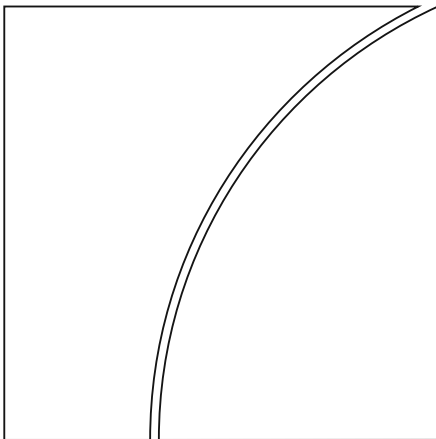




BANK FOR INTERNATIONAL SETTLEMENTS



BIS Working Papers

No 981

Back to the future: intellectual challenges for monetary policy

by Claudio Borio

Monetary and Economic Department

November 2021

JEL classification: E43, E51, E52, E58, E31.

Keywords: monetary policy, business cycle, financial cycle, inflation, deflation, natural interest rate.

BIS Working Papers are written by members of the Monetary and Economic Department of the Bank for International Settlements, and from time to time by other economists, and are published by the Bank. The papers are on subjects of topical interest and are technical in character. The views expressed in them are those of their authors and not necessarily the views of the BIS.

This publication is available on the BIS website (www.bis.org).

© *Bank for International Settlements 2021. All rights reserved. Brief excerpts may be reproduced or translated provided the source is stated.*

ISSN 1682-7678 (online)

Back to the future: intellectual challenges for monetary policy¹

Claudio Borio

Abstract

The central banking community is facing major challenges – economic, intellectual and institutional. A key economic challenge is the need to rebuild room for policy manoeuvre, which has fallen drastically over time. This lecture focuses on the intellectual challenge, ie facts on the ground are increasingly testing the long-standing analytical paradigms on which central banks can rely to inform their policies. It argues that certain deeply held beliefs underpinning those paradigms can complicate the task of regaining policy headroom.

Keywords: monetary policy, business cycle, financial cycle, inflation, deflation, natural interest rate.

JEL classification: E43, E51, E52, E58, E31.

¹ The views expressed are my own and not necessarily those of the BIS. I would like to thank Piti Disyatat for extensive discussions on these issues. My thanks also to Frédéric Boissay, Stijn Claessens, Gabriele Galati, Charles Goodhart, Jan Marc Berk, Fiorella de Fiore, Mikael Juselius, Marco Lombardi, Raghu Rajan, Phurichai Rungcharoenkitkul, Masaaki Shirakawa, Dora Xia and Egon Zakrajšek for their comments.

A previous version of this paper was presented as the David Finch Lecture, University of Melbourne, 2 September 2021.

Contents

Introduction.....	1
I. The economic challenge.....	2
II. The intellectual challenge: how we see our world today.....	5
Characterisation	6
Evolution	7
III. The intellectual challenge: how we could see our world differently.....	8
A different pair of eyes.....	8
Different eyes, different policies.....	13
Conclusion.....	15
References.....	16

Introduction

I am honoured and delighted to be here. I would like to thank the organisers for the privilege of giving this year's David Finch Lecture – a lecture that unfortunately had to be postponed by one year due to the circumstances we know all too well. I am particularly fond of Australia. My connections with the country go back a long way, not least because of illustrious co-authors with whom I have done some of my most rewarding work. It is sad that I cannot be there with you in person.

Today, I would like to take you on an intellectual journey. The lands that we will be exploring together may appear unfamiliar, possibly uncomfortably so. However, at least in some respects, they should not be. So-called "truths" in economics are learned and unlearned at irregular intervals, as events unfold forcing people to question their convictions. I would like to revisit critically beliefs that nowadays permeate our perception of the economy so deeply that we don't even notice them – beliefs that are sometimes taken as self-evident truths. But they have not always been treated this way. In this sense, we may need to travel back to the future.

The motivation for our journey is that the central banking community is facing daunting challenges – challenges that, I suspect, may well define the future of the central bank as an institution for years to come. In the 30 plus years of my professional career, most of which was spent working for the central banking community, I do not recall more taxing times.

The challenges are of three kinds. First, an *economic* challenge: the economic environment is becoming increasingly difficult. A summary statistic for this – if I may use that term – is the unprecedented loss of room for policy manoeuvre.² Second, an *intellectual* challenge: facts on the ground are increasingly testing the long-standing analytical paradigms on which central banks can rely to inform their policies. And third, an *institutional* challenge: peering into the future, central bank independence may come under threat.

On previous occasions, I have addressed in some detail the first and the third challenges.³ Today, I would like to focus primarily on the second – the intellectual one. That said, to set the stage, I will need to briefly discuss the economic one. After all, it is unfolding economic events that motivate changes in the way we think the economy works.

Before I continue, let me clarify two important points.

First, the focus. I will not focus on the inevitable complexities and subtleties of policymaking. Policy decisions must be taken in a world of great, some would say radical,⁴ uncertainty – a world in which judgment is essential and a wide array of considerations must be taken into account. This is what is commonly known as "the

² In addition, what I will be discussing is particularly relevant for advanced economies. Several EME central banks still have to grapple with inflation rates that are uncomfortably high, and virtually all have to deal with the vulnerabilities that arise from the countries' high exposure to financial global conditions. For a discussion of these issues, see eg BIS (2019).

³ See, in particular, Borio, Drehmann and Xia (2019) and Borio (2019), respectively.

⁴ See Kay and King (2020).

art of central banking". Rather, my focus is on the far simpler and more rarefied world of analytical paradigms in which you and I, wearing our academic hats, can take refuge – the world of ideas, which, after careful filtering, can nonetheless influence policy.

Second, the perspective. In addressing these questions, I will draw largely on research carried out over the years. What I will provide, therefore, is very much a *personal* view. This will allow me to be more provocative and stimulate debate. In addition, I hope you will excuse me if the reference list is rather lop-sided. You will be able to find much richer ones, outlining comprehensively the evidence for different viewpoints, in the pieces of work to which I will be referring.

The bottom line? In the years ahead, rebuilding room for policy manoeuvre – monetary buffers – will be essential.⁵ At the same time, a number of beliefs that underpin the prevailing analytical paradigms may complicate this task.

Our journey is structured as follows. You and I will first briefly visit the lands, describing how the global economy has evolved and sprung monetary policy challenges from unsuspected quarters. We will then explore very familiar territory to examine how we now see the world we live in. We will then try to see the same world through different eyes. It may be the case that those eyes are better equipped to understand current realities.

I. The economic challenge

The main challenge currently faced by central banks is the limited room for policy manoeuvre. Policy rates are exceptionally low globally, especially in advanced economies. They are close to zero and, in some cases, even below, which is historically unprecedented. Partly as a result, real interest rates have never been negative for as long as they have been in recent years. And central bank balance sheets have soared to levels seen only during wars, in the range of 40–60% of GDP for the main central banks and even higher for some others.

To clarify, the loss of policy headroom is not technical in nature. Central banks can decide to push policy rates further into negative territory, and there is no or hardly any ceiling to how much liquidity they can inject or assets they can buy. The limits are economic and political. Even if the zero lower bound on cash was overcome – and technically it can be – we don't really know how economic agents would react. Further, as central banks purchase a growing amount of assets, they risk being perceived as eroding the basis of a market economy.

From a longer-term perspective, why has this loss of policy headroom occurred? To be sure, we had two major crises (the Great Financial Crisis (GFC) of 2007–09 and Covid-19). Central banks had to pull out all the stops to successfully stabilise the financial system and the economy – in the best lender of last resort tradition. But that cannot be the whole story. Crises are just episodes, even if their effects may be long-lasting. What are the deeper factors at work?

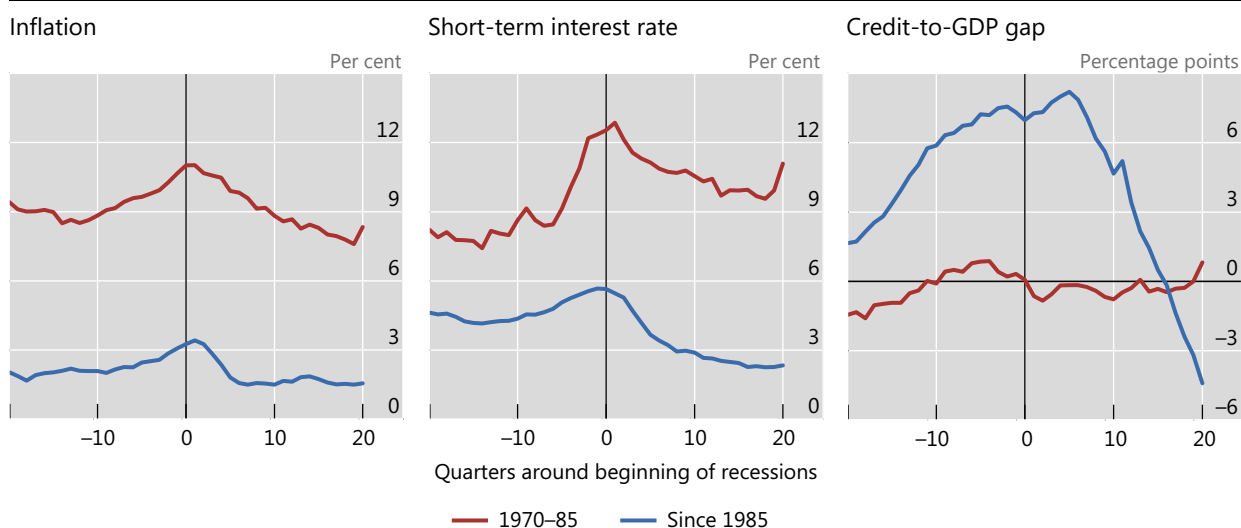
⁵ In order to keep the scope of the lecture manageable, I will not address the equally important issue of the need to rebuild fiscal buffers and of its interaction with the monetary policy challenge. For a discussion of these issues, see Borio and Disyatat (2021) and BIS (2021).

I would suggest that two economic factors have played a role. One is well known, the other is probably less appreciated. The two, despite appearances, are closely linked

The first, well known factor is that inflation has proved rather insensitive to monetary policy easing, thereby thwarting central banks' efforts to push it up to target post-GFC. The proximate cause is well understood. On the one hand, inflation has proved unexpectedly unresponsive to economic slack – the Phillips curve is very flat (and indeed hard to estimate). In fact, in its recent review, the Federal Reserve downplayed the role of an unobservable equilibrium rate of unemployment in setting policy (Powell (2020)). On the other hand, there are growing concerns that inflation expectations may be rather backward-looking or at least unresponsive to policy announcements:⁶ if, despite central bank efforts, inflation remains very low, it will be hard to dislodge them. Hence also central banks' concern about expectations drifting down and becoming unanchored.

More prominent role of financial factors in business cycle fluctuations

Graph 1



The horizontal axis denotes quarters around recessions in the business cycles, with the peak date set at zero (vertical lines). Lines show the median evolution across 16 advanced economies and events in the respective time period.

Source: C Borio, M Drehmann and D Xia, "The financial cycle and recession risk", *BIS Quarterly Review*, December 2018, pp 59–71.

The *second*, probably less appreciated factor, is the rise of the financial cycle as a prominent economic phenomenon. By "financial cycle" I mean the financial expansions and subsequent contractions driven by the self-reinforcing interaction between funding conditions, asset prices and risk-taking.⁷ Starting in the early 1980s, a subtle change in the business cycle took place (Graph 1). Until then, recessions were triggered by an increase in inflation, which elicited a round of monetary policy tightening that helped drag the economy down. Since then, recessions have often been triggered by a turn in the financial cycle – deviations of the credit-to-GDP ratio

⁶ See eg Coibion et al (2020) and De Fiore et al (2021). Coibion et al (2020), however, argue that a more targeted communication strategy could be effective.

⁷ See Borio (2014a) and references therein. The (domestic) "financial cycle" mentioned here should not be conflated with the "global financial cycle" (Rey, (2015)), which focuses on how US monetary policy, in particular, influences global financial conditions; see Aldasoro et al (2020).

from a long-term trend is a proxy here – as expansions have ushered in contractions with little change in inflation and hence in the monetary policy stance (Borio, Drehmann and Xia (2019)).⁸ Naturally, the Covid-19 crisis is an exception driven by an exogenous, non-economic event.

Why do I believe the two factors – unresponsive inflation and the rise of the financial cycle – are related?

There is no question that a key reason for the rise in the financial cycle has been financial liberalisation. Starting in the early 1980s, it provided ample room for the self-reinforcing interaction between funding liquidity, risk-taking and asset prices. But changes in the inflation process and monetary policy regimes have also played a role. The globalisation of the real economy has arguably put persistent downward pressure on inflation.⁹ It is hard to believe that the inflation process could remain immune to the entry of 1.6 billion lower-paid workers in the global economy, as the former Soviet bloc, China and emerging market economies opened up. Arguably, globalisation eroded the pricing power of labour and firms, making the wage-price spirals of the past (“second-round effects”) less likely.¹⁰ At the same time, with central banks focusing increasingly on near-term inflation and downplaying the role of monetary and credit aggregates, there was no reason to tighten when inflation remained low and stable during economic expansions. Monetary policy was no counterweight to financial booms.¹¹

To my mind, these two factors can help explain the gradual decline in interest rates and the loss of policy manoeuvre. The story could go something like this. In the wake of Volcker’s efforts, central banks worldwide succeeded in taming inflation, allowing them to reduce interest rates. Then, gradually, globalisation acted as a powerful tailwind, allowing central banks to keep interest rates low for longer. When booms turned to busts, central banks naturally significantly eased the stance and – since inflation did not appear again – persisted in this course of action, thereby pushing interest rates down further. Partly as a result, the policy headroom had shrunk substantially by the time the Covid-19 crisis struck.

⁸ The authors also find that financial cycle proxies outperform the popular term spread as leading indicators of recessions since the mid-1980s.

⁹ For a more extensive discussion, see Borio (2017a) and references therein. The picture is similar if one measures the financial cycle in different ways, including the composite indicator that combines the behaviour of credit with that of property prices.

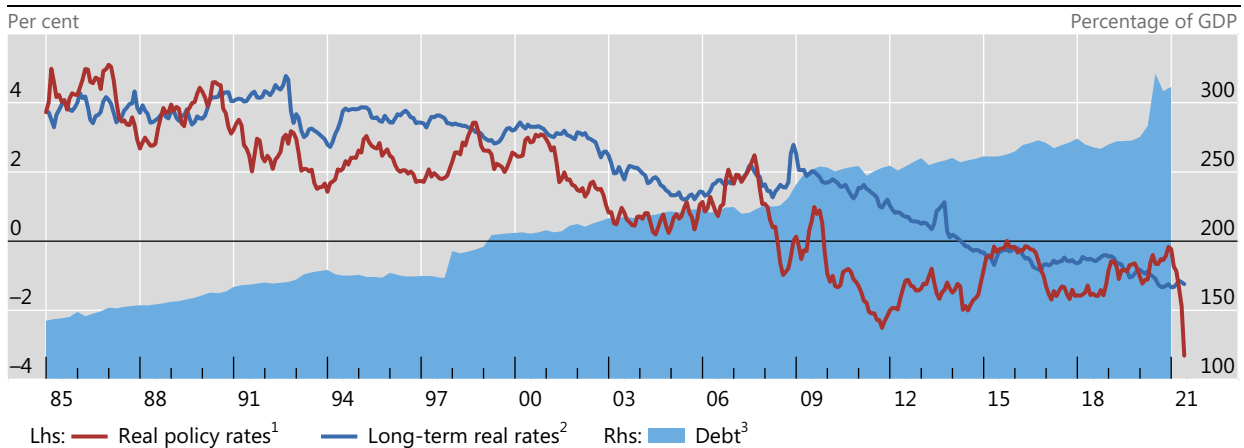
¹⁰ Of course, globalisation was only one factor, albeit an important one, reducing the bargaining power of labour. The ascendancy of a free-market philosophy, of which globalisation was in part a reflection, as well as technological forces also played a key role. Moreover, given its impact on the effective labour force, globalisation can also be regarded as a major and persistent demographic shock. For a recent empirical paper linking the loss in bargaining power to more subdued inflation, see Lombardi et al (2020). The view that globalisation has been a key factor behind the behaviour of inflation has been gaining ground within the central banking community; for a very early conjecture, see Greenspan (2005); and for more recent statements, see eg Carney (2017), Lagarde (2020) and Powell (2021), who also mention technology and the possible role of demographics. For a broader treatment, see also Goodhart and Pradhan (2020).

¹¹ See Borio (2017b) for the argument that the GFC and its aftermath reflected a financial boom gone wrong rather than secular stagnation (Summers (2014)). The fact that prudential regulation failed to keep up with the rapid evolution of the financial system and the build-up of financial imbalances played an important role in the lead-up to the GFC. The post-crisis development and implementation of macroprudential frameworks was designed to address these limitations, eg Borio (2014b).

In addition, this raises the risk of a “debt trap”. As interest rates fall – nominal *and* real – debt-to-GDP ratios climb and the economy becomes more vulnerable to higher interest rates, which in turn makes it harder to raise them. In other words, low rates beget lower rates (Borio and Disyatat (2014)). There are indications that this is a material risk (Graph 2).

If this is a reasonable approximation to the nature of the problem, what could be a solution? Part of the solution would be to follow a more countercyclical policy also during business expansions. Hence the importance of analytical paradigms that could help guide policy.

A debt trap? Graph 2



¹ Nominal rate less headline consumer price inflation. Unweighted average of United States, euro area and Japan. ² Simple average of index-linked 10-year government bond yields of the United States, France, Japan and the United Kingdom. ³ General government debt and non-financial sector debt, in percent of nominal GDP. Weighted average of G7 economies plus China based on GDP and PPP exchange rates.

Sources: Bloomberg; Datastream; national data; BIS calculations.

II. The intellectual challenge: how we see our world today

This takes us to the intellectual challenge? By intellectual challenge, what do I mean?

I mean that certain ingrained economic beliefs at the core of the prevailing analytical paradigms may have facilitated the loss of policy headroom and may complicate the quest to regain it to the extent that they influence policy. If my analysis is broadly correct it would be worth re-examining these intellectual macroeconomic paradigms in order to see the world differently.

I would characterise those paradigms by three beliefs. Some beliefs have a long intellectual pedigree, others less. But all manifest themselves most forcefully and clearly in the workhorse model on which the current generation of macroeconomists have been trained. This is the New Keynesian model built on a real business cycle core by adding temporary nominal rigidities (typically prices and/or wages).¹² So, to simplify the analysis, let me take this model as the starting point.

¹² For the classic statement of the model, see Woodford (2003).

I will consider, in turn, the characterisation of the beliefs and their evolution post-GFC before turning, finally, to their evaluation.

Let me stress that I will characterise those beliefs in *intentionally* very stylised terms. Portraying them in stark, black and white terms has the merit of ensuring that the message is not lost in the inevitable shades of grey that nuance and enrich perspectives.

Characterisation

The *first belief* is that economic fluctuations reflect exogenous shocks rather than inherently unstable dynamics. Myriads of shocks are possible, with those involving preferences and technology being particularly prominent. Once hit by these shocks, the economy returns rather smoothly to its steady state. Financial factors can and do play a role in the model's many refinements. But they influence only the persistence of the impact of the shocks – amplifying and lengthening the effects – not the smooth return to a steady state (eg Bernanke et al (1999)).

Taken *literally*, this perspective rules out business cycles in which expansions sow the seeds of subsequent contractions. By extension, it also rules out the possibility that accommodative policy during expansions can generate the conditions for a subsequent downturn. In this approach, policy can generate recessions only if it allows inflation to rise and then slams on the brakes, or if it runs out of room and fails to respond sufficiently once a shock strikes. For example, again taken literally, price stability is a sufficient condition for macroeconomic stability. This is the much celebrated “divine coincidence” result.¹³

The *second belief* is that monetary policy has but a transient impact on the real economy – money neutrality. This view has a much longer tradition. It is deeply engrained in the history of economic thought. It is also embedded in the real business cycle core of New Keynesian models, which describes the long-run equilibrium once nominal rigidities dissipate. This influential perspective assumes away frictions in the process of exchange. With perfect coordination across agents and time, monetary factors play no role in driving economic activity in the long run.

An important implication is that monetary policy has no influence on real interest rates in the long run. The real rate is pinned down by equilibrium in the goods market independently of monetary policy. This rate is the so-called natural rate of interest, or “r-star”.

This concept is intimately linked to the issue of the room for policy manoeuvre: it implies that the *only* way for monetary policy to gain headroom is to raise inflation, so that nominal interest rates can increase alongside it. Central banks must cut rates (ease monetary policy) today to raise inflation tomorrow. Paradoxically perhaps, to *gain* policy headroom on a sustainable basis *tomorrow* requires *lowering* it *today*.

Taken at face value, this notion can greatly constrain central banks. It can also encourage the adoption of a strategy that is itself not devoid of risks. If, as the evidence indicates, inflation is rather unresponsive to monetary policy, the risk of

¹³ Of course, various extensions of the baseline model invalidate the result, but they do not subvert the spirit of the analysis and hence the main policy conclusions that have been derived from it.

depleting buffers is material. The post-GFC experience could be read as illustrating this.

The *third belief* is that the costs of persistent falls in the price level – deflation – are large. This adds to the urgency of accommodative policies. The concerns were already embedded in traditional models. Imagine that aggregate demand contracts at the zero lower bound, for whatever reason, and disregard balance sheet policies, for simplicity. Central banks can do little to offset the contraction. This raises real interest rates, which depresses aggregate demand further – a dynamic that does not have an obvious floor. New Keynesian models embody a similar fear. At the zero lower bound, economies can get stuck in a deflationary equilibrium with low output. So-called “Japanification” embodies this fear – although, in fact, in per capita terms, GDP growth in Japan compares rather favourably with that in many other advanced economies.

Evolution

Beliefs are grounded in evidence. This is also true of the three I have just described. A large body of work supports them.

At the same time, views in economics have come and gone. As is well known, evidence cannot be foolproof. Its interpretation requires a good dose of judgement, in which priors, consciously or unconsciously, loom large. In addition, relying on unobserved variables helps to fit facts into one’s own worldview. Moreover, the economy is not a stationary system. In particular, it evolves, sometimes radically, in response to policies. Arguably, this explains why the paradigm embodied in New Keynesian models had difficulties coming to grips with the GFC. It seemed to work well during the so-called Great Moderation: if you held it to be a sufficiently close approximation to reality, you would not see any contradictory evidence. However, by playing down the role of financial factors and overestimating the self-equilibrating properties of the economy, it could not identify the build-up of risks ahead of the crisis nor replicate its dynamic.

How has the GFC influenced those three beliefs? In some cases, it has weakened them; in others, it has had little impact. Either way, it has not fundamentally altered the overall picture. Let us consider each belief in turn.

Take the *first belief* – the shock-cum-return-to-steady-state view of the business cycle. There is an increasing recognition that the endogenous component of economic fluctuations is substantial and cannot be ignored.¹⁴ This actually harks back to the origins of business cycle theory. There is also a growing recognition that financial factors are important. Indeed, Jay Powell (2020) noted in his Jackson Hole speech how the nature of business fluctuations has changed because of those very factors, along the lines I mentioned earlier. (By the way, this is the speech in which he announced the key features of the new monetary policy framework.) More generally, the concept of the financial cycle is at the very heart of the macroprudential frameworks implemented post-GFC (eg Constâncio (2019)) – frameworks that seek to address the procyclicality of the financial system, ie the tendency for the financial system to amplify economic fluctuations.

¹⁴ See eg Beaudry et al (2020) and references therein.

That said, there is still a certain divide within central banks and among their researchers. On one side, you have the macroeconomists who advise on monetary policy, for whom the shock-cum-return-to-steady-state is the paradigm of reference. On the other side, you have the economists who advise on financial stability policy, for whom the financial cycle plays a similar role, and who focus on it purely as a cause of financial crises (tail events), not as a factor behind recessions in general. It is left to the senior policymakers, who take the decisions that ultimately matter, to synthesise and reconcile these perspectives, based on a large dose of judgement.

Why have these differences of perspective survived among the economists that prepare policy decisions? For one, professional experience matters. Cross-fertilisation, which has been strongly encouraged, should reduce the gap and has already started to do so. But closing the gap will inevitably take time. In addition, another obstacle to a wider adoption of the cycle view of business fluctuations is that we don't yet have adequate operational models that can reconcile the perspectives, eg for counterfactual policy analysis. Doing so is very hard. As a result, analyses often still proceed along separate, sometimes entirely parallel, tracks. Finally, even as the role of financial vulnerabilities in business fluctuations has received much more attention, there is significant scepticism as to whether monetary policy is suited to deal with it: prudential tools are generally considered much better suited. This, in turn, can reduce the incentive to bridge the gap in perspectives.

If the first belief has started to be questioned, the same is not true of the *second* and *third*, ie that monetary policy is neutral, so that the natural rate of interest is exogenous to monetary policy, and that the costs of deflation are invariably high. To be sure, mainstream economists have built models in which monetary policy neutrality does not hold.¹⁵ Similarly, a handful of economists have raised doubts about the costs of deflation: Feldstein (2015) and Rajan (2015) have gone as far as referring to the "deflation bogeyman". However, these are exceptions. Most statements, as well as empirical and theoretical analyses, still embody those beliefs. For instance, it is still common practice to assume that monetary policy is neutral when imposing identification restrictions on econometric models (eg vector autoregressions).

In fact, in some respects those beliefs have become more prominent. As interest rates have approached the effective lower bound, central banks have often invoked the concept of the natural rate of interest as the main explanation, whereas the concept had hardly been mentioned pre-GFC. In addition, concerns about the costs of deflation have been a reason for keeping an accommodative policy.

III. The intellectual challenge: how we could see our world differently

A different pair of eyes

Why have these two beliefs remained so prominent in analytical paradigms? Maybe the monetary policy neutrality view is too deeply rooted in economic thinking. Maybe

¹⁵ Garga and Singh (2021) and Benigno and Fornaro (2018) analyse potential long-run influences of monetary policy in models with endogenous growth.

the Great Depression has left a deep imprint on people's minds: the image of long queues of the unemployed juxtaposed with that of sharply falling prices is as vivid as ever. Moreover, Fisher's (1933) "debt deflation" has engraved the image on the intellectual furniture of many an economist.

But let's examine the two beliefs more critically, taking each in turn.

To my mind, the proposition that money is neutral derives much of its force from thought experiments in which the question posed is: what happens if one doubles the quantity of money in the economy?¹⁶ Or in experiments that even hint at an equivalence between this question and the redenomination of contracts and prices, ie changing the number of zeros.

The proposition is less self-evident if one realises that in the *real world* changing monetary policy does not amount to changing the quantity of money, but to changing interest rates. The elasticities of various types of expenditure, not least expenditures on capital goods, which have a *persistent*, if not permanent, impact on the economy, vary a lot. More to the point, once it is recognised that monetary policy has an impact on the financial cycle, it is hard to believe that *for any relevant policy horizon* monetary policy could be neutral. There is substantial evidence that financial booms and busts leave very long-lasting if not permanent scars on the economic tissue, especially if banking crises follow.¹⁷ This type of "financial" hysteresis is different from, albeit complementary to, the more standard one in the literature, in which persistent shortfalls of aggregate demand erode labour's skills or hinder investment and innovation.¹⁸

This brings me to the concept of the natural rate of interest. There are a number of concepts in economics whose validity has never been questioned; for instance, demand curves slope downwards, or the price of a good is somehow related to its relative scarcity. The natural rate of interest is not one of them. Just to name one famous economist, the natural rate of interest was at the heart of Keynes's *Treatise* (1930), harking back to Wicksell (1898), but he had discarded it by the time he got to his *General Theory* (Keynes (1936)). It was not at the core of academic curricula on money in the 1970s–1980s and, as noted, it was hardly invoked in practical policymaking pre-GFC.

I see two sets of issues with the notion of the natural rate of interest: one conceptual; the other empirical.

Conceptually, it is odd to state – as many do – that what is regarded as an "equilibrium" interest rate can cause major macroeconomic damage at some point in the future by contributing to financial instability. Output should be in equilibrium both today *and* tomorrow. A better treatment of the financial system in the models would surely lead to a different measure of the equilibrium rate.

¹⁶ Such thought experiments are the basis for the appeal of the quantity theory of money. For a classic modern restatement, see Friedman (1956); and for the long history of the hypothesis, see Laidler (1991).

¹⁷ See eg BCBS (2010), Claessens et al (2012), Drehmann et al (2017) and references therein. This analysis does not question in any way "neutrality" interpreted as the notion that it is not possible to raise growth sustainably simply by relying on monetary policy. Clearly, other policies are needed, notably structural and growth-friendly fiscal ones.

¹⁸ Cerra et al (2020) provide a recent review of these mechanisms.

Indeed, in some recent work with colleagues we have tackled this issue head-on.¹⁹ Our theoretical model has three key, real-life features. First, the central bank sets the real interest rate at each point in time.²⁰ Second, banks create money through their lending; they do not just allocate resources/savings as in standard models. The additional purchasing power helps clear the goods market, so that the real interest rate is no longer pinned down by saving and investment, ie there is no unique natural rate of interest. The economy adjusts to the interest rate the central bank sets. Third, banks take more risk during financial expansions than during contractions, depending on how much capital they have. This generates endogenous financial booms and busts. Therefore, boosting output in the near term comes at the expense of larger recessions down the road. Moreover, if in the model one realistically constrains the central bank to move the policy rate gradually, over time the interest rate will tend to fall as recessions become deeper and longer-lasting. This is one possible formalisation of the “debt trap” mentioned above.²¹

Empirically, the evidence in favour of a decline in the natural rate of interest driven by saving and investment is not as overwhelming as sometimes believed. The two approaches to evaluate the proposition have limitations.

The first approach calibrates models that assume the factors driving saving and investment also drive the natural rate of interest. It then checks whether their evolution is qualitatively consistent with the data over the period in which real interest rates have declined – that is, and significantly, since the early 1980s. One problem here is that the period need not be representative. Moreover, the researcher has plenty of degrees of freedom to fit the data.

The second approach does not look at the drivers of saving and investment directly and uses the behaviour of inflation to infer the level of the natural rate of interest. The Phillips curve tells us that, if there is slack, inflation falls; and if there is excess demand, it rises, so that the natural rate of interest is below or above the market interest rate, respectively. The problem here is that the method is no more reliable than the Phillips curve itself, and we saw earlier that this relationship is weak and hard to estimate precisely.

¹⁹ See Rungcharoenkitkul et al (2019). Mian et al (2020) also have a model that generates a debt trap, by focusing more on the impact of aggregate debt on consumption, while Beaudry and Meh (2021) show that it is possible for accommodative monetary policy to push the economy into a low interest rate equilibrium. Multiple equilibria are key in both cases. Other theoretical models that generate an endogenous natural interest rate include Rungcharoenkitkul and Winkler (2021), based on imperfect information, and McKay and Wieland (2020), based on the effect of monetary policy on “lumpy durable consumption”.

²⁰ At first sight, this may appear odd. But we *know* that the central bank sets the short-term nominal and, given sluggish prices and expectations thereof, also the real interest rate *at any given point in time* (eg Borio and Disyatat (2010)). Logically, this means that it must do so *all the time*. When people say that it does not do so in the long run, they can only mean that the central bank is somehow forced to adjust the real interest rate so that it coincides with the natural rate: unless it does so, things in the economy will go wrong and cause damage. See Borio (2017a) for an elaboration of this point.

²¹ For a discussion of the debt trap in the context of sovereign, as opposed to private sector debt, see Borio and Disyatat (2021). The debt trap is all the more likely if, as some recent empirical evidence seems to suggest, the impact of monetary policy diminishes as interest rates are very low and stay there for a long period of time (Ahmed et al (2021)). At a more fundamental level, Shirakawa (2021) argues that this reflects the way expansionary monetary policy inherently works: lower rates shift consumption from the future to the present, and there must be limits to this process. Moreover, the transfer also affects investment, which is profitable only if future consumption is there.

In fact, all the studies that let the data speak more freely and look at the relationship between saving/investment drivers and real interest rates beyond the 1980s have a hard time finding any strong link. A co-authored study, which goes back to the 1870s for several countries, reaches the same conclusion (Borio et al (2017)). In addition, it finds evidence of a relationship between real interest rates and monetary policy regimes.²²

This brings me to the *third belief*: the costs of deflation. How justified is this tight link between deflation and output weakness? The answer is “less than one might think”.

Conceptually, as is actually recognised, the link is not that tight. To simplify, the answer depends on whether falling prices are supply- or demand-driven, even if wages and prices are inflexible. Globalisation, technology and demographics fall in the supply-side category. Think, for instance, of the textbook aggregate supply/aggregate demand model. An increase, for example, in the labour force or improvements in technology shift the aggregate supply curve outwards: prices fall and output rises.

Moreover, if we go beyond one-good models (or their equivalent), the distinction between fundamental changes in relative prices and inflation is important: it means that falling deflation may actually be optimal, *even* in the New Keynesian models.²³ Why? The prices of the goods for which productivity grows more slowly should fall relative to the rest. In the new Keynesian model, to minimise adjustment costs, it is necessary to stabilise the prices that are more rigid. But, empirically, the prices that are more rigid are also those of the products for which productivity grows relatively more slowly – think, in particular, of the prices of many services relative to those of manufacturing goods. As a result, keeping those prices stable means *a reduction in the rest*. That is, it means deflation. This echoes the behaviour of inflation in the wake of globalisation, which has kept a lid on the evolution of the prices of tradeable goods.

Empirically, it is hard to find a *systematic* relationship between deflation and output weakness – the Great Depression is more the exception than the rule. Several studies confirm this view (eg Borio et al (2015)).²⁴ They also suggest that what matters is not so much the damaging interaction between debt and the prices of goods and services (Fisher’s (1933) debt deflation), but that between debt and asset prices, as the GFC has confirmed. None other than Friedman and Schwartz (1963) in their *US monetary history* talked about a more than decade-long period of deflation and sustained growth in the 19th century, questioning the standard view of the link. Moreover, one does not have to go far back in history to find episodes of “benign” deflation. In recent years, China, Norway and Switzerland, among others, are cases in point.²⁵

²² Lunsford and West (2019), for instance, present complementary results.

²³ Adam and Weber (2019) provide a recent analysis of the issue, building on the work of Wolman (2011).

²⁴ Borio et al (2015) carry out a historical empirical analysis and have a rich reference list, including, among others, Selgin (1997).

²⁵ Indeed, in contrast to a widespread view, the deflationary phase in Japan after the banking system was cleaned up in the early 2000s, saw a high rate of growth of output per working population compared with other advanced economies (eg Shirakawa (2021) and Borio et al (2015)). One could say that, once the debt overhang from the early 1990s bust was resolved, Japan suffered from a demographic, not a deflation, problem.

This raises the more general question of the behaviour of inflation at very low levels. I would suggest that there may be reasons why, *all else equal*, there could be a stronger tendency for inflation to remain range-bound once monetary policy has driven inflation down thanks to a credible monetary policy regime. This could be the case – and this is a conjecture – *even if* expectations of inflation are not very responsive to central bank pronouncements.

A key reason is that expectations may well play a *smaller* role. On the one hand, they may be less responsive to *actual* inflation; on the other hand, they may have a weaker *impact* on it.

Inflation expectations may be less responsive to inflation because agents are likely to pay less attention to it, as it makes little difference to their decisions. This is what some economists have termed “rational inattention” (Sims (2010)).²⁶ Indeed, Alan Greenspan aptly *defined* price stability as “that state in which expected changes in the general price level do not effectively alter business and household decisions” (Greenspan (1994)). We may not be far away from that state in many countries.²⁷

Inflation expectations may have a weaker impact on inflation if one reason for the absence of second-round effects is loss of bargaining and pricing power. For instance, regardless of what workers may expect inflation to be, they would be reluctant to demand higher wages as a result of concerns about losing their jobs. Structural forces would play a bigger role.

All else equal, this would mean that inflation would have a stronger tendency not to become unmoored. It would be largely buffeted by idiosyncratic – ie good or sector-specific – price changes, whether these are transitory or result in more persistent relative trends. As long as the factors driving idiosyncratic price changes do not result in *accelerating* trends, inflation would have a stronger tendency to oscillate within a range.

Indeed, there is growing evidence in this respect. At low inflation rates, the component common to all price changes, which is arguably closer to the theoretically correct definition of inflation, appears to be much smaller than the good-specific/relative one.²⁸

Graph 3, taken from Borio et al (2021), illustrates the point with US data. We see that the common component of inflation – here proxied by the first principal component – dropped drastically as inflation became low and stable starting in the mid-1980s following the “Volcker shock” (left-hand panel).²⁹ Correspondingly, the idiosyncratic component became more important and larger than the common one. This occurred alongside the well known decline in inflation persistence, here illustrated by the fact that the transitory component of inflation has become more

²⁶ This is indeed what empirical evidence seems to indicate, see eg Coibion et al (2020).

²⁷ See also Volcker (2018), who expressed concern about the view that “lowflation” is a problem and about monetary frameworks where central banks seek to push it up to the target (eg 2%) regardless of circumstances.

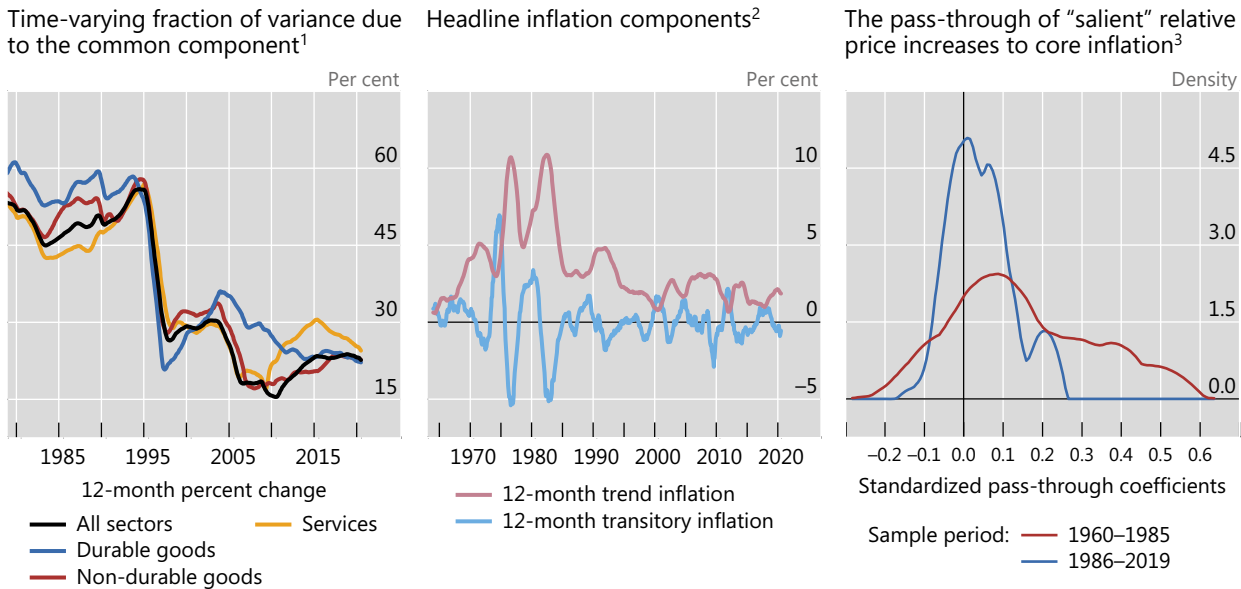
²⁸ Miles et al (2017) provide evidence in the case of the United States and euro area using the methodology developed by Reis and Watson (2010) to decompose inflation into its “pure” (same proportional changes in all prices) and “relative” (non-proportional changes in prices across goods) components.

²⁹ As that paper shows, the decline in the weight of the common component is also true at the level of categories of goods and services.

important relative to the trend one (centre panel).³⁰ Consistent with all this, the pass-through of outside (“salient”) relative price changes to inflation has declined: the mass of the distribution of their impact has shifted towards zero (right-hand panel). Evidently, second-round effects have become more muted.

The common component of inflation drops: the US example

Graph 3



¹ The common component of 12-month percentage changes in prices across all sectors and within each specified broad sector is estimated using a 15-year moving window. ² The trend and transitory components are estimated using a modified version of the Hamilton filter (Hamilton (2018)) proposed by Quast and Wolters (2020). ³ Each line shows the weighted kernel density estimate (ie a smoothed histogram) of the distribution of pass-through coefficients of “salient” relative price increases to core personal consumption expenditures (PCE) inflation for the specified sample period. The weights are equal to sector-specific average PCE shares in each period.

Source: C Borio et al (2021).

Different eyes, different policies

What does our different pair of eyes imply for monetary policy?

I started by stressing that a key challenge ahead for monetary policy is to regain room for policy manoeuvre, ie to rebuild buffers. Economies that operate with small safety margins are exposed and vulnerable. Building buffers will be especially important in the wake of the Covid-19 crisis, which has also dramatically cut fiscal policy headroom. I have dealt with the implications for monetary policy in more depth elsewhere. Here, let me just sketch one key point.

Put simply, if the foregoing analysis is a better approximation to reality than the prevailing ones, there would be room for additional flexibility in gradually building buffers as opportunities arise and as conditions allow. The costs of normalisation would be smaller, because the risk of inflation drifting down and the costs thereof would be lower. Further, the benefits would be greater, as higher interest rates would reduce the, by now familiar, potential side effects of interest rates remaining “low for long” that operate through the financial system (eg higher risk-taking, weaker

³⁰ The study also shows that the decline in persistence applies also at the disaggregated level.

financial institutions, capital misallocation etc). Extra flexibility means being able to afford somewhat larger and more persistent deviations of inflation from narrowly specified targets than would otherwise be the case. The length of the policy horizon is key here.³¹

More generally, this extra flexibility in the pursuit of inflation objectives could allow for a more systematic integration within monetary policy strategy of longer-term financial and macroeconomic stability considerations – linked, in particular, to the financial cycle and the gradual cumulative increase in indebtedness.³² This, in turn, could help address the tricky intertemporal trade-offs involved. Just like the *credible* and highly respected conductor of a well rehearsed orchestra can afford to lead with minimal gestures, so a *credible* central bank can afford to let inflation evolve within a wider range without energetic adjustments to the stance.

The usefulness of flexibility is underlined by two stylised facts. First, it stands to reason that, as a pervasive or aggregate force, changes in the monetary policy stance should have a stronger impact on the common component than on the item- or sector-specific component. Evidence is indeed consistent with this (Graph 4, compare the left-hand with the centre panel). In addition – at least since inflation has been low and stable – changes in the stance have operated through a remarkably narrow set of prices (right-hand panel), mainly in the more cyclically-sensitive services sector.³³ Taken together, these stylised facts indicate that monetary policy would have to try hard to push inflation up to achieve a tightly-defined target, which would magnify the side effects of “low for long”.³⁴

At the same time, it is clear that monetary policy cannot effectively address the intertemporal trade-offs linked to the financial cycle and the trend increase in indebtedness on its own. The support of (micro- and macro-)prudential policy, fiscal policy and even structural policy is critical – as part of what can be termed a holistic “macro-financial stability framework”, eg BIS (2021). This is very much a work in progress.

³¹ How much larger and more persistent is a question that needs to take into account a variety of considerations, including the credibility of the policy regime and the communication strategy.

³² This remains very controversial, and a minority view. This is mainly because, even if the role of monetary policy in fuelling the financial cycle may be recognised, it is often argued that prudential, notably macroprudential, policy can successfully address this. For a defence of the use of monetary policy, see Borio (2014c) and Borio, Disyatat, Juselius and Rungcharoenkitkul (2019), and references therein; for a review, see Smets (2014) and, for a recent paper supporting its use, see Adrian (2020).

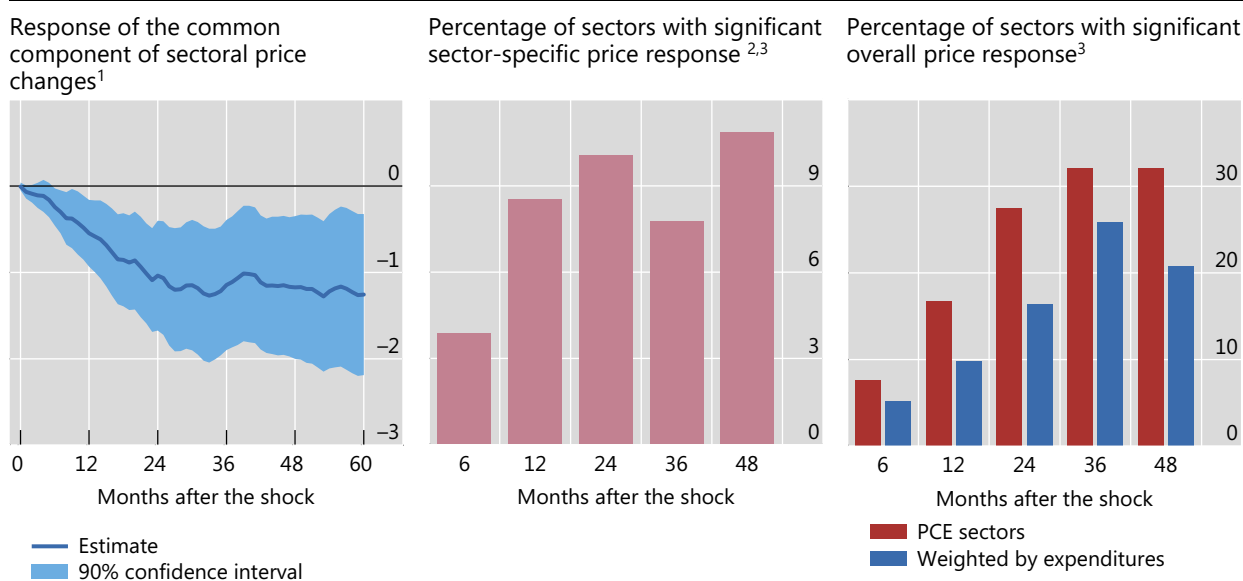
³³ Put differently, this suggests that the factor loading of these prices are relatively high.

³⁴ These findings are fully consistent with the evidence that the Phillips curve is flat, although they are less specific. It is yet to be seen if the recent burst in inflation proves longer-lasting or just transient. The previous analysis suggesting that inflation has a stronger tendency to remain range-bound at low levels within a credible monetary regime is on an “all else equal basis”. This “all else equal” clause is important. In particular, the post-pandemic increase in inflation is rather unusual, having taken place as part of the post-Covid normalisation process and on the back of unprecedented fiscal stimulus. The analysis here is just one piece of the jigsaw puzzle, which requires a much more holistic assessment (eg BIS (2021)).

Monetary policy loses traction: the US example

In per cent

Graph 4



¹ The common component is constructed as the first principal component of monthly log price change across the 131 sectors. The response corresponds to a 25 basis points monetary policy shock. ² For each sector, its sector-specific log price is calculated by summing up the residuals from regressing monthly log price change of the sector on the common component. ³ Significant at 10% level.

Sources: C Borio et al (2021); Federal Reserve Board; US Bureau of Economic Analysis; author's calculations.

Conclusion

Let me conclude. Central banks are facing especially testing times. It is precisely in periods like this that probing questions about analytical paradigms need to be asked and convictions re-examined. Central bank reviews of the monetary policy frameworks testify to the importance of this task.

As the physicist Richard Feynman (2005) once said, with reference to "hard" science: "I can live with doubt and uncertainty and not knowing ... We will not become enthusiastic for the fact, the knowledge, the absolute truth of the day, but remain always uncertain ... In order to make progress, one must leave the door to the unknown ajar." This task, arduous as it is, applies to all of us, all the more so in economics.

References

- Adam, K and H Weber (2019): "Optimal trend inflation", *American Economic Review*, vol 109, no 2, pp 702–37.
- Adrian, T (2020): "'Low for long' and risk-taking", *IMF Departmental Papers*, no 20/15.
- Ahmed, R, C Borio, P Disyatat, B Hofmann (2021): "Losing traction? The real effects of monetary policy when interest rates are low?", *BIS Working Papers*, no 983, November.
- Aldasoro, I, S Avdjiev, C Borio and P Disyatat (2020): "Global and domestic financial cycles: variations on a theme", *BIS Working Papers*, no 864, May.
- Basel Committee on Banking Supervision (BCBS) (2010): *An assessment of the long-term economic impact of stronger capital and liquidity requirements*, July.
- Beaudry, P, D Galizia and F Portier (2020): "Putting the cycle back into business cycle analysis", *American Economic Review*, vol 110, no 1, pp 1–47.
- Beaudry, P and C Meh (2021): "Monetary policy, trends in real interest rates and depressed demand", Bank of Canada, *Staff Working Papers*, 2021-27.
- Benigno, G and L Fornaro (2018): "Stagnation traps", *Review of Economic Studies*, vol 85, no 3, pp 1425–70.
- Bernanke, B, M Gertler and S Gilchrist (1999): "The financial accelerator in a quantitative business cycle framework", in J Taylor and M Woodford (eds), *Handbook of Macroeconomics*, Amsterdam, pp 1341–93.
- Bank for International Settlements (2019): *Annual Economic Report 2019*, June.
- _____ (2021): *Annual Economic Report 2021*, June.
- Borio, C (2014a): "The financial cycle and macroeconomics: what have we learnt?", *Journal of Banking & Finance*, vol 45, pp 182–98, August. Also available as *BIS Working Papers*, no 395, December 2012.
- _____ (2014b): "Macroprudential frameworks: (too) great expectations?", *Central Banking Journal*, 25th anniversary issue, also published in *Vox eBook*, 2014.
- _____ (2014c): "Monetary policy and financial stability: what role in prevention and recovery?", *Capitalism and Society*, vol 9, no 2, article 1. Also available as *BIS Working Papers*, no 440, January 2014.
- _____ (2017a): "Through the looking glass", OMFIF City Lecture, London, 22 September.
- _____ (2017b): "Secular stagnation or financial cycle drag?", *Business Economics*, April.
- _____ (2019): "Central banks in challenging times", SUERF Annual Lecture, Milan, 8 November; reprinted as *SUERF Policy Notes*, issue no 114. Also available as *BIS Working Papers*, no 829, December 2019.
- Borio, C and P Disyatat (2010): "Unconventional monetary policies: an appraisal", *The Manchester School*, vol 78, no 1, pp 53–89. Also available as *BIS Working Papers*, no 292, November 2009.
- _____ (2014): "Low interest rates and secular stagnation: is debt a missing link?", *VoxEU*.
- _____ (2021): "Monetary and fiscal policy: privileged powers, entwined responsibilities", *SUERF Policy Note*, no 238, May.

Borio, C, P Disyatat, M Juselius and P Rungcharoenkitkul (2017): "Why so low for so long? A long-term view of real interest rates", *BIS Working Papers*, no 685, December. Forthcoming (shorter version) in the *International Journal of Central Banking*.

_____ (2019): "Monetary policy in the grip of a pincer movement", in Á Aguirre, M Brunnermeier and D Saravia (eds), *Monetary policy and financial stability: transmission mechanisms and policy implications*, edition 1, vol 26, chapter 10, pp 311–56, Central Bank of Chile. Also available as *BIS Working Papers*, no 706, March 2018.

Borio, C, P Disyatat, D Xia and E Zakrajšek (2021): "Monetary policy, relative prices and inflation control: flexibility born out of success", *BIS Quarterly Review*, September, pp 15–29.

Borio, C, M Drehmann, D Xia (2018): "The financial cycle and recession risk", *BIS Quarterly Review*, December, pp 59–71.

Borio, C, M Drehmann, D Xia (2019): "Predicting recessions: financial cycle versus term spread", *BIS Working Papers*, no 818, October; forthcoming in *Journal of Macroeconomic Forecasting*.

Borio, C, M Erdem, A Filardo and B Hofmann (2015): "The costs of deflations: a historical perspective", *BIS Quarterly Review*, March, pp 31–54.

Carney, M (2017): "[De]Globalisation and inflation", IMF Michel Camdessus Central Banking Lecture, 18 September.

Cerra, V, A Fatás and S Saxena (2020): "Hysteresis and business cycles", *CEPR Discussion Papers*, DP14531, March.

Claessens, S, M Kose and M Terrones (2012): "How do business and financial cycles interact?", *Journal of International Economics*, 87, pp 178–90.

Coibion, O, Y Gorodnichenko, S Kumar and M Pedemonte (2020): "Inflation expectations as a policy tool?", *Journal of International Economics*, no 124.

Constâncio, V (ed) (2019): "Macroprudential policy at the ECB: institutional framework, strategy, analytical tools and policies", *ECB Occasional Papers*, no 227, July.

De Fiore, F, M Lombardi and J Schuffels (2021): "Are households indifferent to monetary policy announcements?", *BIS Working Papers*, no 956, August.

Drehmann, M, M Juselius and A Korinek (2017): "Accounting for debt service: the painful legacy of credit booms", *BIS Working Papers*, no 645, June.

Feldstein, M (2015): "The deflation bogeyman" *Project Syndicate*, 25 February.

Feynman, R (2005): *The pleasure of finding things out*, Helix Books.

Fisher, I (1933): "The debt-deflation theory of great depressions", *Econometrica*, vol 1, no 4, October.

Friedman, M (1956): "The quantity theory of money: a restatement", *Studies in the Quantity Theory of Money*, Chicago University Press.

Friedman, M and A Schwartz (1963): *A monetary history of the United States, 1867–1960*, Princeton University Press.

Garga, V and R Singh (2021): "Output hysteresis and optimal monetary policy", *Journal of Monetary Economics*, vol 117, pp 871–86.

Goodhart, C and M Pradhan (2020): *The Great Demographic Reversal: ageing societies, waning inequality, and an inflation revival*, SpringerLink.

Greenspan, A (1994): Testimony before the Subcommittee on Economic Growth and Credit Formation of the Committee on Banking, Finance and Urban Affairs, US House of Representatives, 22 February.

_____ (2005): "Globalization", remarks given at the Council on Foreign Relations, New York, New York, 10 March, Federal Reserve Board.

Hamilton, J (2018): "Why you should never use the Hodrick–Prescott filter," *Review of Economics and Statistics*, vol 100, no 5, pp 831–843.

Kay, J and M King (2020): *Radical uncertainty: decision-making for an unknowable future*, The Bridge Street Press.

Keynes, J (1930): *A treatise on money*, two volumes, London.

_____ (1936): *The general theory of employment, interest, and money*, MacMillan.

Laidler, D (1991): *The golden age of the quantity theory: the development of neoclassical monetary economics: 1870–1914*, Philip Allan Publishers Ltd.

Lagarde, C (2020): "The monetary policy strategy review: some preliminary considerations", speech at the *ECB and Its Watchers XXI* conference, Frankfurt am Main, 30 September.

Lombardi, M, M Riggi and E Viviano (2020): "Bargaining power and the Phillips curve: a micro-macro analysis", *BIS Working Papers*, no 903, November.

Lunsford, K and K West (2019): "Some evidence on secular drivers of safe real rates", *American Economic Journal: Macroeconomics*, vol 11, no 4, pp 113–39.

McKay, A and J Wieland (2020): "Lumpy durable consumption demand and the limited ammunition of monetary policy", mimeo.

Mian, A, L Straub and A Sufi (2020): "Indebted demand", *NBER Working Papers*, no 26940.

Miles, D, U Panizza, R Reis and Á Ubide (2017): "And yet it moves: inflation and the Great Recession", *Geneva Reports on the World Economy 19*, International Center for Monetary and Banking Studies, CEPR.

Powell, J (2020): "New economic challenges and the Fed's monetary policy review", speech at an economic policy symposium sponsored by the Federal Reserve Bank of Kansas City on "Navigating the decade ahead: implications for monetary policy", Jackson Hole, Wyoming, 27 August.

_____ (2021): "Monetary policy in the time of COVID", speech at an economic policy symposium sponsored by the Federal Reserve Bank of Kansas City on "Macroeconomic policy in an uneven economy", Jackson Hole, Wyoming, 27 August

Quast, J and M Wolters (2020): "Reliable real-time output gap estimates based on a modified Hamilton Filter", *Journal of Business and Economic Statistics*.

Rajan, R (2015): Panel remarks at the IMF conference on "Rethinking Macro Policy III", Washington DC, 15–16 April.

Reis, R and M Watson (2010): "Relative goods' prices, pure inflation, and the Phillips correlation", *American Economic Journal: Macroeconomics*, vol 2, no 3, pp 128–57.

Rey, H (2015): "Dilemma not trilemma: the global financial cycle and monetary policy independence", *NBER Working Papers*, no 21162, May.

Rungcharoenkitkul, P, C Borio and P Disyatat (2019): "Monetary policy hysteresis and the financial cycle", *BIS Working Papers*, no 817, October (revised August 2020).

Rungcharoenkitkul, P and F Winkler (2021): "The natural rate of interest through a hall of mirrors", mimeo.

Selgin, G (1997): "Less than zero: the case for a falling price level in a growing economy", *IEA Hobart Paper*, no 132, The Institute of Economic Affairs, April, London.

Shirakawa, M (2021): *Tumultuous times: central banking in an era of crisis*, Yale University Press.

Sims, C (2010): "Rational inattention and monetary economics", Chapter 4, *Handbook of Monetary Economics*, vol 3, pp 155–181.

Smets, F (2014): "Financial stability and monetary policy: how closely interlinked?", *International Journal of Central Banking*, vol 10, no 2, June.

Summers, L (2014): "Reflections on the 'New Secular Stagnation Hypothesis'", in C Teulings and R Baldwin (eds), *Secular stagnation: facts, causes and cures*, VoxEU.org eBook, CEPR Press.

Volcker, P (2018): *Keeping at it: the quest for sound money and good government*, Public Affairs.

Wicksell, K (1898): *Geldzins und Güterpreise. Eine Untersuchung über die den Tauschwert des Geldes bestimmenden Ursachen*, Jena, Gustav Fischer (English translation: *Interest and prices: a study of the causes regulating the value of money*, London: Macmillan, 1936).

Wolman, A (2011): "The optimal rate of inflation with trending relative prices", *Journal of Money, Credit, and Banking*, vol 43, issue 2–3, March–April, pp 355–84.

Woodford, M (2003): *Interest and prices*, Princeton University Press.

Previous volumes in this series

980 November 2021	What does machine learning say about the drivers of inflation?	Emanuel Kohlscheen
979 November 2021	Dampening the financial accelerator? Direct lenders and monetary policy	Ryan Banerjee and Jose-Maria Serena
978 November 2021	Financial crises and political radicalization: How failing banks paved Hitler's path to power	Sebastian Doerr, Stefan Gissler, José-Luis Peydró and Hans-Joachim Voth
977 November 2021	Does gender diversity in the workplace mitigate climate change?	Yener Altunbas, Leonardo Gambacorta, Alessio Reghezza and Giulio Velliscig
976 November 2021	Central bank digital currencies: motives, economic implications and the research frontier	Raphael Auer, Jon Frost, Leonardo Gambacorta, Cyril Monnet, Tara Rice and Hyun Song Shin
975 November 2021	ETFs, illiquid assets, and fire sales	John J Shim and Karamfil Todorov
974 November 2021	The natural rate of interest through a hall of mirrors	Phurichai Rungcharoenkitkul and Fabian Winkler
973 October 2021	What does digital money mean for emerging market and developing economies?	Erik Feyen, Jon Frost, Harish Natarajan and Tara Rice
972 October 2021	Non-bank financial intermediaries and financial stability	Sirio Aramonte, Andreas Schrimpf and Hyun Song Shin
971 October 2021	Do term premiums matter? Transmission via exchange rate dynamics	Mitsuru Katagiri and Koji Takahashi
970 October 2021	Big techs in finance: on the new nexus between data privacy and competition	Frederic Boissay, Torsten Ehlers, Leonardo Gambacorta and Hyun Song Shin
969 October 2021	Inter-agency coordination bodies and the speed of prudential policy responses to the Covid-19 pandemic	Michael Brei and Blaise Gadanecz
968 October 2021	Indebted demand	Atif Mian, Ludwig Straub and Amir Sufi
967 October 2021	Joined at the hip: monetary and fiscal policy in a liquidity-driven world	Guillermo A Calvo and Andrés Velasco

All volumes are available on our website www.bis.org.