BANK FOR INTERNATIONAL SETTLEMENTS

Through the looking glass[1]

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"In another moment Alice was through the glass … Then she began looking about, and noticed that … all the rest was as different as possible" – *Through the Looking Glass, and What Alice Found There*, by Lewis Carroll.

Central banks must feel like they have stepped through a mirror, and who can blame them? They used to struggle to bring inflation down or keep it under control; now they toil to push it up. They used to fear wage increases; now they urge them on. They used to dread fiscal expansion; now they sometimes invoke it. Fighting inflation defined a generation of postwar central bankers; encouraging it could define the current one.

What is going on in this topsy-turvy world? Could it be that inflation is like a compass with a broken needle? That would be a dreadful prospect – central bankers' worst nightmare. And what would be the broader implications for central banking?

In my presentation today, I would like to address these troubling questions. I will do so recognising that "in order to make progress, one must leave the door to the unknown ajar", as Richard Feynman once said. We should not take for granted even our strongest-held beliefs. That, of course, means that I will be intentionally provocative.

I will make three key points – putting forward two hypotheses and drawing one implication.

First, we may be underestimating the influence that real factors have on inflation, even over long horizons. Put differently, Friedman's famous saying that "inflation is always and everywhere a monetary phenomenon" requires nuancing (Friedman (1970)). Looking back, I will focus mainly on the role of globalisation; but, looking forward, technology could have an even larger impact.

Second, we may be underestimating the influence that monetary policy has on real (inflation-adjusted) interest rates over long horizons. This, in fact, is the mirror image of the previous statement: at the limit, if inflation were entirely unresponsive to monetary policy, changes in *nominal* rates, over which central banks have a strong influence, would translate one-to-one into changes in *real* rates. And it raises questions about the idea that central banks passively follow some natural real interest rate determined exclusively by real factors, embodied in the familiar statement that interest rates are historically low because the natural rate has fallen a lot. Here, I will provide some new empirical evidence to support my hypothesis.

[1] I would like to thank Raphael Auer, Stijn Claessens, Piti Disyatat, Dietrich Domanski, Andy Filardo, Marc Flandreau, Charles Goodhart, Boris Hofmann, Mikael Juselius, David Laidler, Marco Lombardi, Gianni Lombardo, Elmar Mertens, Phurichai Rungcharoenkitkul and Hyun Song Shin for helpful comments and Magdalena Erdem for excellent statistical assistance.

Finally, if these hypotheses are correct, we may need to adjust monetary policy frameworks accordingly. As I shall explain, that would mean putting less weight on inflation and more weight on the longer-term real effects of monetary policy through its impact on financial stability (financial cycles). Incidentally, the stronger focus on financial stability would bring central banking closer to its origins (Goodhart (1988), Borio (2014a)).

Let me take each point in turn.

I – Real factors and inflation: the role of globalisation[2]

Controlling inflation is the bread and butter of modern central banking – it has been so for at least half a century. Subtleties aside, the vast majority of central banks have price stability as a core objective. Increasingly, with the spread of inflation targeting, that objective has crystallised in a precise number. I am sure that 2% rings a bell with all of you: it is the most common. For those central banks with a numerical objective, the chosen number is their credibility benchmark: if they attain it, they are credible; if they don't, at least for long enough, they lose that credibility.

Yet the behaviour of inflation is becoming increasingly difficult to understand. If one is completely honest, it is hard to avoid the question: how much do we *really* know about the inflation process?[3] After all, since the Great Financial Crisis (GFC), policymakers have been repeatedly surprised. During the Great Recession, inflation turned out to be higher than expected, given the depth of the slump. During the subsequent upswing, it has, overall, turned out to be lower than expected. And despite huge efforts to push it up, it has remained stubbornly low.

Moreover, if history is anything to go by, our profession has always struggled to understand inflation. For instance, as Charles Goodhart (2017) has recently reminded us, albeit at the cost of some inevitable oversimplification, since the 1950s we have seen three major "fashions" wax and wane. From the 1950s to the mid-1970s, the focus was on labour markets and relative bargaining power, with little reference to aggregate demand. From the late 1970s to the 1990s, it was on money and monetary aggregates. And from the 1990s onwards, it has been on the NAIRU (non-accelerating inflation rate of unemployment) and the determinants of expectations – think of the prominence of forward-looking Phillips curves in today's dominant analytical frameworks.

Could it be that we know less than we think? Might we have overestimated our ability to control inflation, or at least what it would take to do so?

Let me start with one observation. The link between measures of domestic slack and inflation has proved rather weak and elusive for at least a couple of decades now. True, if one tries hard enough, it is always possible to find it. But it is not the kind of relationship that jumps out at you and appears robust. [4] Indeed, this is a recurrent theme in the discussions at the central bankers' meetings in Basel.

Graph 1 is just one possible illustration among many. It shows that, for G7 countries, the response of inflation to a measure of labour market slack has tended to decline and become statistically indistinguishable from zero. In other words, inflation no longer appears to be sufficiently responsive to tightness in labour markets. Again, let me stress: one *can* get statistically significant coefficients for some

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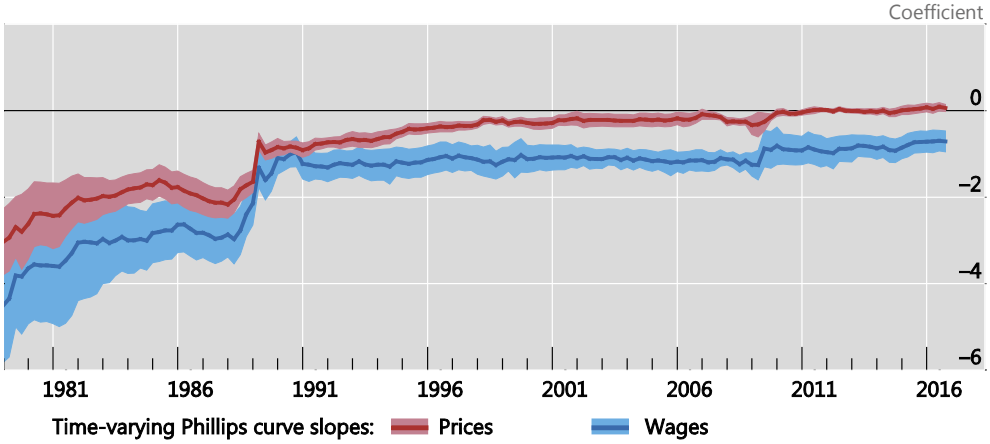
[2] This section draws heavily on Borio (2017a).

[3] See, for instance, the proceedings of the 2015 Jackson Hole Economic Symposium (Federal Reserve Bank of Kansas City (2015)) and Blanchard (2017).

[4] See, among others, Stock and Watson (2007), Ball and Mazumder (2011), IMF (2013), Faust and Wright (2013), Faust and Leeper (2015), Kiley (2015) and Blanchard (2017). For a different view, see Gordon (2013) and Coibion and Gorodnichenko (2015).

specifications, but the picture portrayed in the graph is quite typical. Moreover, it would have been even starker had one used output-based, as opposed to labour market-based, measures of slack.

A flatter Phillips curve for prices and (less so) wages[1] Graph 1



[1] Rolling 15-year window estimates from panel of G7 economies. See source for details.

Source: BIS (2017, Chapter IV).

The same graph shows that the picture is not fundamentally different for wage inflation. Granted, as also found in other work, the relationship remains statistically significant. But, just as for price inflation, it has tended to decline over time. Indeed, a surprisingly weak response of wages to economic conditions has been very much in evidence recently in a number of advanced countries. Labour markets have been very tight according to traditional indicators, but wage growth has been anaemic.

How can we explain these developments?

Probably the most popular explanation is that greater anti-inflation credibility has weakened the link. Inflation expectations become better anchored around inflation objectives, so that wages and prices become less responsive to slack (eg Bernanke (2007)). No doubt, there is a lot to be said for this hypothesis. We all know that, since at least the early 1980s, central banks have been much more successful in delivering low and stable inflation. And inflation expectations have indeed been quite sticky around targets.

At the same time, other, best regarded as complementary, hypotheses should be considered too. The one I find particularly attractive is that the globalisation of product, capital and labour markets has played a significant role. Is it reasonable to believe that the inflation process should have remained immune to the entry into the global economy of the former Soviet bloc and China and to the opening-up of other emerging market economies? This added something like 1.6 billion people to the effective labour force, drastically shrinking the share of advanced economies, and cut that share by about half by 2015.[5] Similarly, could it have remained immune to the technological advances that allowed the de-location of the production of goods and services across the world? Surely we should expect the behaviour of both labour and firms to have become much more sensitive to global conditions. We know that workers are not just competing with fellow workers in the same country but also with those abroad. We know that, for a given nominal exchange rate, the prices of two tradable goods that are close substitutes should track each other pretty closely. And we know that exchange rates have not been fully flexible, as the authorities have been far from indifferent to exchange rate movements. In other words, we should expect

[5] On this, see, in particular, Freeman (2007).

globalisation to have made markets much more contestable, eroding the "pricing" power of both labour and firms. If so, it is quite possible that all this has made the wage-price spirals of the past much less likely.

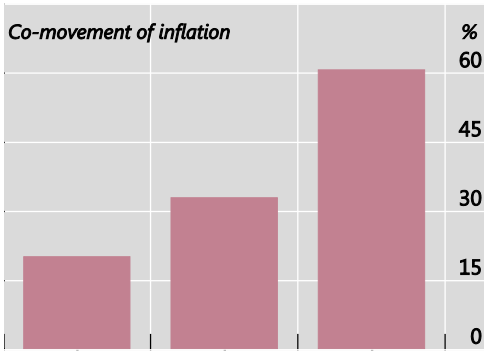
More specifically, one can think of two types of effect of globalisation on inflation. The first is *symmetrical*: assuming something akin to a global Phillips curve, one would expect *domestic* slack to be an insufficient measure of inflationary or disinflationary pressures; *global* slack would matter too. The second is *asymmetrical*: one would expect the entry of lower-cost producers and of cheaper labour into the global economy to have put persistent downward pressure on inflation, especially in advanced economies and at least until costs converge.[6]

Now, what is the empirical evidence for this hypothesis? Many studies have found that the global component of inflation has tended to increase over time (Graph 2).[7] As an illustration, Graph 2 shows this with reference to inflation and unit labour costs. But, of course, correlations, no matter how sophisticated the statistical method, do not disentangle the factors behind the co-movements. Other forces could be at work, including the widespread adoption of inflation targeting – an obvious candidate.[8]

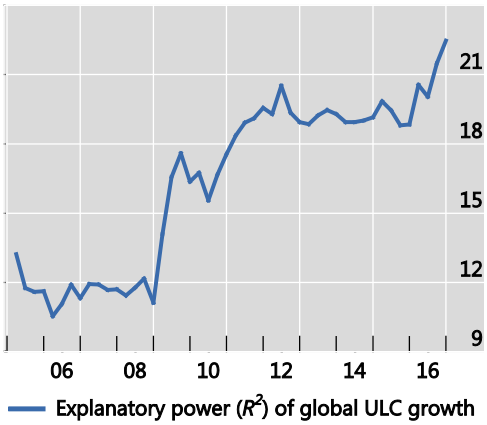
Domestic ULCs more linked to global ULCs in advanced economies

In per cent — Graph 2

Co-movement of inflation[1]



Global ULC growth explains greater share of domestic ULC growth[2]



[1] Detrended inflation; variance explained by the first principal component for 36 advanced and emerging market economies. [2] R^2 from the estimated stacked country regression $\widehat{ulc}_{i,t} = \alpha_i + \beta_i \widehat{ulc}_{f,t} + \varepsilon_{i,t}$, where $\widehat{ulc}_{i,t}$ is quarterly real ULC growth in country i and $\widehat{ulc}_{f,t}$ is the global measure defined as average real ULC growth in the other countries weighted by value added trade; the time variation reflects the use of a 10-year moving estimation window. The sample includes 15 countries.

Sources: Johnson and Noguera (2016); OECD, *Economic Outlook*; national data; BIS estimations.

One way of testing the symmetrical version of the hypothesis more directly is to check whether global measures of slack help explain domestic inflation beyond domestic ones. A number of studies,

[6] For the impact of foreign competition on inflation, see eg Guerrieri et al (2010) and Engel (2013).

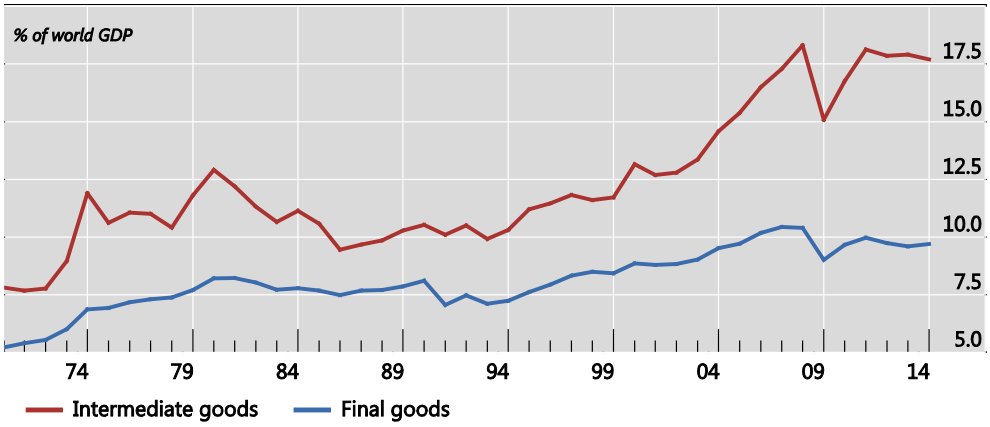
[7] See eg Ciccarelli and Mojon (2010), Mumtaz and Surico (2012), Duncan and Martínez-García (2015), Mojon and Osbat (2017) and ECB (2017).

[8] See eg Bernanke (2010) and IMF (2013, 2016).

including some done at the BIS, have found support for this view. That said, the literature remains divided on this issue.[9]

In recent research, we have taken this line of inquiry one step further, by looking more closely at the possible mechanisms at work (Auer et al (2017)). In particular, we have examined the role of global value chains (GVCs), which have grown substantially since the 1990s (Graph 3). For instance, the ratio of intermediate goods to world GDP – a proxy for the size of GVCs – has increased a lot over the period, and clearly much more than the corresponding ratio for final goods trade. Now, surely one should expect GVCs to have been a key transmission channel of global influences on domestic inflation, notably by increasing competition at *all* stages of production.

Global value chains grow much more than final trade — Graph 3



Sources: Johnson and Noguera (2016); Powell (2016); World Input-Output Database.

This is indeed what we find by considering a sample of 18 countries over more than 20 years. Specifically, we find that GVCs help explain the relative importance of global and domestic measures of slack in driving domestic inflation both across countries and over time (Graph 4).

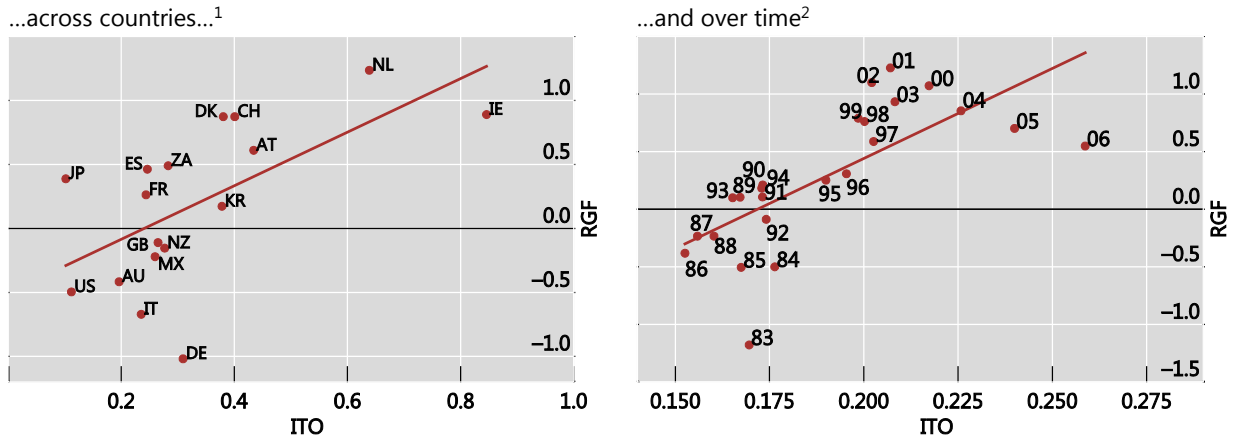
So much for the symmetrical effect. Globalisation's asymmetrical effect on inflation is probably even harder to test. To be sure, some work has found that actual measures of import penetration can help identify the impact of low-wage competition on inflation.[10] But those measures do not quite do the job: the mere *threat* of penetration matters more.

One way of getting at the problem, at least indirectly, is to see whether globalisation's impact on domestic labour markets helps explain changes in domestic Phillips curves. Some evidence to this effect is discussed in this year's BIS Annual Report (BIS (2017)). We find that indicators of the long-term decline in labour's pricing power (proxied by employment protection, union density and coverage) help explain the decline in the responsiveness of wages to domestic slack conditions. If, as stands to reason, globalisation has contributed to this decline in pricing power, it should also have reduced the wage responsiveness to slack.

[9] On the role of globalisation in driving inflation, see Borio and Filardo (2007) and BIS (2014). For empirical studies highlighting the global determinants of inflation, see eg Pain et al (2008), Eickmeier and Moll (2009), Bianchi and Civelli (2013) and Auer et al (2017); for others that, by contrast, stress the domestic view of inflation, see eg Tootell (1998), Ihrig et al (2010), Martínez-García and Wynne (2012) and Lodge and Mikolajun (2016).

[10] In particular, Auer and Fischer (2010), overturning earlier results by Kamin et al (2006), find that inexpensive imports from China and other emerging economies substantially reduced US producer price inflation.

Global value chains and the explanatory power of global output gaps… Graph 4



AT = Austria; AU = Australia; CH = Switzerland; DE = Germany; DK = Denmark; ES = Spain; FR = France; GB = United Kingdom; IE = Ireland; IT = Italy; JP = Japan; KR = Korea; MX = Mexico; NL = Netherlands; NZ = New Zealand; US = United States; ZA = South Africa.

ITO = (exports plus imports of intermediate goods and services)/GDP, as a proxy for the incidence of global value chains in a given country. RGF = relative global factor, denoting the difference between the impact of the global output gap and the domestic output gap on domestic inflation. A positive slope indicates that the relative importance of the global output gap (RGF) increases with the incidence of global value chains, across countries at a given point in time (left-hand panel) or on average over time (right-hand panel).

[1] For each country, each observation shows the relationship between the average ITO and RGF for the period 1982–2006. The red fitted line has a slope of 2.09 (significant at the 1% level). Canada (RGF = −3.17, ITO = 0.40) is not included. [2] Each observation shows the cross-country average of ITO and RGF in a given year (1983–2006). The red fitted line has a slope of 15.6 (significant at the 1% level).

Source: Auer et al (2017).

What I have said so far about globalisation could also apply to technological change. Clearly, the two are intimately linked: technological advances have turbocharged the greater openness, as GVCs attest (eg Baldwin (2016)). But, more fundamentally, both operate in very similar ways. Just as globalisation, technological advances threaten labour's pricing power – think robots as opposed to foreign workers. And both reduce incumbent firms' pricing power – through cheaper products, as they cut costs; through newer products, as they make older ones obsolete; and through more transparent prices, as they make shopping around easier. No doubt, globalisation has been *the* big shock since the 1990s. But technology threatens to take over in future. Indeed, its imprint in the past may well have been underestimated and may sometimes be hard to distinguish from that of globalisation.

Now, the evidence I described about the impact of globalisation is just a first step. Moreover, no work that I know has examined the impact of technology. But the plausibility of the hypothesis, coupled with the testimony of more casual daily observation, suggests that it deserves much more careful scrutiny than it has received so far.

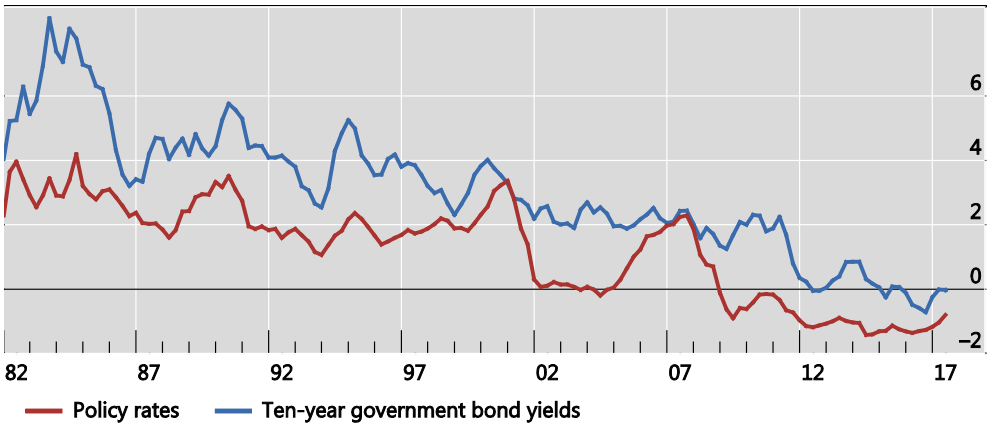
II – Real factors and real interest rates: the role of monetary policy

Let me now turn to my second hypothesis: the idea that the impact of monetary policy on real interest rates over long horizons has been underestimated. This may seem a rather technical issue. Yet it turns out to have first-order implications for monetary policy and central banking as practised today, since real interest rates are regarded as the primary gauge of the policy stance and determinant of macroeconomic conditions. So, it is worth exploring further. As you shall see, the previous discussion about the inflation process will matter a lot.

The question is why real (inflation-adjusted) interest rates are so low by historical standards and why they have declined so much since at least the early 1980s. Both short- and long-term rates have never been as low in peacetime except during the Great Inflation of the 1970s (Graph 5). In fact, they have been negative for even longer than during that phase. This has coincided with historically low nominal interest rates, in some cases even negative – something that would have been unthinkable pre-crisis.

Real (inflation-adjusted) interest rates decline to very low levels[1]

In per cent — Graph 5



[1] Weighted averages based on rolling GDP and PPP exchange rates; nominal policy rate (yield) less consumer price inflation excluding food and energy for the G3 economies.

Sources: National data; BIS calculations.

Now, the prevailing view is that real factors are responsible. Deep-seated forces, *unrelated to monetary policy*, have affected the balance between desired saving and investment – factors such as productivity growth, demographics, income distribution, the relative price of capital, and the like. This is, for instance, the presumption behind Summers' (2014, 2016) secular stagnation hypothesis or Bernanke's (2005, 2015) global saving glut. The view is so pervasive that it is almost part of the furniture: you simply take it for granted.

Understanding real interest rates: a critique of the prevailing view

How justified is this view? How strong is the empirical evidence? Probably less than commonly thought.

To start with, it is worth recalling how market interest rates are determined *at any given point in time*. There is a broad consensus that they reflect a combination of central bank and market participants' actions. Central banks set the nominal short-term rate and influence the nominal long-term rate (through signals of future policy rates and purchases of assets). Market participants adjust their portfolios based on their expectations of central bank policy, their views about the other factors driving long-term rates, their attitude towards risk and various balance sheet constraints. Given nominal interest rates, actual inflation – which is sticky – determines ex post real rates, and expected inflation ex ante real rates.

The prevailing view then goes on to state that, in fact, the influence of monetary policy on the real rate is only temporary: in the long run, it disappears. In the models, the "long run" means "in steady state" and, in particular, "when prices have adjusted". Technically, this view of the "long run" thus embeds the

broader notion that monetary policy is neutral: it does not affect *any* real variables.[11] Obviously, it is then appealing to define an *equilibrium* or so-called *natural* interest rate that is entirely independent of monetary policy. This is the real interest rate that would prevail if the economy was at full employment – the rate that equilibrates desired saving and investment (Wicksell (1898), Woodford (2003)). And, in this view, it is also the interest rate towards which market rates tend to gravitate.

Now, the long run, as just defined, is purely an *analytical* concept – the result of a thought experiment. How does it map into *calendar* time, which is the only one relevant for policy? In practical terms, "long run" is taken to mean that over sufficiently long horizons – say, a decade – market real interest rates will tend to coincide, on average, with the natural rate.[12]

Through this logic, therefore, one reaches the conclusion that market real interest rates tend to track the natural rate, cyclical variations aside. The view is so ingrained that, in discussions, the argument is often short-circuited: it is simply stated that saving-investment balances determine real interest rates. In fact, saving and investment balances do not influence market real rates *directly*; they affect those rates only insofar as they affect inflation (and expectations thereof) or the setting of the nominal rates by central banks and market participants.

But what compass guides central banks and market participants to ensure that market rates follow the natural rate? And how can we tell that the two types of rate do, in fact, tend to coincide on average over time? After all, the natural rate is an abstract, unobservable, model-dependent concept.

Let me postpone the question of the guiding compass for a moment and focus on the question "how can we tell?".

The answer is: "with great difficulty"! Crucially, the feasible evidence is strongly theory-based. Technically, it relies heavily on *maintained* or unquestioned hypotheses to guide our observation. Data are allowed to speak, but only within very tight constraints.

This "great difficulty" becomes apparent when we consider the two broad approaches used to shed light on the evolution of real interest rates.

The first approach simply *assumes* that, over the relevant sample, the market rate tracks the natural rate.[13] In the process, it abstracts entirely from discussion of the behaviour of inflation. It then proceeds to do a couple of things. The less formal variant is to tell plausible stories based on visual inspection of graphs; the more formal one is to use more articulated models and calibrate parameters to see whether they can produce results roughly consistent with the data.[14]

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[11] The intuitive appeal of the neutrality hypothesis takes root in thought experiments where, in stylised economies without production, the quantity of money is changed, all else equal. It then becomes more natural to think that, in the new equilibrium, nothing changes except prices. Once we realise that, in the real world, changes in monetary policy take place through changes in interest rates – in effect, a relative price that affects different expenditure items differently – the conclusion is much less appealing (see below). For instance, if monetary policy has an influence on the financial cycle and, as the evidence indicates, financial busts have large and very persistent, if not permanent, effects on output, it is arguably hard to think of monetary policy as neutral, even as a first approximation. For a further discussion of this point, see Borio (2016).

[12] In fact, in his famous presidential address, Friedman (1968) notes that the effect could take some *two decades* to play itself out, underlying the difficulties in mapping analytical statements about neutrality into calendar time.

[13] To be sure, the studies focus mainly on medium-term fluctuations, where, assuming that the framework is correct, it might be more reasonable to expect the rates to be close to each other, as long as on average output is at potential. Even then, though, the variant is also used to explain post-crisis developments, for which the assumption is less compelling.

[14] Examples of the narrative approach include IMF (2014), CEA (2015), Bean et al (2015) and Eichengreen (2015); examples of calibration include Rachel and Smith (2015), Gagnon et al (2016), Carvalho et al (2016), Thwaites (2015) and Marx et al (2017).

The drawbacks of this first approach are apparent. Neither variant provides independent evidence that the market rate has actually tracked the natural rate. Moreover, upon closer reflection, neither really tests the underlying saving-investment framework of interest rate determination. The less formal variant takes it as the starting point to see whether some factors might provide reasonable explanations. The more formal variant at best tells us whether the stylised model can in principle describe some features of the data, but not whether the model is true or not: the behaviour of the interest rate is not actually used to test it – the bar would be too low.[15]

The second approach seeks to filter out the unobservable natural rates from market rates. Since the natural rate is defined as the real interest rate that would prevail at full employment, or when output equals potential output, the behaviour of inflation provides a key signal. That is precisely because the Phillips curve tells us that when output is above potential (the output gap is positive), inflation rises; when it is below, inflation falls. So, one infers that whenever inflation rises, the market rate is too low, ie below the natural rate, and vice versa when it is above. This is because the real interest rate is a key variable influencing aggregate demand.[16]

Put differently, inflation is the compass needle that is supposed to tell us where the natural rate is: control inflation and you will know that you have reached your destination. Indeed, when all is said and done, this is the most crucial relationship for policy. If one takes the model as true, it becomes almost a tautology to say that, since inflation is not rising and economies are close to full employment, the natural rate *must* have fallen. Indeed, it is not uncommon for policymakers to revise their estimates of potential output or the NAIRU – two other unobservable variables – assuming that the Phillips curve relationship holds, ie if inflation fails to rise, potential output is revised upwards and the NAIRU downwards.

The main drawback of this approach is that the Phillips curve is a key component of the maintained hypothesis. And yet this is precisely the relationship that has proved so elusive. Recall how inflation has remained remarkably subdued even though economies seem to be close to full employment or beyond it using benchmarks *other than inflation itself*.

Understanding real interest rates: new evidence and some reflections

How can one try to break out of this circularity and reduce the grip of maintained hypotheses? One possibility is to let the data speak a bit more. Crucially, this also requires going beyond the traditional period used to discuss the decline in real interest rates (from the early 1990s or, in some cases, early 1980s).

This is what we have done in some work under way, not yet out as a BIS Working Paper (Borio et al (2017)).[17] We go back to the 1870s for 19 countries, and we examine the relationship between real interest rates and the "usual suspects": growth, productivity, demographics, income distribution, the relative price of capital and the marginal product of capital. We do this for both real long-term interest rates and the most popular standard estimate of the short-term natural rate, based on the behaviour of

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[15] Moreover, the numerous degrees of freedom mean that it is typically not that hard to reproduce the qualitative behaviour of the interest rate.

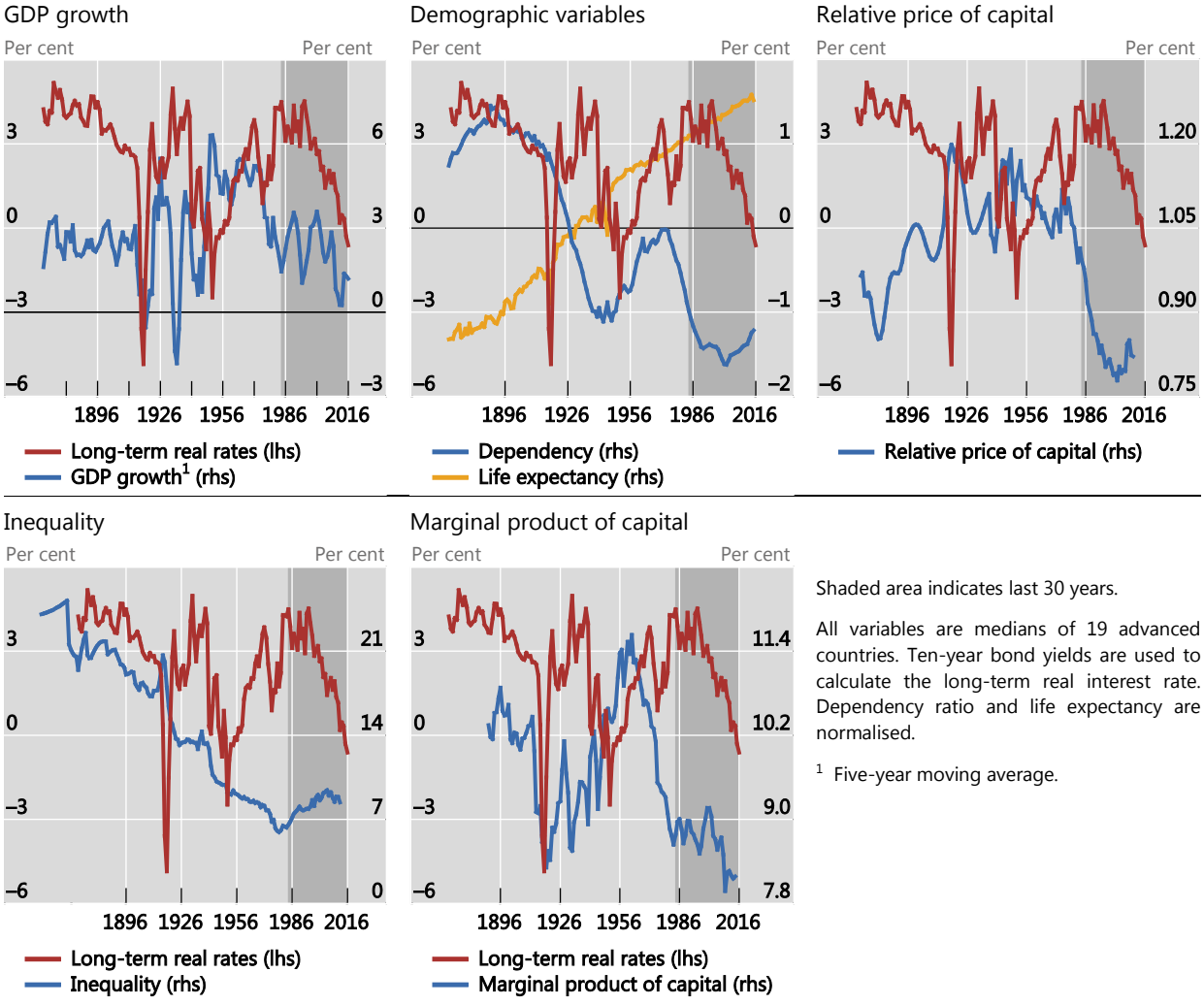
[16] The seminal paper here is Laubach and Williams (2003), who recently extended their work to other countries in Holston et al (2016). See also Justiniano and Primiceri (2010). For other papers expressing reservations about some of the identifying restrictions, although not inflation as such, see Cukierman (2016) and Taylor and Wieland (2016).

[17] For studies following a similar approach, but testing a fewer set of variables and largely on US data, see Hamilton et al (2015) and Lunsford and West (2017). In line with the results reviewed below, they do not find any systematic relationship between real interest rate and variables such as GDP and productivity growth, which theory takes for granted as the determinants of the natural interest rate.

inflation. We then compare the role of these factors with that of monetary policy. The advantage of going that far back is that we cover different monetary policy regimes.

We come up with two key findings. First, while the usual suspects appear to work reasonably well over the often-cited, more recent sample, the relationships break down when going back in history: no consistent pattern emerges – a sign that the relationships may be spurious. Even a simple visual inspection of the data suggests that this is likely to be the case (Graph 6). The finding is confirmed in more formal testing, when one allows the various real-sector determinants to interact. And it appears robust to the use of different interest rates (long and short; market or traditional estimates of natural rates) and measures of inflation expectations.[18] Second, there are generally economically and statistically significant differences in the level of interest rates across monetary policy regimes. This is so even when one controls for the usual suspects (see Graph 7, left-hand panel, for an illustration).

Real interest rate and saving/investment drivers: spot the correlation — Graph 6



Shaded area indicates last 30 years.

All variables are medians of 19 advanced countries. Ten-year bond yields are used to calculate the long-term real interest rate. Dependency ratio and life expectancy are normalised.

[1] Five-year moving average.

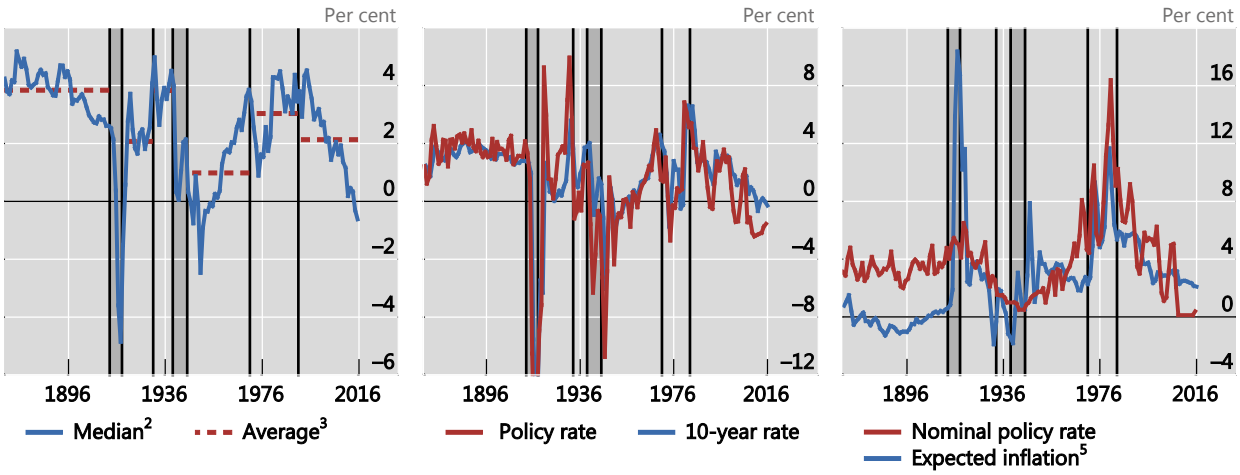
Sources: Borio et al (2017).

[18] Measuring expectations is notoriously hard for long-term rates. On this issue and a review of much of the evidence, including under the gold standard, see Friedman and Schwartz (1982). See also the discussion in eg Borio and Filardo (2004).

Just as in the case of the impact of globalisation on inflation, these findings are simply a first step. But they do suggest that it is important to evaluate existing views from different angles and to pursue further work on the long-term impact of monetary regimes.

Now, so much for the statistical evidence. What about its interpretation? Let me just provide two examples of why monetary policy may have a bigger role than normally presumed. The first comes from the classical gold standard phase; the second reinterprets developments over the traditional, recent sample. Both cases suggest that the Phillips curve relationship may have been weaker for longer than we thought.

The influence of monetary regimes on real interest rates[1] Graph 7



[1] Monetary policy regimes, in order: (mainly) classical gold standard; post-WWI gold standard; other interwar years; Bretton Woods; post-Bretton Woods, pre-Volcker; post-Bretton Woods, post-Volcker tightening. Shaded areas indicate WWI and WWII (excluded from the empirical analysis). [2] Median interest rate for 19 countries. [3] Average of median interest rate over the periods corresponding to regimes. [4] Data for the United Kingdom up to WWI, and for the United States thereafter. [5] One-year-ahead expected inflation (year-on-year headline CPI).

Source: Borio et al (2017).

The classical gold standard is quite revealing. During this regime, central banks did not respond systematically with changes in interest rates to output and inflation as they do now. They simply tended to keep nominal interest rates constant unless the (internal or external) convertibility-into-gold constraint came under threat (eg Flandreau (2008)).[19] Gold acted as a monetary anchor, but only over very long horizons.[20] In other words, central banks did not try to follow the present compass. Still, inflation remained

[19] For illuminating discussions on the gold standard, and the rules of the game as applied in practice, see Bloomfield (1959) and De Cecco (1974).

[20] In his political economy lectures, Wicksell (1906) recognises this and discusses the related issues in some detail. He notes, for instance, that the direct impact of increased gold supplies may be relatively small compared with the indirect influence operating through interest rates and the convertibility constraint. He then postulates an unobservable and time-varying natural rate to explain periods in which price declines coincide with falling interest rates and contractions in gold production. This contrasts with economists more firmly rooted in the monetarist tradition, who ascribe a bigger role to exogenous increases in gold in circulation in influencing the price level by boosting expenditures (eg Fisher (1911) and, more recently, Bordo (1999)). For a discussion of these issues, and of Wicksell's shifting views, see Laidler (1991).

very much range-bound, with the price level gradually falling or rising over long periods.[21] As a result, nominal and real interest rates were remarkably stable and did not deviate much from each other (Graph 7, centre and right-hand panels). Given the behaviour of inflation, the standard approach would infer that the market rate tracked the natural rate quite closely. And yet the usual suspects tended to vary just as much as they have in the recent sample (Graph 6). Another possible interpretation is that monetary policy had a persistent impact on the real interest rate without exerting a strong influence on inflation.

The decline in real rates over the recent standard sample could be attributed to the combination of three factors, all related to monetary policy. The first factor is the gradual normalisation of interest rates after the Volcker shock that ended the Great Inflation (Graph 7). This suggests that the starting point is rather unrepresentative and already embeds a key monetary policy imprint.

The second factor is an asymmetrical policy response to successive financial and business cycles in a context of prevailing disinflationary tailwinds linked to globalisation (eg Borio (2014a,b and 2017b)). In particular, asymmetrical responses were in evidence around the financial boom and bust of the 1980s–1990s and the one that surrounded the GFC.[22] As long as inflation remained low and stable, there was no incentive for central banks to tighten policy during the financial booms that preceded financial strains in both cases. But there was a strong incentive to respond aggressively and persistently to fight the bust and stave off any deflation threat.[23]

The third factor, especially post-GFC, is strenuous central bank efforts to push a stubbornly low inflation rate towards target, as the disinflationary tailwinds before the crisis turned into unwelcome headwinds after it. Difficulties in generating second-round effects, with wages chasing prices, would imply that reductions in interest rates have a largely temporary effect on inflation. Thus, repeated cuts would end up reducing real interest rates further and further even as inflation remains persistently below target.

The three examples raise the possibility that monetary policy may have a very long-lasting impact on real interest rates – ie that, over periods as long as a decade or more, money is not neutral, at least for practical policy purposes. In the 1980s and early 1990s, the long-lasting impact would reflect attempts to quash inflation, which are then slowly unwound; in the 1990s to the post-GFC phase, asymmetrical responses to successive business and financial cycles; and in the more recent period, and for longer in countries such as Japan, efforts to push inflation up towards objectives.

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[21] Inflation was actually quite volatile in the short run, given the composition of the price index, in which commodities and food had a much larger weight than today. The stability mentioned in the text abstracts from this volatility, which is not relevant for our analysis.

[22] Drehmann et al (2012) document how the asymmetrical response to equity prices in the late 1980s and early 2000s added to the downward trend in interest rates. Equity prices co-move more closely with the business than with the longer financial cycle, better captured by the joint behaviour of credit and property prices. In both cases, lowering interest rates further boosted the credit and property price boom.

[23] Indeed, there is empirical evidence that financial cycle proxies, such as credit and property prices, can provide better information than inflation about potential output (Borio et al (2016)). For similar evidence, see Arseneau and Kiley (2014), Blagrave et al (2015) and Melolinna and Tóth (2016). Based on such measures of potential output, Juselius et al (2017) also find that the corresponding estimates of the natural rate have fallen by less and are now higher than standard methodologies suggest.

III – Implications for monetary policy

If my hypotheses are correct, ie if the influence of real factors on inflation and that of monetary policy on real interest rates have been underestimated, what are the implications for monetary policy? Let me mention five and choose them in the spirit of being provocative.

First, it is worth reflecting on the usefulness of the concept of the natural interest rate for policy. One issue concerns its definition. If, as stands to reason, monetary policy has an influence on financial booms and busts and, as evidence suggests, these cause serious macroeconomic instability, is it reasonable to define natural or equilibrium rates without any reference to the financial cycle? Is it reasonable to state, as many proponents of the standard view do, that interest rates are at their equilibrium level but to note – in the same breath – that those rates can contribute to major financial instability? To my mind, the statement is more a reflection of the limitations of current models, which cannot accommodate financial instability, than of an inherent tension between financial and macroeconomic stability. It might be more useful to adjust the definition to include also equilibrium in the financial sphere (Juselius et al (2017)). But a broader issue concerns the usefulness of the very concept.[24] There are obvious risks in basing policy on unobservable variables,[25] especially when the maintained hypotheses underlying their measurement are not very reliable. This is precisely the case for the natural interest rate, given the elusive nature of the Phillips curve and the evidence on the role of saving-investment imbalance proxies discussed in this presentation. The dog may end up chasing its tail.

Second, Milton Friedman's popular dictum "inflation is always and everywhere a monetary phenomenon" requires nuancing. No doubt, there is a sense in which this dictum is true. Inflation cannot continue for very long unless the central bank accommodates it. And the central bank can surely bring inflation down if it wants to. All this is very important. But real factors may also have persistent effects, by influencing wage- and price-setting behaviour.

Third, we should not overestimate the central banks' ability to fine-tune inflation. This follows in part from the previous implication. And it is reinforced by the possible importance of global, as opposed to purely country-specific, factors in driving inflation. In particular, raising inflation against powerful headwinds may prove harder than previously thought. It would also increase any collateral damage.

Fourth, this puts a premium on understanding the factors driving inflation. To the extent that disinflationary pressures result from forces such as globalisation or technology, they should be generally benign: they would reflect favourable supply side developments as opposed to damaging demand weakness.[26] At a minimum, this suggests lengthening the horizon over which it would be desirable to bring inflation back towards target.

Finally, as explained in more detail elsewhere, it would be desirable to use the additional room for manoeuvre to address the financial cycle more systematically (eg Borio (2014a,b and 2016), Juselius et al (2017)). This could improve overall macroeconomic performance and reduce the risk of a "debt trap" (Graph 8). A trap could arise if policy ran out of ammunition, and it became harder to raise interest rates

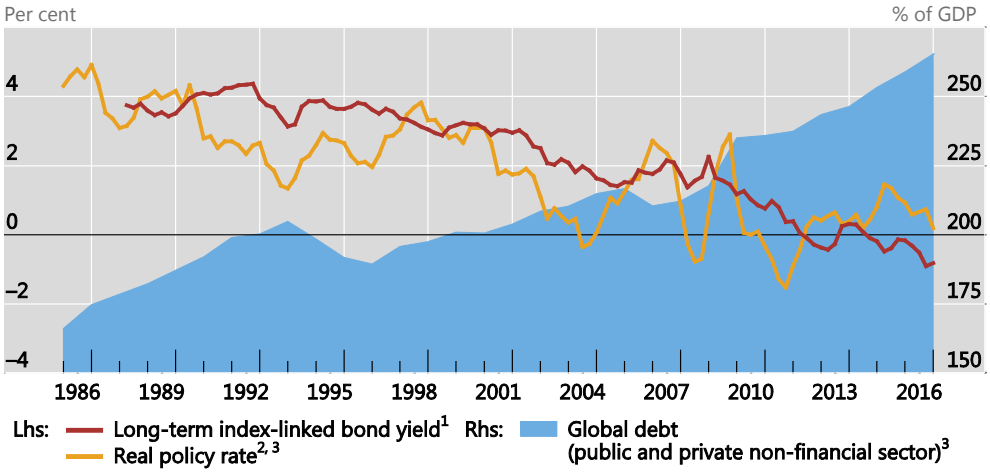
[24] It is well known, for instance, that, while retaining the notion in his Treatise, Keynes rejected it in his General Theory; see Leijonhufvud (1981) for an in-depth discussion. For a recent sceptical analysis of the natural rate of interest, see Laidler (2011).

[25] On this, see also Orphanides (2001).

[26] This may well be the reason why – Great Depression aside – deflations do not appear costly in terms of output (eg Selgin (1997), Bordo and Redish (2004), Borio and Filardo (2004), Atkeson and Kehoe (2004), Bordo and Filardo (2005)), especially relative to declines in asset prices (Borio et al (2015)). For a different view, see Eichengreen et al (2016).

without causing economic damage, owing to the large debts[27] and distortions in the real economy that the financial cycle creates.[28] After all, the huge and long-lasting costs of financial busts and banking crises are well documented.[29] As long as monetary policy has a material influence on the financial cycle, such costs are simply too large to be ignored. Such a strategy would fully recognise the potential persistent impact of monetary policy on the real economy through financial instability, broadly defined. And it would have a firm long-term focus. Over such a horizon, any trade-offs between price and financial stability tend to dissipate. Price and financial stability become two sides of the same coin.

Interest rates sink as debt soars — Graph 8



[1] From 1998, simple average of France, the United Kingdom and the United States; otherwise only the United Kingdom. [2] Nominal policy rate less consumer price inflation. [3] Aggregate based on weighted averages for G7 economies plus China based on rolling GDP and PPP exchange rates.

Sources: IMF, *World Economic Outlook*; OECD, *Economic Outlook*; national data; BIS calculations.

Conclusion

To conclude, today I have put forward two hypotheses and drawn one implication. First, we may be underestimating the influence that real factors have on inflation, even over long horizons. Here I highlighted the role of globalisation, but noted that technology may well play a bigger one in the future. Second, we may be underestimating the influence of monetary policy on real (inflation-adjusted) interest

[27] Here, debt service burdens, compressed by the fall of interest rates even as debt increases, play a key role. See Drehmann and Juselius (2013), Juselius and Drehmann (2015), Drehmann et al (2017) and Juselius et al (2017).

[28] Thus, over sufficiently long horizons, low interest rates become to some extent self-validating: too low interest rates in the past are one reason for such low interest rates today. In other words, policy interest rates help to shape the economic environment which policymakers take as given ("exogenous") when tomorrow becomes today (Borio (2016, 2017b)). This is not quite the notion of an independent natural interest rate embedded in current thinking. And it reflects a form of time inconsistency that can be more insidious than the familiar one in the context of inflation (Borio (2014b, 2016).

[29] See the BCBS (2010) survey and, in particular, Cerra and Saxena (2008) and, more recently, Ball (2014). Blanchard et al (2015) find that other recessions too may have a similar effect. On the costs of credit booms in general, see Reinhart and Reinhart (2010), Jordà et al (2013) and Mian and Sufi (2015); and on the experience of the Great Depression, see Eichengreen and Mitchener (2004).

rates over similar horizons. Here I highlighted the limitations of current empirical approaches that support the prevailing view and have provided some new evidence. Third, if so, we may need to adjust monetary policy frameworks accordingly. Here I highlighted the desirability of greater tolerance for deviations of inflation from point targets while putting more weight on financial stability.

I am fully aware that one can read the empirical evidence in many ways. My remarks have been intentionally provocative. But I do believe that, while the answers we may give can be very different, the future of central banking, and monetary policy more specifically, depends on them.

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