Central Banking’s Long March Over the Decades
David G. Mayes, Pierre L. Siklos, and Jan-Egbert Sturm

Introduction
In a speech delivered at the beginning of 2000, Mervyn King, former Governor of the Bank of England, argued that a “successful central bank should be boring” (King 2000, pg. 6), a phrase that has often been repeated to highlight once widely held aspirations among many central bankers. The new century’s arrival, several years into a period that came to be called the “Great Moderation” (Bernanke 2004), supposedly coincided with central banks at the apogee of their power and influence among of public institutions and their reputation celebrated as the outcome of good policy practices supported by convincing theory.

As we approach the end of the second decade of the 21st century much has changed in the world of central banking and yet some important elements remain just as they were before the events that began in 2007, now referred to as the Great Financial Crisis or the Global Financial Crisis (either way, GFC), produced an outpouring of new research, memoirs, and personal accounts, which ask how it came to be that modern finance produced such a large financial crisis and where we go from here. Mervyn King himself, looking back on his years in central banking (King 2016), argues that what ails the financial system remains firmly in place and that a new and possibly even larger crisis is in the offing. Others (e.g., El-Erian 2016) underscore that, in spite of the GFC, monetary authorities around the world remain “the only game in town”.

And yet, there are equally powerful signs that many things are changing and it remains unclear whether the accomplishments of central banks trumpeted almost two decades ago will simply become just another phase in the history of central banks. Where once policy rules were supposed to provide guidance and educate the public about how and why central banks change
the stance of monetary policy these are now replaced by a more artful view of how policy is set. Indeed, several central banks no longer rely a single policy instrument, a policy interest rate, to signal the stance of policy. Instead, a complex mix of forward guidance, expressions of bias about the likely future direction of interest rates, not to mention the creation of a large number of new policy instruments, have now entered the vocabulary of central banking. Most of these, originally labelled ‘unconventional’ monetary policies (or UMP for short), have been in place and used for a decade. Today, it is no longer obvious that the proliferation of instruments can still be thought of as unconventional.

Next, the belief that good practice in monetary policy goes hand in hand with the maintenance of financial stability, is being replaced with experimentation about how achieving a monetary policy objective aimed at keeping inflation under control can operate in parallel with the desire to maintain financial system stability. The shift is more than technical since what is also at stake is the institutional role of central banks and their relationship with other public agencies that are responsible for regulating and supervising the financial system.

To the above list of forces buffeting on the central banking institution there is added pressure to revisit the widely accepted view that monetary policy should aim for low inflation. While few doubt the wisdom that the control of purchasing power is a sensible objective there are a growing number of voices, including some emanating from some central banks, that low inflation, that is, inflation rates in the vicinity of 2% per annum\(^2\), brings about too often the possibility that interest rates will also remain too low for too long. Indeed, there is a worry that central banks will more frequently face the so-called zero lower bound (ZLB) for nominal interest rates especially if inflation rates also remain low for long whether due to secular stagnation or demographic factors. This has not prevented some central banks from breaching this fictitious lower limit with
the end result that we are now witnessing several examples of central banks maintaining negative interest rates with the profession now asking: where is the effective lower bound (ELB)? As this is written the resistance to targeting higher inflation rates has been successful but the topic has not been removed from consideration as one way to reform popular inflation control regimes currently in place.³

Any list of forces that are making central banking less boring over the past decade would not be complete without mention of the tension between the pre-crisis consensus about certain truths about what drives the transmission mechanism of monetary policy and emerging challenges to these views. These tensions have now spilled over into rethinking how monetary policy interacts not only with the financial sector but the real economy as well. As a result, as this volume went to press, we find ourselves facing a new conundrum of sorts. Whereas there was little opposition to reducing central bank policy rates quickly as the effects of the global financial crisis were beginning to be keenly felt, central banks especially are equally keen to delay a return to more “normal” policy rates for fear of derailing a relatively weak recovery in economic growth. As a result, we are seeing a battle between those who would prefer to ‘lean against the wind’ against the ‘data dependent’ view that growth beyond capacity together with higher inflation is just what economies need at the moment (e.g., see Svensson 2016, Filardo and Rungcharoenkitkul 2016). In any case, the emergence of macroprudential policies can deal with the distortionary consequences of interest rates that are too low for too long even if there is scant evidence that this is the case (e.g., see Lombardi and Siklos 2016, and part 5 of this volume).

The experience of the last decade is also producing new research that seeks to improve models used in policy analysis not only by explicitly incorporating a nexus between the real and
financial sectors but by allowing for better ways to select among competing models in order to improve the quality of policy advice.

Ordinarily, a Handbook is intended to provide a reference of received knowledge in a particular field. If the foregoing interpretation of the state of central banking is reasonably accurate then the time is surely appropriate to provide an account not only about where we are but, equally important, where central banking might be headed. In other words, the current Handbook is more than just a compendium of what central banking can and has done but an attempt to lay out the unanswered questions about existing monetary frameworks. In so doing readers will hopefully obtain a glimpse of the sentiment expressed earlier, namely that changes are afoot in the role and place of central banks in society.

The Handbook is divided into seven parts with titles that are, hopefully, self-explanatory. They are: Central Bank Governance and Varieties of Independence; Central Bank Financing, Balance Sheet Management, and Strategy; Central Bank Communication and Expectations Management; Policy Transmission Mechanisms and Operations; The New Age of Central Banking: Managing Micro and Macro-Prudential Frameworks; and, Evolution or Revolution in Policy Modelling?

To make clear that the Handbook represents a beginning and not the end of an era in the study of central banks the following pages provide not only a summary of some of the key contributions of each chapter but also related ideas and topics that could not be covered in such a vast area of study.

Central Bank Governance and Varieties of Independence

Much of the good fortune that allowed central bankers to extoll their success at stabilizing inflation, if not relegating business cycles to history, was arguably due to acceptance of the idea
that the monetary authority ought to be independent within government and not subject to the kind of political pressure that might lead to exploiting the trade-off believed to exist between inflation and real economic activity or unemployment. This was accomplished by granting central banks autonomy via legislation by granting de jure independence, or rather by appointing a central banker who is relatively more conservative about inflation than the rest of the population but shielded from political pressure to loosen monetary policy when this undermines the aim of achieving low and stable inflation. By the early 2000s, and in spite of several criticisms that the link between inflation and central bank independence was weak, acceptance of central bank independence as the sine qua non of good institutional structure became widespread and was no longer widely debated.

Beyond awarding sole authority over the day to day operations of central banks there were two other powerful forces at play during the 1990s and 2000s. Along with autonomy both central bankers and politicians came to the conclusion that the objectives of monetary policy ought to be clearly and simply stated. Moreover, the lessons from the ‘great inflation’ of the late 1960s through the early 1980s convinced policy makers and the public that low and stable inflation was the best, if not the only, objective that monetary policy should aim for. Armed with theory and empirical evidence, central banks first in advanced economies, and later in emerging market economies, were assigned a mandate to control inflation. To be sure there were considerable differences around the world in how explicit this mandate would be, as well as how accountability for failing to reach an inflation objective would be penalized. Nevertheless, on the eve of the GFC, a significant majority of the global economy would adopt a policy strategy of this kind.
It also became more widely acknowledged that a successful central bank ought to deliberate, via a committee structure, policy options. Not only would this ensure that diverse opinions could be heard inside the central bank but, in the presence of adequate transparency, reassure the public that the individuals put in charge of monetary policy would be accountable for their decisions. However, the committee structure also raises many challenges. If the size of the committee is too large decisions risk taking too long; if the members of the committee are too much alike in their thinking about monetary policy then the much vaunted diversity necessary to air differing opinions is lost; finally, and depending on how votes are counted and the manner in which motions are presented, not to mention whether committee members are individually accountable or the committee as a whole must answer for decisions taken, there is always the possibility that free riders or followers of the majority will not be willing to offer the necessary counterweight to the need for diverse thinking inside the committee.

Eijffinger, Mahieu, and Raes’ chapter wades into the question of what we can learn by analyzing committees and how they make decisions. Whereas economists often consider the number of dissenting voters in a committee, the distribution of voting over time given the extant macroeconomic environment and the information content of policy reaction functions, their chapter argues that there is something to be learned from models (in this case spatial voting models) used in political science to study votes taken by legislatures or in judicial decisions. Using data from Sweden’s Riksbank, Eijffinger, Mahieu and Raes are able to rank members of its policy making committee not only according to whether they are hawkish or dovish but when their position change over time. After all, there is no reason why an individual needs to wear the hawkish or dovish label at all times, although this is clearly possible. Moreover, this kind of
analysis also permits the creation of categories of central bankers over time according to whether they lean more heavily towards tightening or loosening monetary policy.

Of course, any model, no matter how enlightening it is about the positions taken by individual committee members, must confront the trade-off that inevitably exists between realism and complexity. The same is true of the spatial voting models of the variety used by Eijffinger, Mahieu, and Raes. Equally important, their work also underscores how important it is for outsiders to obtain the necessary information not only about how voting is conducted inside committees but also information about the content of the deliberations, even if these are finely worded via the publication of minutes of central bank policy making committees. Sadly, comparatively few central banks make this kind of information available. Indeed, the chapter by Eijffinger, Mahieu, and Raes, also highlights the likely pivotal role played by the committee structure (e.g., central bank insiders versus outsiders), the size of the committee which adds complexity to the policy making process, and the numerous biases and other phenomena (e.g., groupthink, voting order, the precise wording of any motion) that complicate our understanding of the value of committee based monetary policy decisions (also, see Maier 2010). As the authors themselves acknowledge, there is a dearth of comparative analyses as the extant literature tends to adopt the case study approach. Finally, while an examination of decisions by MPCs is essential, the authors point out that even more can be learned from the successes and failures of committees by contrasting their activities with those which shadow them by providing a second opinion about the appropriate stance of monetary policy (e.g., see Siklos and Neuenkirch 2015).

The contribution by Masciandaro and Romelli, dealing with the issue of central bank independence (CBI), reminds us that it is easy to fall into the trap of assigning too much
emphasis on de jure independence, not only because de facto independence is more relevant to an assessment of the success of monetary policy but also because de facto independence changes over time, rising and falling as other macroeconomic and institutional factors put pressure on central bank behavior. The authors also go back to first principles by asking us what is the state of the art regarding what makes a central bank autonomous. In so doing, it is clear that CBI need not be sui generis as is often portrayed in the vast literature on the consequences of providing autonomy to a central bank. Ultimately, a central bank must respond to public opinion, directly or indirectly, and this will dictate the effort central bankers exert in delivering the monetary policy that society demands.

CBI, if properly used by central banks, appears to be a persistent phenomenon. That is, once CBI is obtained it is likely to be maintained over time but will also be significantly influenced by real economic outcomes. For example, variables such as the unemployment rate are more significant, in a statistical sense, that inflation. Polity also plays an important role in enshrining the role of CBI. In particular, democratic institutions foster more central bank autonomy.

It is, of course, as critics would point out, always difficult to boil down complex relationships down to a coefficient, especially when the variables cannot be measured precisely. Perhaps more importantly, while there are both good theoretical and empirical reasons to support some form of central bank independence, the concept ought to be elastic enough to permit the monetary and fiscal authorities to coordinate their policies during crisis times. The events surrounding the GFC make clear that monetary policy should support a fiscal expansion intended to cushion a significant contraction that followed the near collapse of the global financial system in 2007. That said, supporters of CBI would also point out that an accommodative policy can, in principle, also provide an incentive for the fiscal authorities to delay necessary structural
reforms. Indeed, the most serious critics of QE would highlight the failure of fiscal policy to take advantage of extraordinarily loose monetary policies to put in place investments that are likely to boost future productivity.

Beyond these questions there are a couple of additional complications raised by an analysis of the kind offered by Masciandaro and Romelli. Since most economies are open how do globalization and exchange rate regimes enter the picture when thinking about the role of CBI? Since textbook depictions of the differences between fixed and floating exchange rates may not be accurate in a world where trade flows and financial flows operate simultaneously there is a need to consider these influences more seriously. Next, policy has waxed and waned between being forward-looking, when inflation was under control and inflation objectives were met on average, and a tendency to be backward-looking because central banks were hesitant to remove policy accommodation until there was sufficient data to convince them to change course. How these attitudes towards the setting of the stance of monetary policy interact with how we think about the concept of CBI is also in need of more research.

Both CBI and the manner in which central bank decisions are delivered raise issues about the governance of central banks. There exists, of course, a large literature on corporate governance where, for example, the long-term interests of shareholders plays a critical role. However, Capie and Wood ask: who are the shareholders of central banks? The answer is government. However, governments change every few years in a democratic society and there is really no equivalent at the central banking level of an annual shareholders’ meeting. Moreover, even if, technically speaking, the government has controlling interest in the shares of the central bank, in spirit it is the public to whom most central banks ultimately feel they are responsible to.
Complicating matters, as Capie and Wood remind us, is that many of the original central banks were private institutions. It is only over a considerable period of time that central banks became the public institutions we know them to be today. Hence, the authors suggest that it is useful to draw parallels and lessons from corporate governance for the governance of central banks. The Bank of England (BoE) and the Reserve Bank of New Zealand (RBNZ) serve as the case studies. The BoE is one of the oldest institutions of its kind while, relatively speaking, the RBNZ is a young institution. More importantly perhaps, New Zealand is the archetypical small open economy while the same is not true of the United Kingdom. Capie and Wood conclude that small open economies, by their nature, need to be flexible since they are subject to numerous external shocks. As a result, in such societies, a premium is placed on protecting the central bank from the vagaries of undue political interference while demanding that there should be clarity of purpose and an accountable set of objectives.

It is useful, of course, to consider the governance of central banks in relation to models used in the private sector. Nevertheless, whereas private concerns are expected to maximize profits the objective function of central banks is more complicated and more difficult to observe. It is also the case that legal tradition plays a role. The Anglo-Saxon approach inherent in the histories of the two central banks considered by the authors is not necessarily portable to other parts of the world with different legal traditions. Next, it is commonplace to examine the relationship between the government and the central bank as one where the former is the principal and the latter acts as the agent. However, there are other ways of thinking about these two organizations such as, for example, through the prism of preferences for inflation versus real economic outcomes, that is, via the belief that there exist political cycles. Finally, when private corporations tinker with governance it is almost exclusively because of an economic imperative.
In the realm of central banking, reforms are often prompted by political considerations. Indeed, Capie and Wood recognize that crises play an important role in the evolution of governance structures over time but how these reforms are implemented is likely to also be influenced by the resilience and transparency of political institutions.

Central Bank Financing, Balance Sheet Management and Strategy

Until the global financial crisis it was very difficult to get academics to show any interest in central bank balance sheets. Since then, the ballooning of these balance sheets in the central banks of the main western countries has become one of the most important issues on the agenda. It therefore attracts a specific part of this book to its study: Part 2. Two of the chapters there: 5 by Ricardo Reis and 6 by Alex Cukierman; cover part of this topic. Cukierman, in particular, explains how the balance sheet increase emerged initially, as central banks hurried to fill the gap caused by the virtual closure of wholesale markets. Then, as the zero interest bound was reached, central banks expanded their balance sheets further, through trying to drive down interest rates farther out along the yield curve and in markets for other financial instruments, as part of a program to try increase monetary policy’s contribution to the recovery of the real economy, and to get bank lending restarted in particular.

However, while the history of how central banks got into this territory in the first place is of great interest in its own right, the major current concern is over how this will all develop in the future. How can central banks move to an orderly system where economies are growing, interest rates are back to the levels that were normal in the decades before the global financial crisis and inflation remains firmly under control? The Bank of Japan and the ECB are still in the expansionary phase and the Bank of England is debating whether it has reached the turn round point. Of the major central banks that expanded their balance sheets in a significant way, only the
Federal Reserve has embarked on the process of the return towards some sort of new normality and that is still rather hesitant and without a clear long run.

It is tempting to argue by analogy that these banks are facing the same sort of problem that a houseowner faces when they discover rotting timber beams. They must rush round and support the house in the short run, put up scaffolding, remove the rotten timber, determine the causes of the rot, put those right, replace the timber, make other adjustments to strengthen the building, make good the damage and only then can the supports and the scaffolding be removed in the expectation that the house will survive for the indefinite future, provided it is carefully maintained. However, part of the fear is that the building will never be the same again. Perhaps the supports are still needed; removing the scaffolding may reveal other problems.

It is not a simple matter just to reverse the flow of purchases, nor is there any indication that the rate of reabsorption should be the mirror image of the increase. In the first place the banking system needs to return to proper stability with greater capital and a confidence that the atmosphere which led to the excesses before the crisis will not return. That will provide an environment for markets to operate normally again and for the central bank to bow out of the system, except for its continuing safety net role. (At least they have had the opportunity to demonstrate the great strength of that net.) In the second place monetary policy needs to return towards normality. Over the last decade the fear has been of deflation, and the ECB’s raising of interest rates in 2011 turned out to be premature to say the least. In the recovery period, inflation will again be the concern. Although all the main countries may be in reasonably similar parts of the cycle, if they act at different times this has an effect on the exchange rate, which, outside the US and to an extent the euro area, also has an impact on the inflation rate, as it is an important channel in the inflationary process. Indeed monetary policy in China is also part of that particular
equation. A falling exchange rate in a period of slack demand does not have its usual inflationary impact and is therefore not such an unattractive policy and indeed leads to competitive downward pressure as was experienced in the 1930s after the 1929 crash.

A third complication is the distortions to behaviour that the unusual period of low interest rates and quantitative expansion has led to. The most obvious example is the recovery in real estate prices and other asset prices, which are now back to historically high levels and ratios in many countries. Unsustainably high asset prices were an important part of the sharp downturn in the global financial crisis. Central banks are not surprisingly cautious about triggering another cycle of financial difficulty just as their economies appear to be exiting from the last one. Indeed the most critical judgement of the consequences of quantitative easing and very low interest rates comes from Schnabl in chapter 19, who sees them as sowing the seeds for increasing instability, not as solving the problems of the past.

For this reason, Cukierman, in his chapter, puts all of the issues together including these macro-prudential concerns. Central banks and other macroprudential authorities have sought to drive a wedge between general inflation in the consumer price level and inflation in asset prices, especially real estate, by using tools that impact sectoral lending and borrowing. Such concerns are not unique to central banks that have encountered the zero bound. Even in Australia and New Zealand, where interest rates have been low but not extreme, house prices have taken off, and by some counts the Auckland housing market has shown the greatest tension in terms of debt to income ratios. In that case a raft of constraints, limiting investment from overseas, restricting loan to value ratios and increasing capital requirements do appear to have cooled the market. Although experience elsewhere, such as, Hong Kong, suggests that such periods of cooling may
still be temporary if the underlying constraints on supply from the availability of building land and the pressure on demand from immigration continue.

The nature of the balancing act in trying to return to normality, without causing worse problems, is therefore considerable. Indeed there is a fourth concern which relates more directly to the management of the central bank’s balance sheet. Namely, that, as interest rates rise, asset prices will fall and central banks could realise losses if they sell assets below purchase cost.

In one sense this can be avoided if assets are held to maturity and central banks manipulate the term structure of their holdings appropriately so that they can still sell enough assets to absorb the required amount of liquidity from the financial system and banks in particular.

Ricardo Reis also looks at the economy-wide concerns in his chapter but from a different perspective. He notes that in quantitative easing the central bank is in effect assisting fiscal policy. While with one hand the state is seeking to expand the economy in the post-global financial crisis downturn, by running large deficits and raising substantial new debt to finance them. The central bank, on the other, is buying this debt on secondary markets and giving financial institutions the resources to buy further new debt, when it is issued, with the resulting proceeds. This sounds like an unbelievable money machine and indeed at some point the process does have to come to an end before the system explodes. Central banks can become insolvent when they go beyond the point that the state can borrow the money to bail them out. In the meantime, however, as both Reis and Cukierman point out the central bank could in effect issue helicopter money, as, in a depressed environment, the inflationary consequences are not apparent. However, here too there is a limit to how much the printing press can be used before confidence is lost and hyperinflation ensues. In any case the giving of money directly to people
would be a highly politicised decision and not something a central bank would do without the
direct encouragement of the government.

Reis takes the issues a step further by considering the extent to which the central bank can
redistribute resources within a financial area, as the ECB has done since the sovereign debt crisis
struck in 2010. Clearly, simply redistributing seignorage dividends in a manner different from
the capital key is not going to be politically possible but in 2014 the ECB did agree to pay back
to Greece the extra revenue it was earning from holding high interest Greek government debt. It
is perhaps more interesting to look at how the ECB has effectively been able to redistribute
through emergency liquidity assistance to the Greek banking system and through allowing major
imbalances to build up in the Target2 system. The ECB has thus been able to push the envelope
quite considerably beyond simply buying securities in secondary markets and with the option to
undertake ‘outright monetary transactions’ can do so further.

Indeed central banks have not reached the end of what they could do with their balance sheet to
assist monetary policy and economic recovery. For example, while forward guidance is normally
used simply to indicate what expected economic outcomes would imply for the setting of
monetary policy under prevailing policy, it could be used to indicate that central banks will
permit higher inflation for a while in the interests of recovery.

A more drastic move discussed by Cukierman is to alter the role of cash so that effectively it can
also attract a negative interest rate to drive down the short-run base of the entire system. At one
extreme the central bank could simply end the use of notes and coin except for trivial
transactions and replace it with a digital equivalent whose value can fall. At the other, notes
could be dated so that they have to be exchanged at regular intervals or see their value fall. Either
way round this seems to be in the realm of the theoretically possible rather than the politically
likely. However, as we discuss elsewhere in this chapter, the introduction of digital currency (without any implication that its value might be written down) is a much more reasonable possibility into which a lot of practical research is being undertaken at present. Other theoretically possible changes in the role of the central bank are also discussed, such as the introduction of some version of the Chicago Plan where commercial banks have a 100% reserve requirement. But unwinding of at least some of the central banks’ unusual balance sheet position derived from the global financial crisis seems more likely than further steps into more extreme territory.

Ultimately the concern for both authors is that the deeper the involvement with semi-fiscal issues the more likely it is that the independence of the central bank will be compromised. On the one hand the solvency of the bank may become an issue with its expanded balance sheet, while on the other the fiscal authority is so stretched that it might feel it needed to constrain the central bank’s shrinkage of its balance sheet in the interests of its own stability. As Cukierman points out, with the expanding role of the central bank in the field of financial stability and macroprudential policy, the more it needs to be closely involved with the other main public sector actors, particularly the ministry of finance.

The third chapter in Part 2: 6 by Daniel Thornton is a longer-term review of monetary policy strategies over the last one hundred years or so and hence is somewhat separate from the others, except in so far as it also obviously covers the balance sheet expansions of recent years. It provides a very interesting history of the debate about how monetary policy can affect inflation and aggregate output in the economy, where new ideas have emerged as existing theories appeared to be contradicted by actual behaviour, with the insights of Keynes and Bill Phillips being interesting examples. A second level of debate has been over which transmission
mechanisms are leading to the effect. To some extent the experience may well have been that a change in policy led to a change in behaviour. Goodhart’s Law is a helpful case in point; as soon as money targeting became popular in the 1980s what appeared to have been a stable money demand relationship evaporated, leading to the adoption of inflation targeting with a much more pragmatic approach to the relationships but with a firm emphasis on looking forward rather than correcting previous errors. As Governor Bouey of the Bank of Canada put it in 1982 ‘we did not abandon a monetary target, it abandoned us’.

While the general philosophy behind inflation targeting is very simple: if inflation looks as if it is going to rise above acceptable levels you should tighten monetary policy and similarly if it looks as if it is going to fall you should loosen; there has been considerable debate and very extensive modelling effort to try to make policy more accurate. In his chapter Thornton contrasts interest targeting with money targeting and forward guidance and it is this last which links his work very firmly with the other two chapters in this part of the book. He is critical of forward guidance, not simply because it is state contingent, which means that it is still difficult for people to form a view of what will happen in the future, but also because much of its rationale depends on how expectations of the term-structure of interest rates are formed. He then goes on to contrast inflation targeting with nominal income targeting and quantitative easing, again providing a link with the two earlier chapters.

Like forward guidance, Thornton is very critical of quantitative easing (QE) and makes the memorable remark ‘Bernanke (2014) quipped “the problem with QE is that it works in practice but doesn’t work in theory.”’ The problem, of course, is that if it doesn’t work in theory, it won’t work in practice either.’ As a result Thornton’s conclusion about the appropriate monetary policy strategy is rather negative. Thus far all models are too simplistic to explain what the optimal
reaction should be and hence central banks tend to take a rather pragmatic approach. While QE and forward guidance may be the latest policies, it is clear from his conclusion that he expects that the lessons of time will be rather negative in their regard as well.

Central Bank Communication and Expectations Management

Whereas in the 1970s and 1980s it was considered that monetary policy is most effective when being as opaque as possible, the sheet has certainly turned in recent decades. Nowadays, it appears that central bankers can hardly be too transparent and too open in order to be successful. Exemplary in this context are two quotes of Alan Greenspan and Ben Bernanke. While speaking to a Senate Committee in 1987, Alan Greenspan stated that “Since becoming a central banker, I have learned to mumble with great incoherence. If I seem unduly clear to you, you must have misunderstood what I said.”

Whereas to Greenspan obfuscation was key, the opposite holds for his successor: “As a general matter, the more guidance the central bank can provide the public about how policy is likely to evolve (or about the principles on which policy decisions will be based), the greater the chance that market participants will make appropriate inferences – and thus the greater the probability that long-term interest rates will move in a manner consistent with the outlook and objectives of the monetary policy committee.”

As these quotes indicate, the transition towards more and transparent communication set in well before the Great Financial Crisis. Nevertheless, the latter did change communication policies of most central banks significantly. The three chapters in this part of the book look into today’s role of central bank communication and transparency in the conduct of monetary policy. This is first done by giving a survey of the different ways in which central banks communicate nowadays and how successful that has been. Subsequently, a more in-depth analysis is given regarding one particular communication channel of the US Federal Reserve, the post-FOMC-meeting
statements. It ends with a chapter devoted to measuring and comparing the degree of transparency of central banks around the world.

As argued in De Haan and Sturm, central banks communicate on different dimensions to the public. It can be on the objectives of monetary policy, its strategy and the decision-making process, (upcoming) macroeconomic conditions, and or on actual or future policy decisions. Their openness on each of these dimensions can be translated into degrees of transparency. In line with the above, Dincer, Eichengreen and Geraats distinguish between political, operational, procedural, economic and policy transparency.

Although the increased independency of central banks all around the world has been a clear driver of higher accountability standards and thereby increased reporting on and openness of also objectives, strategies and procedural aspects, in practise most of the interest rests on transparency and communication directly related to active and future monetary policy and the underlying economic motivation thereof. As indicated by the above quote of Bernanke, this kind of communication is expected to make monetary policy more effective and has, according to many, turned into a separate instrument of central banks to reach their objectives. Besides almost directly controlling short-term interest rates through e.g. short-term open market operations, communication can influence expectations about future short-term interest rates, thereby affecting long-term interest rates. Especially, when facing the effective lower bound of short-term interest rates, implying traditional tools to become ineffective, this instrument gains in value.

This so-called forward guidance comes in different shapes and forms and De Haan and Sturm discuss their pros and cons. Although the academic oriented literature suggests that it would be most effective if central banks would commit, this is not what is actually observed. Although
clear statements about the future policy path are likely to have a stronger impact than more cautious ones, a central bank fears a loss in credibility when changes in economic conditions would force it to deviate from such an announced path. Furthermore, history has shown that it is very difficult, if not impossible, to formulate waterproof state contingency. Nevertheless, there is general agreement that forward guidance did and does have a substantial effect on interest rate expectations.

Furthermore, it plays an important role in unconventional monetary policy instruments that have been introduced during and after the Great Financial Crisis also to alleviate reaching the ELB. Through the so-called signalling channel, in which the central bank usually communicates about their size and duration, the effectiveness of these asset purchase programs is boosted. Without proper communication the stimulating impact of such programs might be offset by expectations of higher policy rates.

A final broad topic discussed in this survey chapter is on the management of inflation expectations. Communication helps to anchor inflation expectations and in that way supports changes in nominal short-term interest rates to reflect changes in real rates. This allows the economy to return to its long-run path faster. Whereas studies using inflation forecasts in general find that explicit inflation targets do help anchor inflation expectations, studies focusing on the general public’s knowledge of central bank objective and firm and household’s inflation expectations come to more sobering conclusions.

The chapter of Davis and Wynne zooms in on communication of the US Federal Open Market Committee (FOMC). During the past decades, the FOMC has stepwise increased communication substantially. For instance, in 1994 it started to release statements immediately after a policy meeting in case policy rates were changed. Since 1999, these statements were issued after every
scheduled meeting. In December 2004, the release of the minutes of these meetings was moved forward and now appear three weeks after the meeting to which they refer. Following other major central banks, the chairman nowadays holds a press conference at regular intervals. Furthermore, members of the Board of Governors and the individual Reserve Bank Presidents now release their economic forecasts four times a year as part of a regular Survey of Economic Projections.

Davis and Wynne concentrate on the FOMC post-meeting statements and document how these have become longer, more and more detailed and complex over time. Whereas in the early years, these statements only contained a vague description of the policy actions of the Federal Reserve, they nowadays contain an assessment of economy, a balance of risks, a forecast and what sometimes can be interpreted as commitments on future policy actions. In that sense, these statements have turned into a policy instrument affecting expectations and thereby financial markets. To test the latter, the authors use daily financial market data and estimate a daily time series of US monetary policy shocks. They also characterize some of the linguistic features of these statements and show that these features correlate with the identified monetary policy shocks. Especially during the period in which the federal funds rate reached its ELB (December 2008 - December 2015), the absolute size of the monetary policy shocks increased on statement days and are a function of the length and the complexity of the FOMC statements made. Also for the pre-ELB period and when controlling for the actual policy change, a similar relationship is shown to exist: the impact of FOMC’s policy statements have increased as they got longer and more complex.
The third and final chapter in this part broadens the scope again and looks at transparency in the world. Transparency is a commitment device disciplining central banks to communicate. It serves as mechanism for accountability, a necessary condition for central bank independency.

It forces independent central bankers to explain how their actions are consistent with that mandate. It thereby enhances the credibility of the central bank and increases the effectiveness of the policy decisions made.

Dincer, Eichengreen and Geraats' main contribution is producing and publishing a new transparency index covering a panel of 112 central banks for the years 1998 until 2015. The new index combines and extends the work of Eijffinger and Geraats (2006) and Dincer and Eichengreen (2008, 2010, 2014) by being more granular and thereby more focused while capturing developments in the post-crisis world. It distinguishes between the political, economic, procedural, policy and operational dimensions of transparency. As the new data shows, central banks vary substantially across these different dimensions. From the point of view of the central bank’s ability to effectively pursue its mandate, it is important to understand to what extent and in what respects more transparency along these different dimensions is always and everywhere beneficial.

The chapter focuses on procedural and policy transparency. Regarding the first, a key aspect is the release of voting records and minutes without undue delay. Its desirability is discussed. With respect to policy transparency, the chapter analyses its evolution in the wake of central banks’ post-crisis experiments with unconventional policy measures and forward guidance. During the 18 years covered, the index reveals a rise in monetary policy transparency throughout the world, irrespective of the level of economic development of the country and the monetary policy framework of its central bank. This trend has weakened in the wake of the global financial crisis.
With policy rates near the ELB, the use of forward guidance, on the other hand, has increased substantially. Central bank communication can be fraught by complications. This may be part of the explanation for why the trend toward greater transparency has slowed rather than accelerated following the crisis. The chapter presents some case studies that illustrate that attempts to increase openness can be taken too far.

Although these chapter are able to cover a lot of relevant material and arguably the core of topics related to central bank communication, gaps remain. They do not deal with discussions about how to appropriately translate the language of central bankers as such to be able to use it in empirical analyses. Text analysis is a rich and vastly expanding research area. More in-depth analyses on other major central banks and/or different forms of communication would also have been a natural way to extend this part. Another example as of natural ways in which to extend this part is by realising that central banks have moved away from institutions mainly concentrating on price or inflation stability to those in which financial stability has become another key task since the Great Financial Crisis. Although the complications for communication strategies that accrue are touched upon in the first survey chapter, a more detailed analysis on its (future) consequences also for policy transparency would certainly have been insightful. Finally, although all three chapter ultimately are interested in how central banks influence expectations, each of them takes the expectation formation process for granted. The role of the media in this transmission process or how individuals form their expectations are largely still open questions.

Policy Transmission Mechanisms and Operations

Having instruments to carry out monetary policy requires knowledge as of how these instruments affect the working of the economy. Economic theory distinguishes many different transmission channels. This part of the Handbook is not intended as an overview, but rather as discussing
some of these transmission channels or ways in which monetary policy in practise operates also in light of the Great Financial Crisis. From today’s perspective, it very much looks like that this crisis also has had a lasting impact on the ways in which monetary policy actions transmit into the economy. This part consists of four chapters each highlighting such aspects in different ways and from different angles.

Not only does the real estate sector play an important role in most financial and economic crises, it is also the sector through which most of the commonly distinguished transmission channels work. Arguably, no other sector is more sensitive to changes in interest rates or balance sheets. That said, cycles observed in construction are often not in sync with macroeconomic cycles – a reason why it might not always be straightforward for central banks to meet the objectives of monetary and financial stability simultaneously. Although this is more and more recognised by policymakers, this new stylised fact has not yet been fully digested and incorporated by economic research.

The chapter of Sinclair deals with these and related issues by setting up a small model that links house prices and quantities using stock-flow concepts, and explores how these variables are shaped over time. In that set-up, it looks at how monetary and financial variables interact with the construction sector and analyses what role the government should play to keep the financial system stable. While realising that land and real estate are notoriously immobile, bubbles created in this market are foremost national problems that need national solutions. The introduction of macroprudential instruments, like ceilings on loan to value ratios (LTVR) for lending on real estate, maximum mortgage durations (MMD) and refined minimum capital ratios (CR) on banks, can all help to prevent bubble formation in real estate markets and thereby financial instability. Allowing flexibility in these instruments might circumvent potential conflicts with monetary
stability objectives. Looking at it from this angle, Sinclair recognises that the what is nowadays often labelled financial cycle might differ substantially from the regular business cycle, thereby strengthening the case of viewing macroprudential policy as providing a necessary set of additional instruments to cope with the ever-increasing complexity of the world. What is not discussed and therefore left for future research is the role of demographics and the impact of secular stagnation on real interest rates and housing prices.

Gambacorta and Mizen focus in their chapter on the most traditional of all transmission channels, the interest rate channel. After summarizing its theoretical foundations, the chapter reviews the literature on the pass-through of policy into lending and deposit rates. It is thereby realised that the environment has turned more complex since the great financial crisis and not only other channels that are specific to the banking system impinge on this traditional transmission channel, but also the necessity to look into the different funding sources to understand the cost of bank funding has become more important. Not only, the so-called bank lending channel and the bank capital channel are discussed from this angle, but also the influence communication has on expectations about expected policy rates and through futures thereby on the pass-through of policy rates. Although the chapter veers off in the direction of forward guidance, it does not go into issues related to the effective lower bound and whether there is a difference in this respect between policy and retail rates.

Despite concerns of a weakening of monetary transmission, most research still points towards a strong and robust relationship between policy and retail rates. The role lending standards play in determining the strength or weakness of the interest rate channel is potentially important, albeit not touched upon in this chapter. Further and future institutional changes, for instance along this dimension, will likely continue to alter the banking system and thereby influence the
transmission process of monetary policy. The chapter argues that this is perhaps most evident in Europe where the emerging banking union will trigger more cross-border banking competition.

Digging deeper into the interest rate transmission channel, the chapter of Fuerst and Mau deals with the term premium, its variability and the role monetary policy plays in this. The effective lower bound on short-term policy rates triggered the introduction of new instruments aiming at directly affecting returns on long-term bonds and thereby the term premium. In an environment in which balance sheets of many major central banks are likely to remain large for long, the question emerges to what extent the term premium should remain an input, or even target, for monetary policymakers? To answer this, Fuerst and Mau use a DSGE model in which either Epstein-Zin (1989) preferences separate risk aversion from intertemporal substitution elasticities, or – following Carlstrom et al (2015) – asset markets are segmented as such that short and long bonds are priced by different (constrained) agents. Whereas, in the first case, the term premium should not directly policymakers, in the second one, there is a clear role for monetary policy to smooth fluctuations in the term premium. The latter model can be calibrated as such that it matches the empirical mean and variability in the term premium. This does not appear possible when using the first model. The authors therefore conclude that there are significant welfare gains to a central bank smoothing the term premium. Long-term bond yields can be decomposed into average expected future short rates and term premiums. Taken the conclusions of this chapter at face value requires policymakers to distinguish between these different components in order to measure the not directly observable term premium. As with discussions around potential growth and the NAIRU, this is likely to pose policy issues that require further research.

In the final chapter in this part, Toporowski looks into the buying and selling of financial assets by the central bank as a way to implement monetary policy. He first takes an historical
perspective and documents the use of open market operations as an alternative to interest rate policy, when that policy cannot be used, and as a supplement to such policy when it appears to be ineffective. In the modern world, the chapter argues that it is important to distinguish between reverse purchase (or sale) agreements and ‘outright’ purchases (or sales) of securities. Whereas the former has the attraction that they allow central banks to inject (or withdrawal) liquidity over a fixed time horizon, without committing to provide such reserves in the future and thereby potentially removing incentives to sound bank management, they ceased to have enough of an impact after the Great Financial Crisis. This caused a dramatic switch to outright purchases. Whereas prices at or near the bottom of the market has allowed central banks to earn capital gains, it also – given the thin capital base central banks work with – substantially increased the risks in their balance sheet. It is furthermore argued that the effectiveness of open market operations not only depends on the state of the economy, but also on the complexity and liquidity of the financial system.

The New Age of Central Banking: Managing Micro and Macro-Prudential Frameworks

Perhaps nothing symbolizes the changes in central banking since 2007 than the recognition that micro and macro-prudential concerns are not easily separable. The veritable explosion of academic work over the past decade has at least provided the necessary ingredients so that policy makers are equipped with the “known knowns” as well as the “unknown unknowns”, to use the expression made famous by former U.S. Defense Secretary Donald Rumsfeld. This much becomes clear after reading the four chapters in this section, as we shall see. Nevertheless, there are several complications that arise in the ‘new era’ of central banking that policy or the profession have not yet fully grasped. First, there some vague acknowledgment that monetary and financial stability go hand in hand. However, while there used to be widespread agreement
about what constitutes good conduct in monetary policy, there was and continues to be a lack of clarity about what constitutes financial stability. About the best that can be said is that, when it comes to financial stability, we know it when we see it.

Adding to the difficulties is that monetary policy involves, for the most part, monitoring easily observed policy instruments such as an interest rate as is the case with the main objective of monetary policy, namely a form of price stability. In contrast, measuring the quality and effectiveness of micro and macro-prudential regulations and policies is proving to be exceedingly difficult and subject to a number of different interpretations (e.g., see Barth, Caprio, and Levine 2013, Lombardi and Siklos 2016, and references therein). Second, pre-crisis there was some consensus about the desirability of assigning micro and macro-prudential authority to separate institutions even if some coordinating mechanism would be required to ensure that the objective of financial stability is met. While the capacity of a particular country to support several institutions is one determinant, the notion that a central bank may be open to a moral hazard type dilemma by becoming responsible for supervising and regulating banks as well as being accountable for macro-prudential objectives led several countries to assign the relevant responsibilities to separate institutions.

It was never always made clear by governments that devised such arrangements whether these institutions would be equal or whether the central bank was first among equals, especially since many central banks (e.g., the U.S. Federal Reserve) were born out of a need to maintain some form of financial system stability. Moreover, it was often more of a hope and a prayer that separate micro and macro-prudential regulators would cooperate, if not coordinate, their responses when crisis conditions emerged. The experience of the former Financial Services
Authority (FSA) vis-à-vis the Bank of England (BoE) is likely the case study par excellence of the failure of two critical institutions to operate in tandem in a time of need.

Davis considers the broad sweep of financial regulation and supervision and the role of the central bank over time and across several economies. He concludes that the wheel has turned so that, like the proverbial pendulum, we are “back to the future” (Masciandaro 2012). This means that what was once long ago thought as the core function of a central bank, namely the maintenance of financial system stability, lost during an era when monetary policy could not only assist with ensuring calm financial conditions but deregulation was believed to lead to economic salvation, is now being returned to the portfolio of responsibilities that central banks acquired in the aftermath of the GFC. It comes as no surprise, as Orphanides (2013) and others (e.g., Siklos 2017) have pointed out, that central banks risk being overburdened. While some are willing to see the return of responsibility for financial stability as almost natural, given the historical origins of many central banks, others highlight the increased complexity of financial systems and the growth of government as two factors that ought to make policy makers wary of making central banks even more powerful than they currently are. Even if we accept that central banks should be given more responsibilities the difficult choice of deciding how much relative weight to put on monetary stability versus financial stability has yet to be addressed. Moreover, if the public is unable to observe how much emphasis a central bank places on one set of responsibilities over another then much of the progress in central bank transparency and accountability may well be lost.

Taylor, Arner, and Gibson begin by arguing that the emphasis in central banking towards the maintenance of price stability meant that monetary authorities around the world effectively shied away from worrying about financial stability which, according to a former central banker, is part
of the ‘genetic code’ of central banks’. Supported by economic theory this created conditions that were ripe for a large financial crisis. Focusing on governance arrangements among large systemically important economies (i.e., the U.S., the U.K., and the Eurozone) the authors consider how the GFC changed institutional arrangements leading to a much greater emphasis on the control of systemic risks. Their tour d’horizon tends to find favor with the so-called single-peak arrangement (see Haldane 2009) of the BoE wherein separate but largely equal bodies are responsible for both monetary and financial stability policies but are housed under one roof. In contrast, recent reforms in the U.S. have resisted giving the Fed sole responsibility over financial stability while the Eurozone’s response is not only a work in progress but, as this is written, resembles a hybrid of the U.S. and U.K. responses to the GFC. Nevertheless, it may be somewhat of an exaggeration to conclude, as the authors seem to suggest, that a ‘new macroprudential consensus’ as been reached as none of the current systems have been tested by a financial crisis.

Llewelyn makes at least two interesting observations. First, regardless of one’s assessment of the effectiveness of regulatory changes since the GFC, they amount to substantial changes of an order that we have not seen for decades. Second, policy makers have woken up to a recognition that reducing bank failures is not a sufficient end in itself for financial regulation. It is equally, if not more important, to minimize the social costs of financial instability. Indeed, the chapter goes on to explain how the previous focus on bank failures is incapable of being met without proper recognition of the social aspects of financial regulation. In other words, regulation cannot be exogenously determined without considering the process by which it is enforced. Indeed, over and above these elements policy makers, regulators and supervisors have paid insufficient attention to the ‘culture’ of banks and this is an aspect that also contributes to the endogeneity of...
bank regulatory structures observed globally. It is clearly essential to recognize that the scope
and structure of regulation of the financial system is not independent of other institutional
arrangements in different financial systems. Nevertheless, beyond corporate culture there is also
political culture to consider and it is unclear how the nexus between the two complicates
recommendations for regulations intended to mitigate the likelihood of future financial crises.
All of the problems highlighted by Llewelyn are otherwise known as leading to the problem of
regulatory arbitrage and, as the chapter suggests, we simply do not have a comprehensive set of
tools and policies to mitigate attempts to exploit the financial system that contribute to creating
conditions for the next financial crisis. There is an urgent need to develop a strategy. As in other
areas a successful strategy will have to be calibrated so that it recognizes country-specific
factors.

Dwyer moves away from solely considering the institutional consequences of the shift towards
greater emphasis on financial stability through macro-prudential regulation to also ask, through
the lens of macroeconomic consequences, whether there are good grounds to think that existing
macro-prudential regulations will be successful. The chapter reviews what we know, including
several historical lessons, and concludes that emerging regulatory regimes are built on shaky
foundations. Dwyer reminds us not only that there is a fallacy in believing that there exists a
perfect regulatory structure designed by government which can prevent the worst effects of a
financial crisis, something that economists have known for decades, but that the ‘time
inconsistency’ that plagues monetary policy also exists in a fashion when macro-prudential
policies are examined. In other words, it is not enough to design a macro-prudential policy
strategy. Instead, a successful policy aimed at maintaining financial system stability must also
provide the right incentives so that regulators and policy makers can maximize the likelihood
that the best solutions are adopted. Throwing cold water on the ability of existing macro-
prudential strategies’ ability to prevent the next financial crisis is possibly a valid conclusion.
The harder task, left out of the existing literature, are concrete solutions to the incentive
compatibility problem highlighted in Dwyer’s contribution. Moreover, designing clear rules of
conduct for macro-prudential regulation is clearly important but there is an equally critical need
to acknowledge and build-in escape clauses and directives so that the scope for discretion is
understood by all. This is perhaps as important as the design of incentives that Dwyer’s chapter
emphasizes, as Tucker (2016) has emphasized (also, see Siklos 2017).

Central Banking and Crisis Management

Until the global financial crisis most of the major central banks were largely content with the
危机管理安排。然而，一旦危机爆发，就清楚地看出所有制度都有困难，其中许多甚至是灾难性的。因此，在接下来的十年里，已经出现了一场急剧的活动来尝试改进这些系统，这尚未完成。即使没有任何新的措施，现有的
变化也不会在2020年代中期前完全实施。

The principles of good crisis management were well-known before the global financial crisis but
fortunately most schemes had not been vigorously tested. The US for example had had to handle
many individual bank failures, including a major concentration of them in the Savings and Loan
crisis of 1986-95, which led to the improvement in systems, in particular through the Federal
Deposit Insurance Corporation Improvement Act of 1991. But these were failures of over 1,000
small institutions and even though in total the losses were considerable at $160bn, they were not
sufficient to result in a recession. The Nordic crises of 1989-93 and the Asian crisis of 1997
were, however, rather more dramatic and resulted in significant changes. Nevertheless, part of
the reason for the catastrophic nature of the global financial crisis is that on the one hand the Nordic countries actually managed to handle their crises rather well, while on the other the Asian countries have made themselves far less vulnerable to the problem in the first place. This provided the opportunity for central banks to be at worst complacent and at best overconfident about their ability to handle any new crisis.

The story told in the three chapters in this section: 19 by Gunther Schnabl, 20 by David Mayes and 21 by Patrick Honohan, Domenico Lombardi and Samantha St. Amand; therefore, only begins in the 1980s.

Schnabl explains the evolution of central bank crisis management of the period by reference to Austrian business cycle theory. He shows that the approach has been asymmetric and as a result has increased instability. Mayes, on the other hand looks at the lessons learned over the period and how they are being implemented, before making a critical appraisal of how they might work in the future. Honohan et al. take a more prescriptive approach and set out not just what is being done but what needs to be done in the light of experience to ensure a well-run system.

Crisis management is inherently asymmetric. Although planned for, it is only actuated when needed or thought likely to be needed. In good times central banks focus on crisis avoidance, although they do require that both the system and individual institutions be structured so as to make efficient crisis management possible. There is some degree of symmetry in macroprudential measures in that they are strengthened as the economic expands and builds up pressures but are released in the downturn. However, that symmetry is somewhat limited. It is rather like the principles behind the ‘Greenspan standard’, whereby monetary policy leans against the wind as the economy grows faster but not to the full extent of the inflationary threat, because the authorities can respond very vigorously when the bubble bursts and (it was thought)
avoid a recession. The reasons for not intervening fully on the upside were twofold. First it might very well be that there had been technical or other innovations which permitted a higher non-inflationary growth rate and it would be a really bad idea to nip that growth in the bud and prevent it emerging. Second, if the central bank pulls the plug, even where warranted, the blame for causing the downside falls on it. If some other event intervenes, then the bank is only responding to the pressures and hence largely avoids the responsibility.

Schnabl interprets crises entirely in the framework of monetary (mis)management and views the Greenspan standard approach, which he regards as a general characterisation of monetary policy over the last 30-40 years not just something relating to the US, as a progressive deviation from a sustainable policy. It is not so much that the low inflation environment that has prevailed, with its apparent stability, has driven equilibrium real interest rates down but that the asymmetric policy is destabilising. These outcomes are particularly strong in the post-global financial crisis era but also acted as a fundamental cause of the crisis itself in the early 2000s. The excessively low interest rate regime is cemented by a perception that sustainable growth rates in the economy have fallen, leading people to believe that they represent a lower equilibrium rather than the conditions for the next destabilising financial cycle. The cycle he describes has both real and money and credit driven components. Thus there is both excessive investment as well as a boom in credit and asset prices generated by the excessively low interest rates.

What makes the whole of this process worse is that deregulation of the financial system internally allows the cyclical process to be more dynamic and removing financial barriers internationally increases its contagion round the world in what Schnabl quotes as ‘wandering bubbles’. One country’s low rates cause their exchange rate to fall and gives them a competitive advantage.
advantage, which leads other countries to respond. This cycle can be seen clearly in the 1980s beginning with the Japanese both in the run up and the response to their crisis.

Schnabl’s chapter feeds through to the other two chapters in this part of the book when he refers to the behaviour of the supervisory authorities once banks get into trouble. The banks themselves will be faced by a build-up of non-performing loans in the crisis. The obvious response is to try bridge over the initial period of difficulty by advancing more to the distressed borrowers so they can service what they have already borrowed. This contributes to the asymmetry of the cycle as does the next step of bailing out the banks to stop them failing and worsening the credit crunch. Thus little action is taken in the upturn to moderate the excesses while vigorous action is taken in the downturn to avoid the consequences of those excesses being realised. It thereby sets the grounds for a progressive amplification of these cycles and at the same time encourages the decline in trend productivity because the inefficient are kept in business. Thus Schnabl’s view of the future is doubly pessimistic. Indeed, the perspective is even worse, as this asymmetry contributes to increasing inequality, favouring those who can acquire assets that benefit from the approach, and harming those who suffer from the slower growth and lower and more precarious incomes. The consequences are reflected in higher debt ratios all round, both for countries and for households, both of which will push the system closer to unsustainability and collapse, assisted by growing debt service ratios. As Honohan et al. put it ‘Over-zealous crisis management can unwittingly sow the seeds of the next crisis’.

The other two chapters are generally more optimistic in tone, although neither suggests that it is possible to get to some nirvana without the cycles and crises. They focus in particular on the lessons that have been learned as a result of the global financial crisis. The most important is that the authorities have to be able to handle problems in failing institutions promptly and at low cost.
without a simple taxpayer bailout. Moreover, that ability to handle the problem – to the detriment of the existing owners, management and creditors of the institution – needs to be thoroughly credible. In that way, owners and managers should want to run their businesses more prudently but, if danger threatens, they will want to make sure they can organise a private sector solution that maximises the value for them and increases the chances of retaining their jobs.

The asymmetry of the process is clear. Action when a bank fails cannot be avoided but in allowing pressures to build up and in intervening early to head off more serious problems there is a choice and the tendency in the past has been for forbearance. Even with compulsory early intervention and prompt corrective action in the US, problems have been allowed to mount and the adverse signals have been disregarded. Indeed, as Mayes points out, crises normally occur because collectively people talk themselves out of the need to act (part of the ‘this time is different’ syndrome highlighted by Reinhart and Rogoff (2009)). Honohan et al. argue cogently against the dangers of ‘group think’ that ostracises those who try to question the general feeling. The system therefore always has to be able to cope with missed opportunities and unexpected shocks. As Honohan et al. put it ‘In short, what is needed for good central bank crisis management is preparedness and a willingness to take quick and decisive action.’

If anything there is a tendency to spend too much effort on problem avoidance because the costs of a crisis are so high that even small chances of reducing their occurrence comes out well in cost benefit analysis. However, the costs of crises are only borne if they occur but the costs of the avoidance measures are borne all the time – even if there is nothing to avoid. Using macroprudential tools will help in limiting asset price bubbles and credit expansions. While the capital and liquidity buffers currently in the process of implementation are intended to be large enough that the systemically important banks in the global financial system would not become
insolvent in the face of shocks of the size experienced in the global financial crisis. As a result, attention has now passed to the process of recapitalisation, which is to be achieved by ‘bailing in’ the creditors. Large institutions cannot be allowed to stop working or they risk bringing the whole of the rest of the financial system down with them because of their degree of interconnection. The resolution method therefore needs to be able to remove the owners and senior management and recapitalise the institution while it still continues to function.

Although a long-time advocate of bailing in, from the times before the word had been coined, Mayes is cautious about whether it can be used in all circumstances and indeed whether such an ability makes crises more or less likely. If the threat of a bail in panics holders of such instruments in all banks and not just those in trouble then it could trigger a market crisis of its own. Much of the debate in practice is going to be over who is going to be bailed in. As has already been shown in the case of Italy, in 2016, the government preferred to use a preventative bailing out of Banca Monte dei Paschi di Siena rather than let retail holders of bonds be bailed in. Similarly in the cases of Veneto Banca and Banca Popolare di Vicenza, in 2017, where the same technique could not be used as the ECB had determined the banks had failed, they preferred to inject taxpayer funding into the resolution of these two banks rather than let such bondholders bear the losses. The list of who can be bailed in without there being severe wider consequences worse than having a bailout may not be long enough.

However, the main point that Mayes addresses is that, despite the advances being made in resolution tools, coordination among the authorities and macroprudential preparedness, the tools and responsibilities are primarily national while the major financial institutions in the world being regulated are international. At worst, a national authority on its own does not have the resources or the powers to handle a major insolvency without a disorderly resolution, as
illustrated by Iceland and Cyprus among others. At best the problem is that the authorities in the various countries, although willing, are unable to cooperate sufficiently and fast enough to address the problem in time. Hence the favoured international solutions have tended to go for either putting the responsibility on the home country of the institution for solving the entire problem itself (labelled single point of entry) or making sure that each country is able to solve the problems in its own jurisdiction irrespective of the degree of cooperation from the other (multiple point of entry). Australia and New Zealand have followed that route while the US and the UK have chosen the single point of entry. As with all recovery and resolution plans, they are only plans and can only be tested in artificial circumstances.

Despite these differences of opinion, Honohan et al. point out that a considerable ‘transnational epistemic community’ has been established that has agreed on the principles of how the problems should be resolved. The BIS and the FSB have been the major fora for these agreements.

A clear theme that runs through the changes since the global financial crisis broke is that in general the role of the central bank has increased. Central banks have frequently become the resolution authority, as in the UK, and have also become responsible for macroprudential supervision. If they are already the supervisor of individual institutions then this a very major concentration of power in the system. This can effectively force the central bank into being a more political body, as demonstrated by the ECB in the case of the Irish and Greek crises explored by both Mayes and Honohan et al. It certainly propels them into having a much closer relationship with the government as wider issues may need to be borne in mind when resolving a bank or lending to it when it faces an indistinct combination of liquidity and solvency problems. Honohan et al. put it even more strongly ‘central bankers are inherently political actors’. Thus
the idea of the central bank being able to take a step back from the political pressures and apply a purely technical solution based on rules laid down in advance and clear evidence of the likely outcomes is obviously at variance with reality. The system may therefore change again if crises are perceived to generate conflicts between the central bank and the government – something that becomes more likely when the central bank has a range of objectives, some of which may conflict. It is inherent that problems may occur outside the central bank’s traditional field of direct responsibilities – as was seen with investment banks and AIG in the US in the crisis. As the guardian of financial and macroprudential stability the central bank has to act even if this has repercussions later. Similarly when encountering the zero lower bound or the crisis of confidence in the euro area, the central bank has to step outside the traditional box and lend under conditions it would not previously have countenanced and challenge the limits of its powers.

The euro area in particular is operating with a new set of largely untried institutions and indeed legislation, with a new Bank Recovery and Resolution Directive, a new Single Resolution Board, new arrangements for pooling funds with the Single Resolution Fund, in addition to the new supervisory role for the ECB. How well this will work out in practice remains to be seen.

Communication plays a critical role in crisis management. Handled badly it can result in a bank run as in the case of Northern Rock. The central bank will only be successful in many of its actions if it is credible and those involved believe the policy will work. Confidence is crucial and what swings that may be relatively small errors and successes, which may even be due to factors outside the central bank’s control. As Honohan et al. point out, the central bank and the government need to act in concert for the credibility to hold. But there are strong incentives for each party to try to place the risks involved on the other. Thus the central bank making losses due to a marginal bank failing may look much better to the government than the same losses
occurring directly on its books from the issuing of a guarantee. Without government endorsement central bank actions can lack legitimacy.

Argument from examples is always helpful and Honohan et al. explore the cases of Indonesia in 1997, Argentina in 1989 and 2001, the UK with Northern Rock in 2007 and the Royal Bank of Scotland and Lloyds/Halifax Bank of Scotland in 2008, Ireland 2008-10 and the euro area 2010-12. Between them they illustrate both the mistakes that can be made and the measures that can be successful. With a long enough list of experience central banks ought to be able to do better at crisis management in the future. As Honohan et al. conclude, good crisis management requires boldness and decisiveness but their examples show weakness, delay, insufficiency and a lack of preparedness. Maybe next time is different??

Evolution or Revolution in Policy Modelling?

It should be clear by now that whereas the conduct of central banking rests on a heavy dose of judgment the success of monetary policy prior to the GFC is also due in no small part to improvements in modelling. One does not have to go back far in time to find dissatisfaction with large scale macroeconomic models that central banks and statistical agencies began to construct in the 1960s and 1970s, that is, during the heyday when economists thought that economic policy could safely deliver the economy to a particular point on the Phillips curve. It took Sims’s work (Sims 1980), among others, to bring attention to the ‘incredible’ restrictions built-in to early large scale models. Nevertheless, these large models developed decades ago at least had the virtue to make clear that understanding how economies evolve over time is potentially a complex task. Estimating precisely the impact of certain policies is also hazardous and subject to considerable model uncertainty.
The first two chapters in this section approach deeper questions about models that central banks use as inputs into the decision-making process. Goodhart, Romanidis, Tsomocos and Shubik build on the fourth author’s important contributions in the role that default plays in our understanding of macroeconomic outcomes. It might seem obvious that the failure of financial transactions or the breakdown of certain financial relationships is an ever present phenomenon in most economies. Hence, this possibility ought to be a concern to central banks. However, in the rush to apply simple model to explain the evolution of key macroeconomic variables, together with the firm belief that financial markets are efficient and do not represent a threat to the real economy, models that ignored financial frictions were almost completely ignored by central banks. This lacuna continued even as monetary authorities in advanced economies began to develop models based on sound microeconomic principles. These were introduced not because their developers believed that markets were literally frictionless and that heterogeneity in individual behavior was not a fact of life. Instead, these assumptions seemed to get in the way of understanding how economies respond to shocks from the real economy or from external factors.

The models of the kind described above came to be called Dynamic Stochastic General Equilibrium models (DSGE) and, since the GFC, these have often been singled out as one of culprits for the failure of economics to ‘see the crisis coming’. The focus of Goodhart et. al.’s attach on the DSGE approach is the role of default as the principal form through which financial frictions throw ‘grease in the wheels’ of financial markets. Their chapter devotes considerable attention to how badly DSGE can mislead policy makers who ignore frictions, especially ones related to default, at their peril. Equally important, recognition of these frictions forced the monetary authority to contemplate in any formal framework developed to analyze the impact of shocks or policies to consider the trade-offs between monetary and financial stability, including
the much discussed contention by some that a lesson learned from the GFC is that ‘leaning against the wind’ (LAW) may be a less successful policy than previously believed. As this is written, the debate about when or when not to LAW continues but it remains largely a battle of ideas at the theoretical level, a point noted at the outset of this chapter. As the more practical level, LAW has fewer proponents with central banks resorting to ‘data dependence’ to avoid using policy rates to tighten aided by low inflation and less than impressive real economic growth. The difficulty is not only that data dependence is a potentially overly flexible means not to take a stand until it is possibly too late but it relegates the economic outlook to becoming far less important to setting the current stance of monetary policy. It is worth recalling that central banking advocates of inflation control used to place heavy emphasis on the economic outlook in deciding how to set policy rates today. Goodhart et. al. do not take a stand on the LAW debate while the next chapter by Binder et. al. sees the existing evidence as indicative that LAW policies are not particularly effective. Nevertheless, even these authors likely admit that the jury remains out on this question.

The recognition that financial frictions matter is far from new. Indeed, what we now call financial frictions were well-known even during the 1950s. It is just that observation rendered these unimportant from a macroeconomic perspective, especially during the period of the Great Moderation. This view, of course, is no longer tenable. Nevertheless, it is also the case that economists in central banks quickly recognized the need to introduce such frictions, together with an acknowledgement that economic agents are heterogeneous. What remains unclear is how best to model financial frictions, and even how heterogeneous agents’ expectations should adjust in such an environment or in response to economic shocks. Equally clear, as Goodhart et. al.
stress, is that the dimension of more suitable models for monetary policy analysis must increase substantially.

The chapter by Binder, Lieberknecht, Quintana, and Wieland, adopts a different strategy vis-à-vis an assessment of the popularity of DSGE modelling in central banks. Their approach centers on the empirical performance of various models. They make a plea for more explicit recognition of model uncertainty and the need for model diversity since no one model will outperform all others at all times. The authors demonstrate that this kind of diversity is essential not only for providing an estimate of how much model uncertainty exists at any given moment but also because the success or failure of various models over time provides a mechanism for policy makers to learn how to improve them for policy analysis and forecasting.

Although, as shown by Binder et. al. there continues to be, at least empirically, a preference for models that retain a New Keynesian flavor, this is in part because models that attempt to combine what is useful from finance and the recognition that financial frictions are important have not been confronted with data to the same degree as the models that reached a peak in their popularity around the time of the onset of the GFC. Matters become even cloudier when these more sophisticated models that are necessary for a post-crisis world are confronted with the various creative interventions implemented by central banks since 2008 generally referred to as quantitative easing (QE). Finally, Binder et. al. confront the modelling challenges created by the growing acceptance of so-called macroprudential instruments deployed to accomplish for financial stability what the central bank policy rate was able to do to deliver inflation stability. Unfortunately, there exist a plethora of macroprudential policies and, together with the profession’s inability to date to agree on how to define financial system stability, research on the appropriate mix of monetary and macroprudential policies are in their infancy (See Lombardi
and Siklos 2016, and references therein). The age-old rules versus discretion debate, thought suspended for a time when the eponymous Taylor rule seemed an adequate enough depiction of how monetary policy can be carried out, has been revived. Once again, as this is written, we are a long way from achieving any new consensus on these questions.

All of the foregoing attempts to deal with how to model economic activity and its dynamics stem from the need for central banks that aims to control inflation and, now, maintain financial system stability, to provide an outlook for the economy. Despite the fact that a marked preference for ‘data dependence’ to explain why central banks delay a return to historical norms for interest rates, financial markets, among others, continue to demand and expect central banks, in particular, to provide regular updates to their forecasts. As Siklos’ chapter points out, just as DSGE models were accused on neglecting important economic features, economists were fond of assuming that expectations could be treated as uniform or, rather, that in explaining the forward-looking nature of monetary policy, one needed only a single expectations proxy. Little effort was devoted to recognizing that there exists considerable diversity in expectations and that disagreement across forecasts can provide critical information about the appropriate conduct of monetary policy. Indeed, it is only comparatively recently that central banks themselves began to publish staff forecasts. Even fewer central banks publish the forecasts of members of the monetary policy making committee. Both, however, are critical ingredients to evaluate not only how well central banks see the economic outlook but as a means to ascertain the extent to which households and professional forecasters might be influenced by such forecasts. Indeed, the importance placed by central banks on the need to ‘anchor expectations’ is dependent on how the public in general interprets central bank forecasts.
Siklos’ empirical evidence for nine advanced economies highlights not only the need to measure and determine the evolution of forecast disagreement but also to understand its determinants over time. Global factors matter greatly it seems and the selection of the benchmark against which to evaluate how much forecasters disagree are critical ingredients. Other determinants considered include central bank communication and fluctuations in energy prices. The bottom line, however, is that economics would do well to borrow some aspects from how weather forecasts are generated. If model uncertainty is rife then there are multiple paths for the economic outlook depending on the model which performs best for different forecast horizons. Nevertheless, and this is misunderstood by some central bankers, economists are unlikely to be able to entirely emulate weather forecasting for at least two reasons. First, it is unlikely, in spite of the tremendous growth in the amount of available data, that policy makers will be able to acquire the sheer volume of data employed in forecasting the weather. Second, and perhaps more importantly, economics cannot count on some of the physical laws that assist in narrowing the degree of model uncertainty around certain forecasts.

It is understandable that, at a theoretical level, the search for a better or a new economic model continues and many of the chapters in the Handbook point this out in a variety of ways. Nevertheless, at an empirical level, there is no reason to restrict inference to one model. Indeed, developments in empirical modelling are especially helpful because we are able to harness useful information from a large variety of models. Surely, this is a more appealing approach in conveying the uncertainty around forecasts than more traditional methods that rely on the measurement of uncertainty around forecasts from a single model. Although many central banks have or claim to have adopted such a strategy it has either not been properly communicated or the b
A Postscript: What’s in Central Banking’s Future? Fintech and the Central Bank

Like other financial institutions, central banks have been affected by the development of financial technology both in their own operations and in their regulation of the financial sector. Payment systems in particular have changed out of all recognition, with the ability to transact electronically in real time replacing batched paper based transactions at the end of the day. Similarly the rise of internet banking and debit and credit cards has transformed how people behave. Mobile devices are providing a further step forward. The role of the central bank in the system has evolved steadily over the last 50 years in the face of these changes but the process has been evolution rather than revolution.

In advance, all such innovations may make a dramatic impact on financial activity. Indeed, one might want to argue that without the improvements in financial technology, the global financial crisis would have been less extreme. However, it is being argued that some of the ideas being developed at present in what is labelled ‘fintech’ (although this is not a new term) have the potential to disrupt how central banks behave in exercising their roles in the system as providers of payment systems and currency, regulators and even in monetary policy. In other words, this will involve more than evolution. IMF (2017) provides a survey of the issues.

Maybe in practice these ideas will not amount to much but it is worth tracing through how their potential might be realised in case they do have a substantial effect over the coming few years on the economics of central banking. Two which offer a particular possibility are cryptocurrencies, and blockchain and related ledger systems, which between them could not merely transform how people transact but alter the role of the central bank in the economy markedly.
After a brief introduction to the technologies we explore the implications for a central bank issued digital currency; monetary policy; payment and settlement; regulation – the encouragement of innovation and the protection of consumers.

Cryptocurrencies and the blockchain

These days the vast majority of money is held in electronic (digital) form, whether as firms’ and households’ deposits in banks and other financial institutions or by those banks in deposits at the central bank. The amount which is held in physical currency (notes and coin) is trivial by comparison. The same disparity applies to transactions – the vast majority by value are also electronic, whether through credit and debit cards, internet banking or inter-bank transfers. Cash is still used in retail transactions in part because its use is subsidised but also because nothing else is quite so convenient. It is also used in illegal and black market transactions because of its anonymity and this may account for the large amount of high value notes in circulation.

What cryptocurrencies offer is a different way forward to just letting the use of cash wither away. They offer a means of payment using a digital currency that is highly protected so that users can be convinced that their balances cannot be attacked by others and that the instructions they give will be accurately executed. At present there are around 1000 of these currencies but most are very small and only Bitcoin is at all well-known and used. Even so the level of transactions as opposed to the theoretical value of the holdings is very small. People are holding the currency in the hope of making capital gains rather than because of the transactional advantages.

These currencies are private, in the sense that they are not issued by governments or central banks, and hence need an open and verifiable approach to establishing transactions and the
ownership of balances. This is where blockchain and other distributed ledger technologies come in. Each set of transactions in Bitcoin needs to be verified before the system can move on and this can be done by anyone with adequate computer power. These sets of transactions, blocks, are then linked one to another to provide a complete history of each unit of the currency. Since these histories, or ledgers, of transactions can be held anywhere, this is known as a distributed ledger technology. As long as the majority of these ledgers come up with the same blocks the transactions are verified and the single path up to the present is confirmed. Traditionally ledgers have been held centrally by a trusted counterparty such as a bank or a central bank. Thus the user trusts the central counterparty rather than requiring multiple verification by independent sites.

Potentially, therefore, one or more cryptocurrencies could replace cash, card and bank-related transactions if people had sufficient confidence in them. This is course is a concern to central banks in that they do not have control over the system and to the providers of existing transaction services in that they might lose market share and see their profits fall. Indeed many think that because of these two drawbacks cryptocurrencies will never develop far – either they will be banned by the authorities or the traditional providers will come up with effective competition, such as the ability to transact in real time at the retail level which is currently being introduced. Not least among the concerns over Bitcoin and related cryptocurrencies is that they are being used for money laundering and they have a history illegal involvement (Popper, 2015).

However, currencies of this form do not have to be private. They could be issued by the central bank (Bech and Garratt, 2017). This could either be at the interinstitutional level (and several central banks including the Bank of Canada appear to be considering this at present) which would mean that all financial institutions allowed into the system could transact with each other in central bank money. (Bott and Milkau, 2017, offer a survey of the possibilities.) Or it could be
at the retail level, which is a much more revolutionary idea. Building on earlier work (Ali et al., 2015a,b), Barrdear and Kumhof (2016) have explored this in some detail. They suggest that the central bank could offer digital currency balances to people in return for government bonds. Thus the digital currency would be entirely backed by these bonds. It is debatable how keen people would be to hold much in the way of such balances if they were not remunerated.

Any interest paid would be clearly below the bond rate and presumably below the rate offered on deposits by the commercial banks. In countries facing the zero bound, this is a somewhat academic debate at present. The government is clearly going to be a gainer in this arrangement as the increased demand for bonds will lower the interest rate they have to pay on their debt. There is thus some attraction in the idea beyond the transactional benefits.

Whether the banks are losers will depend on the popularity of the system and the extent to which they lose profitable business – standard banking transactions are not where banks make their profits. (Offering subsidised transaction services helps retain customers for other products which are much more profitable.) Barrdear and Kumhof do not suggest that the central bank digital currency system should be the only one permitted. Banks could be expected to defend profitable lines of business and the idea that there would be no improvement in the services they offer as a consequence seems very unlikely.

Some people have an extra item on their agenda – if the digital currency were to drive out cash (or if cash were to be withdrawn) then it would be possible in theory to offer negative interest rates (Rogoff, 2017). However, there is no need to consider more extreme circumstances such as those to see digital currency playing a role in monetary policy. While monetary policy under positive interest rates operates through overnight or other short rates, Barrdear and Kumhof (2016) point out that the digital currency supply could be affected by a form of open market
operations. The central bank could offer to buy or sell government bonds as necessary to the holders of the central bank issued cryptocurrency and hence affect the money supply through a second route.

In the same way that digital or cryptocurrencies do not need to be private or dependent on the blockchain, blockchain or related ledgers could be used for transactions without the digital currency. Such applications can extend beyond immediate financial markets to real estate or indeed to what have become known as ‘smart contracts’. Such smart contracts have clauses that can be triggered automatically by the appropriate change in the circumstances of the contracting parties, e.g., if a balance falls below a particular level. However, one of the most popular financial market examples is securities (Mainelli and Milne, 2016). Indeed the technology is already being applied to crowdfunding and other start ups where the costs of a full scale launch on the market are prohibitive. Here, the requirements are very similar to a cryptocurrency. In the secondary market, shares may be traded in any fraction that makes sense and, on completion of the transaction the name on the register needs to be transferred from the seller to the buyer. If one wanted to be optimistic, then all stages in the transaction could be completed together through a similar ledger technology. But the scope here for improvement in both costs and time taken is considerable. Whether one would actually want to go as far as the whole process taking place in real time is more debatable as it would make market making of the traditional form impossible. Counterparties would actually have to have the securities they buy or sell and not merely need to be able to acquire them before the settlement date.

Blockchain style technologies would work well in the markets for less tradeable securities or for crowd and related funding schemes where the costs of transactions need to be and the parcels
that are traded may be very small. Being able to deal directly with counterparties could cut costs and avoid the need to employ brokers. Regulators would have to decide on minimum standards.

A proviso

The potential for an electronic approach to reduce transactions costs is clearly present. The worst costs come in cross border transactions. Processing a small transfer between New Zealand and Australian banks, for example, costs 25NZD at the originating end and 26AUD at the receiving end before exchange rate fees have been added. Thus it probably makes more sense to gamble and put a couple of banknotes in the post. These costs are particularly awkward for remittances where the recipient may not have a bank account. Indeed in Kenya, where it is more likely that people will have a phone than a bank account, you can pay in airtime. With Bitcoin there is no need to exchange the currency if the recipient can spend it directly – clearly something which could be achieved if the currency becomes more widely used.

However, it is widely thought that Bitcoin will not succeed, first because its anonymity (while the pseudonym of the owner is known there is no requirement for their actual name to be revealed) but more seriously because the time it takes to complete a batch of transactions is too long at present to make it convenient. Widespread usage would slow it down even further. Other cryptocurrencies may be able to get round this, Ethereum for example, and Bitcoin itself has spawned a new more efficient arm called Bitcoin Cash (The Economist, 2017).

Governance is also an issue. Bitcoin deliberately has open governance but this makes taking decisions and changing the protocols hugely complicated. Others, Ethereum included, have more concentrated governance so changes are practicable. There are other disadvantages to Bitcoin – it is mainly being hoarded at present rather than used, by a set of people who are hoping to see its
value rise. Not only does this risk a bubble and a stability threatening burst but it makes it difficult to use for transactions if the value is not predictable in real terms. (Bitcoin builds this problem in as its ultimate supply is capped.)

Some jurisdictions, the Federal Reserve included, treat Bitcoin and related cryptocurrencies as commodities. Thus its use is more like a system of barter. Currently this has tax advantages as a swap is not treated the same way as a purchase from the point of view of tax liability.

It is therefore important to focus on the generality of how such currencies could be used rather than on the very specific case (Leinonen, 2016).

Regulation and innovation

Fintech innovations face a difficulty in that most of them are being initially advanced by start ups and other small companies. They are also in a very competitive field so it is difficult to know what will succeed. Many authorities therefore have decided to make the rules easier for bringing the product to market provided that the overall size of the operation is small and the time period involved is relatively short. The Australian Securities and Investment Commission (ASIC), for example, has set up what is described as a ‘sandbox’, where such innovations can be developed inside the boundary of official oversight but outside the panoply of full regulation. The idea is to allow fintech companies to get a start in the market. However a second common route is for banks to buy up any promising ideas and then develop them themselves.

However, it still remains that consumers need to be protected. And it is difficult to advertise clearly which products are subject to consumer claims and which are not because they are in the sandbox phase or outside the system altogether. There are clearly serious problems for redress in systems where the counterparties are anonymous (rather pseudonymous as only their pseudonym
is known). It has been possible to track down Bitcoin transactors and for successful prosecutions to be brought for illegal transactions in the US (Popper, 2015). However, the costs of doing that for small claims would be prohibitive. This implies that any viable system is at least going to have to disclose the names of the merchants so there can be redress and a reasonable opportunity to ensure that other trading regulations are being upheld.

**Where Do We Go From Here?**

Thus the direction that these new technologies are most likely to go is towards making transactions, simpler, easier, less costly and rapid. The format is difficult to judge but there is a major vested interest for existing service providers to make sure that they dominate any such new system as well. Thus it is not clear whether it is encryption or distributed ledger technology that will be the key feature. Either way round the central banks will need to be alert to the more complex and less stable environment that these technologies can bring.

If of course they decide to be supplier of the cryptocurrency themselves then the impact on the central bank’s actions will be substantial and could change the role of the central bank in retail transactions markedly. Taking a much wider role as a provider would alter the balance of markets and would certainly generate a lot of controversy if banks and other private sector providers feel their business is being eroded. Nevertheless if that gave the central bank more policy tools the change might be supported. Similarly, if a central bank issued digital currency provides an opportunity for reducing the costs of government funding, then the chance of introduction is increased.
At some point governments may feel that the central banks’ responsibility should be reduced if fintech leads to yet another expansion of the central bank’s powers. The digital currency could be issued by another agency if it is to be 100% backed by government bonds.

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A draft of this chapter will appear as Chapter 1 in the upcoming *Oxford University Press Handbook* entitled *Economics of Central Banking* to be published in March 2019. Sadly, our friend and colleague, David Mayes, passed away in late 2017. We dedicate this book to him.

2 At least in advanced economies. The inflation target can be higher in emerging market economies. Siklos (2017, Appendix, has an up to date listing of countries that have adopted inflation targets, including the start date and annual changes (if any) in the inflation target levels and ranges.

3 Instead, there may well be a resurgence of interest in price level targeting. A few years ago the Bank of Canada was one central bank actively pursuing this agenda. The GFC put paid to more serious consideration of this kind of policy regime being implemented in practice. However, former central bankers (e.g., Bernanke 2017) now see a version of price level targeting as a means to escape the risks associated with the ZLB.

4 Quoted as such in the Guardian Weekly on November 4, 2005.


6 Arguably, the simplicity of evaluating monetary policy has taken a turn for the worse since QE and the willingness of some policy makers to permit inflation to be too high or too low for a time.