; Brazil; Canada; Denmark; United Kingdom; France; Germany; Greece; Italy; Japan; Malta; Mexico; New Zealand; Norway; Poland; Portugal; Spain; Switzerland; United States.
Profits for all Euro area countries are calculated as distributable net profits plus risk provision.
Source: IMF staff calculations based on audited financial statements of respective central banks.

Key Facets of a Risk-Based Approach

In light of the risks associated with larger balance sheets, central banks may want to consider the merits of moving toward a more dynamic approach that determines an adequate capital level (or perhaps range) on a forward-looking basis that takes account of key sources of risk. Specifically, a dynamic capital policy would allow for the suspension of profit distributions when needed to build the central bank's capital to provision against shocks (even if current profits are positive and capital above the statutory minimum).

Implementing a dynamic capital policy would involve quantifying key risks to the central bank's capital position, including from credit risk, maturity mismatch, and foreign exchange risk. This process can be viewed as a form of "stress-testing" by analogy to the exercises applied to commercial banks insofar as it would help gauge how central bank capital would evolve in a range of scenarios.

Even so, the interpretation of the results would be very different than for a commercial bank, for which negative capital would signal insolvency. A central bank could instead use the stress-testing approach to assess the risk that its capital would dip to levels below the statutory minima and trigger a potentially long suspension of distributions to the government. Such outcomes could pose material challenges to its ability to carry out its mandated objectives (perhaps making it difficult to initiate a QE program) or even operate effectively (if it faces heavy budgetary pressures).

The risks posed by a weak financial position to central bank independence appear to be well-recognized by central bankers. A recent paper by Adrian, Khan and Menand (2024) that aimed to weight the aspects of de jure central bank independence that matter most for de facto independence in policymaking ranked financial

autonomy at the very top of the list, even ahead of independence of the central bank board from government officials. Thus, decisions about how to distribute central bank profits between the general reserves of the central bank (a component of statutory capital) versus the government (the “shareholder”) can be quite consequential.

While central banks may employ different approaches to stress-test their balance sheets, IMF staff have developed a quantitative framework that can potentially facilitate these efforts. The IMF staff approach builds on the model of Hall and Reis (2015), which considers central bank capital as exposed to three key sources of risk: (i) interest rate risk; (ii) credit risk; and (iii) exchange rate risk. The staff’s “central bank stress-testing” model (CBST model) projects the profits and capital path of a central bank in a wide range of macroeconomic scenarios. The scenario analysis can help a central bank gauge an adequate capital level (or comfort range) that would allow it to absorb large but plausible shocks without pushing capital to very low levels likely to create political pressures (either directly or because it would imply a suspension of distributions to the government).

Stress-testing can be used both to assess risks arising from shocks—such as an inflation surge—as well as of central bank policy actions. Notably, the shift of major central banks to floor operating systems has translated into much larger balance sheets that are exposed to both credit and maturity risk, especially from shocks that cause the yield curve to invert. Stress-testing can help the central bank quantify this risk in a range of scenarios that might involve inflation running well above or below its target. Implementation does require a range of specific model assumptions, such as about the form of the monetary policy reaction function, as well as empirical relationships specifying how policy rate changes affect the yield curve. Thus, a more aggressive monetary policy reaction to inflation would mean a sharper interest rate hike in response to an inflation surge, and bigger central bank losses. The stress test could also gauge the effects of policy actions such as QE both under the modal outlook, and in shock scenarios.

The results could help Inform central bank decisions about how to allocate profits, and may entail building capital to well above statutory minimums. For instance, a central bank running a floor system and experiencing large profits due to a decline in policy rates—perhaps because of recession that was expected to be short-lived—may want to retain some of these profits to build capital to counter the risk that the policy rate could eventually rise enough to generate significant losses.

From an institutional perspective, the central bank would typically have a “risk unit” that would develop and maintain the underlying model, as well as prepare the stress tests that would help quantify the central banks’ exposure to balance sheet risk. The Board of the central bank would provide oversight of the stress-testing framework and could draw on the stress-test results to inform its decision about profit distributions. Of course, the Board members might have a range of views about how to proceed, but the stress test would help them think through the implications of different options.

What is the Right Breadth of Risk-Based Provisioning?

An appealing feature of central bank stress testing is that it can help central banks better assess risks to their capital position in an environment of large balance sheets and help insulate them against key risks. This approach can help central banks gauge how much of any “unusual” profits they should retain to offset losses down the road. Such provisioning should reduce the risk that a central bank gets “forced into a hole” and potentially has to request a Treasury recapitalization to maintain credibility.

Such an approach is also helpful for public accountability to help better gauge whether central bank actions such as QE seem warranted based on benefit/cost criteria. Of course, as we have emphasized, such an evaluation should necessarily take account of both the benefits to macroeconomic and financial stability as well as the implications for the government's fiscal position.

But there are a number of open questions that central banks will have to consider. These range from technical issues about how to model various components of balance sheet risk to deciding how to link the stress testing results to provisioning decisions.

One fundamental question concerns the appropriate breadth of provisioning. Should the central bank aim to provision *ex ante* to account for a wide range of actions that it might take in crisis circumstances, or stick to provisioning against "core" risks associated say with operating a floor system and managing FX reserves? The former case would not only entail complex scenario design—about which tools might be used in various situations, and about initial conditions such as the slope of the yield curve—but also to assign probabilities to these scenarios. On the other hand, assessing and provisioning against core risks seems much more straightforward.

A second issue is the role of the Treasury and legislative branch in vetting the stress-testing and provisioning choices. What if the Treasury disagrees with the central bank and perceives that the central bank faces much lower risks of capital losses? Or if it believes that the central bank should not be using certain tools such as QE as readily, reserving it for more exceptional circumstances? Such dynamic provisioning is likely to entail more bilateral discussion between the central bank and government than under the simple mechanical rules central banks have typically followed in the past. It will be important for the central bank to have a high degree of transparency with the government about its stress testing framework and the decision-making process for provisioning.

A third and related issue is that the governmental authorities overseeing the central bank may worry about agency problems associated with the central bank building a large war chest based on their own risk assessment. Such a war chest may weaken the central banks' internal governance, perhaps allowing it to expand employment excessively and move into new areas. Or it may encourage the central bank to put too low a bar on actions that may have some economic benefits but come with substantial political economy risks.

Whether to Move Toward More Risk-Based Capital Policies?

The approach that central banks favor in deciding whether to move to a more risk-based approach should presumably depend on the risks they perceive of a weak financial position, as well as their perception of the backing they have from their Treasury or legislature to "leverage" their balance sheet and take actions that pose balance sheet risks. Of course, in practice any decisions to modify existing approaches would likely be made in close concert with the governmental authorities to whom the central bank is accountable, and is likely to require legislative changes (Tucker, 2018). The legislative framework will need to be clear on the application of this risk-based approach.

Some central banks may view the risk that their policy independence is constrained by their balance sheet position as very low and prefer to retain their current strategy of remitting most or all their profits provided that capital is above the statutory floor. They may view a simple approach to distributing profits as appealing given its simplicity and transparency and prefer not to modify it in light of pandemic-related surge of inflation—especially given the unusual nature of that event. The risks associated with a floor system may be perceived as

quite small given that the term structure is usually upward-sloping, and, importantly, they may perceive that they would have strong governmental backing for using their full arsenal of tools if needed even if it entailed additional balance sheet losses. Even a central bank in this position, however, may find enhanced transparency about its actions—that would involve central bank stress-testing as well as gauging macroeconomic and fiscal effects of its balance sheet policies—as desirable for solidifying public support and maintaining appropriate accountability.

But some central banks may have stronger concerns that a weak capital position, especially if persistent, could undermine their ability to achieve mandated objectives, and thus weaken both policy effectiveness and their credibility. Weak central bank capital, for instance, may make them feel that the bar for using balance sheet policies was unduly high from a social welfare perspective. These concerns would likely be heightened for central banks that have limited seigniorage revenue, so that rebuilding capital organically would be a very slow process. In these circumstances, the central bank could regard it as particularly desirable to adjust its capital policies to reduce the risk of further weakening in its capital position (and would presumably move to getting government backing to do so).

As discussed above, a key question in implementing a more forward-looking approach to its capital policy is the breadth of risks to take into account in determining distributions to the Treasury. With much larger and more leveraged balance sheets under floor operating systems even in normal times, the volatility of profits is much larger as a share of GDP, and it would seem reasonable for central banks adjust their distribution policy to take this into account. Thus, if the central bank holds a sizeable portfolio of long-term Treasuries with a coupon of 3.5 percent and it reduces its policy rate from 3 percent (say the “steady state level”) to 2 percent given a cyclical slowdown, it could use some of these windfall gains to build its capital and cushion against possible future losses when interest rates rise. While many central banks already “smooth through” profit volatility by basing distributions on average profits over a *multi-year backward window,* a forward-looking approach could have quite different implications insofar as it would be based on an evaluation of future risks.

Central banks may also consider provisioning for risks associated with the prospective large-scale use of balance sheet policies in the future, including liquidity support and QE. But given the political economy difficulties of provisioning ex ante for a range of contingencies noted earlier, central banks may find it desirable to use scenario analysis to strengthen political support for providing equity backstops from the Treasury to help address significant risks to macroeconomic and financial stability when they arise. Such “ex post” backstops are desirable insofar as they not only protect the central bank’s balance sheet, but also signal political support for the central bank’s actions. Of course, the government would have to decide ex post what sort of central bank actions to backstop, and the magnitude of the support they are willing to provide, possibly relying on a stress testing exercise like the one proposed for the central bank.

In the event a crisis does emerge, a forward-looking policy can again be very helpful in buttressing the central bank’s capital position. In this event, a central bank could use scenario analysis to consider how its capital position would evolve while taking account of government backstops (which are often only partial). Given that central bank profits—especially in the early phases of programs such as QE—are often sizeable, reflecting that policy rates are very low, retaining a large share to offset future sharp declines would help buttress the central bank’s capital position through the recovery period.

Conclusion

This paper aims at providing a preliminary assessment of the implications of the recent inflation surge for use of quantitative easing and for central bank capital policies (including distributions to the government). We emphasize four key points.

The first is that QE policies are likely to have substantial benefits in a deep recession in which policy rates are expected to be constrained by the ELB for a protracted period. QE boosts output and inflation and improves the consolidated fiscal position of the government. Thus, QE is likely to be a very useful tool in the event that the ELB again becomes severely binding.

The second is that—in light of the recent experience of high inflation – more caution is warranted in using QE in a shallow liquidity trap in which the central bank mainly faces a low inflation problem. While QE may appear beneficial ex ante, there is considerable risk that QE may cause overheating ex post given important nonlinearities in the Phillips Curve, the potential for an outsized easing of financial conditions, and that other inflation-raising shocks may hit after the deployment of QE. Negative interest rates may be preferable in these circumstances.

The third is that the duration risk that central banks take on with QE has the intended outcome of fueling risk-taking, which compresses term premia and eases financial conditions more broadly. But a side effect is to make central banks highly exposed to losses if interest rates rise enough. We argue that the benefits of QE are often significantly positive even when the central bank experiences losses, as can occur if the recovery from recession is unexpectedly fast and the yield curve inverts. Even so, the losses still represent a potential headwind for central bank credibility and may ultimately weaken its independence, at least in some cases.

The fourth point is that central banks should consider reassessing their capital policies—including for distributing profits to the government—in light of much riskier balance sheets. Many central banks have retained simple distribution policies that were developed in an environment of small balance sheets and little duration (or credit) risk. Central banks that believe that their capital positions and profit distributions to the government have little bearing for carrying out their mandate may opt to retain these strategies. However, other central banks may benefit from taking a more forward-looking approach to assessing balance sheet risks and for helping them decide how to allocate profits between building capital and distributions to the government. Allowing central banks greater flexibility in this regard can help protect their financial autonomy and support their independence, and appears high on the agenda for central bank reforms.

References

Acharya, Viral, S. Chauhan, Raghuram Rajan, and Sasha Steffen. 2023. “Liquidity Dependence and the Waxing and Waning of Central Bank Balance Sheets.” NBER Working Paper No. 31050, March 2023.

Adrian, Tobias, Christopher Erceg, Marcin Kolasa, Jesper Lindé, and Pawel Zabczyk (2024), ”Fiscal Costs and Benefits of QE,” IMF Working Paper, forthcoming.

Adrian, Tobias, Ashraf Khan, and Lev Menand. 2024. “A New Measure of Central Bank Independence.” IMF Working Paper 24/35, Washington, D.C.: International Monetary Fund.

Bernanke, Ben. 2017. “Monetary Policy in a New Era.” Paper prepared for a conference on Rethinking Macroeconomic Policy at the Peterson Institute of International Economics on October 2, 2017.

Brandao-Marques, Luis, Marco Casiraghi, Gaston Gelos, Güneş Kamber, and Roland Meeks, 2024. “Negative Interest Rate Policies: A Survey.” *Annual Review of Economics*, Vol. 16.

Chen, Han, Vasco Cúrdia, and Andrea Ferrero. 2012. "The Macroeconomic Effects of Large-scale Asset Purchase Programmes," *Economic Journal*, 122(564): 289-315.

Du, Wenxin, Kristin Forbes, and Matthew Luzzetti. “Quantitative Tightening around the Globe: What Have We Learned?” Paper prepared for the U.S. Monetary Forum on February 28, 2024.

Erceg, Christopher, Marcin Kolasa, Jesper Lindé, Haroon Mumtaz, and Pawel Zabczyk. 2024. “Central Bank Exit Strategies: Domestic Transmission and International Spillovers.” IMF Working Paper 2024/073, International Monetary Fund.

Fabo, Brian, Elisabeth Kempf, Martina Janoková, and Luboš Pástor. 2021. ”Fifty Shades of QE: Comparing Findings of Central Banks and Academics,” *Journal of Monetary Economics,* 120: 1-20.

Gabaix, Xavier. 2020. "A Behavioral New Keynesian Model." *American Economic Review*, 110 (8): 2271-2327.

Gopinath, Gita. 2022. “How Will the Pandemic and War Shape Future Monetary Policy?” Presentation prepared for the Jackson Hole Symposium on August 26, 2022.

Gopinath, Gita. 2023. “Three Uncomfortable Truths for Monetary Policy.” Remarks prepared for the European Central Bank Forum on Central Bank on June 28, 2023.

Hall, Robert, and Ricardo Reis. 2015. “Maintaining Central Bank Financial Stability under New-Style Central Banking.” NBER Working Paper No. 21173, May 2015.

Harding, Martin, Jesper Linde, and Mathias Trabandt. 2022. “Resolving the Missing Deflation Puzzle.” *Journal of Monetary Economics* 126(C): 15-34.

Harding, Martin, Jesper Linde, and Mathias Trabandt. 2023. “Understanding Post-COVID Inflation Dynamics” *Journal of Monetary Economics*, forthcoming.

Kolasa, Marcin, and Grzegorz Wesolowski. 2020. “International Spillovers of Quantitative Easing.” Journal of International Economics vol. 126: 103330.

Orphanides, Athanasios. 2023. “The Forward Guidance Trap.” Institute for Monetary and Economic Studies, Bank of Japan. Discussion Paper no. 20234-E-6, Tokyo.

Stella, Peter. 2008. “Central Bank Balance Sheet Strength, Policy Constraints, and Inflation.” IMF Working Paper 08/49, February 2008.

Tucker, Paul. 2018. “Unelected Power.” Princeton, NJ: Princeton University Press.

PUBLICATIONS

New Perspectives on Quantitative Easing and Central Bank Capital Policies
Working Paper No. WP/2024/103