



Creating a leading central bank

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Introduction

Periods of crisis such as that caused by the COVID-19 pandemic call for decisive action from financial authorities to provide economic support and maintain public confidence. Central banks need to act as the first line of defense — protecting economies, while also stimulating the recovery of trading, commercial and financing activities.

It has been welcome and impressive, therefore, to see the way in which central banks have stepped up: their actions have been rapid and on an enormous scale.

In China, the People's Bank of China (PBC) gave a 3 trillion renminbi (RMB) injection into the banking system in the first half of February, with a further RMB20 billion at the end of March, along with other financing support measures. In the US, the Federal Reserve (Fed) slashed interest rates by a full percentage point to effectively zero and launched a US\$700 billion package of quantitative easing (QE). This was accompanied by a huge fiscal intervention — the US\$2.3 trillion Coronavirus Aid, Relief and Economy Security Act (CARES). In Europe, the European Central Bank (ECB) extended its QE program by more than 750 billion euros (EUR). The ECB Banking Supervisor has also allowed significant institutions to operate temporarily below the Pillar 2 guidance, the capital conservation buffer, and the liquidity coverage ratio. In the UK, the Bank of England slashed interest rates by 65 basis points to 0.1 percent, expanded its holding of government bonds by 200 billion pounds sterling (GBP), and made GBP330 billion of loans and guarantees available to businesses.¹

Additionally, a deal was agreed between six major central banks including the Fed and the ECB to lower their rates on currency swaps to help financial markets function normally.

The size of the aid is obviously a variable of the capacity of the country budget, and in some economies where constraints are more relevant, creative alliances with the private sector were also formed. This element was essential in developing economies such as in Latin America, Africa and Asia.

While all efforts have been directed to deal with the crisis, central banks also have to maintain and in some cases enhance their internal controls and risk governance. Supervising a banking system on the edge of an accelerated era of transformation is a major task. As a result, this year has been one of the busiest and most demanding for central banks in living memory.

Although some of the second quarter data indicates that global GDP and countries' specific outputs have not been as severely affected as initially projected, this crisis still seems likely to generate bigger impacts than even the global financial crisis (GFC) that began in 2008/09. The ramifications could last for many years and central banks will continue to have a pivotal role to play in enabling the recovery.

In this updated publication of the KPMG Central Bank network, we share some of our experiences in engaging with central banks around the world during the crisis — to support their responses and transformation projects, and help them formulate strategies that further bolster risk management and performance in extraordinary times.



Richardo Anhesini
Global Chair,
Central Bank network
KPMG in Brazil

¹ Central Banks respond to COVID-19, Frontiers in Finance, KPMG International, May 2020

Key priorities for central banks

- 1** Legacy data systems: Moving towards further central bank digitization
- 2** Greening the financial system
- 3** Stepping up the three lines of defense
- 4** Stepping up governance, risk management and internal controls
- 5** Central bank digital currencies: Which way forward?
- 6** Cyber security in a digital financial services landscape
- 7** Supervising stability and regulatory compliance
- 8** Transformation: Building a high performance organization
- 9** Implementing International Financial Reporting Standards (IFRS)
- 10** Dynamic Risk Assessment (DRA): Is it possible to predict the impact of a crisis like COVID-19?

1

Legacy data systems: Moving towards further central bank digitalization

Is another patch really a solution?

The late 90s and early 2000s ushered in what were the first real waves of “modern” information technology (IT) for central banks and the commercial banking community.

The new IT tools significantly reduced reliance on mainframe IT infrastructure and manual data manipulations, but they are in many cases still coupled with other inherent challenges. Such challenges include: the ever-increasing cost of maintaining and securing programs and systems; dependency on a high degree of manual interfaces; and legacy system limitations that make it hard for central banks to add much needed functionality and optimize risk mitigation. While these systems continue to serve central banks, they are often operating beyond their intended useful lives and purpose.

The critical technology legacy systems of central banks span virtually the entirety of their operational mandates — from data systems facilitating payments and supervision and regulation tools, to economics research tools and databases; from enabling internal support functions for human resources, to underpinning organizational enterprise management systems. Given the prominence and pervasiveness of the role of those systems, their operational stability is paramount to both internal and external

stakeholders. Central banks face three key objectives and challenges: *keeping it running, keeping it innovative and keeping it economical.*

A patchwork of fixes?

Over time, KPMG has seen organizations manage these challenges with varying degrees of success. There are inherent trade-offs — sometimes the investments in innovation are curtailed to make critical security improvements (often patches themselves), and in other cases, perceived cost pressures prevent management from deploying optimal solutions; instead they ‘buy time’ with more short-term manual workarounds. While some customized fixes are necessary in discrete instances, the trap is when such measures are pervasive and longer-term, as this likely adds costly complexity and instability to operations. The factors contributing to the reliance on ‘patching’ are many and typically include: a familiarity with the legacy systems; fear of the extent of change; and financial considerations that are too narrowly defined. On this last point, we have

observed that cost considerations may not appropriately account for existing internal maintenance efforts and the manual data manipulations that users must perform to try accomplishing the processes’ objectives. Another related underlying factor is interaction between central bank mission, IT strategy and budgetary planning. COVID-19 has made it clear that essential and urgent crisis response efforts may shift priorities and resources away from longer-term IT strategy initiatives.

In the face of these obstacles, central banks can and should broadly consider the benefits that result from a more digitized and adaptable IT framework.

Developing a world class IT operating model

A leading central bank IT operating model takes many years to fully develop. An initial step begins with a thorough analysis of the stakeholders’ current and forecasted operational and business needs as well as risk assessment and overall digitalization objectives. This scoping requires cross-functional input from the internal and

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external facing units of central banks. To make well informed decisions, management should also prepare a comprehensive baseline of the “all-in” costs of IT legacy systems themselves. As noted above, there are less obvious, yet often significant, operating efforts, which create costs that are frequently borne by frontline system users. These usually manifest themselves in the form of manual parallel tasks and data handling. Operational matters are best considered in tandem with IT architecture and central banks should consider these holistically when evaluating alternatives. Next, management should seek to understand the suite of benefits, functionality enhancements and related cost offsets that modern cloud-based or hosted solutions and services can deliver. Most of the newer generation of solutions can provide: an ease of integration and internal connectivity; expanded and flexible reporting functionality; and a higher degree of user satisfaction. These cost/benefit and case analyses are most effective when organizations leverage their own internal operational and IT resources with objective professionals who can contribute their external perspective and experience from other transformation IT projects. These facilitated analyses go step-by-step and deeply assess institutional processes and supporting technology tools and design the ideal replacements. Thus, management can see the benefits of leading-edge technology contrasted against a more complete picture of the true costs (IT and personnel) of its legacy operations.

Executive management leading the strategy

Executive management together with central bank functional heads and CIOs should provide lead oversight in determining the digital strategy. Taking the foundational information gathered about scoping and solutions, they should be able to make critical decisions about the modernization actions. These decisions should include prioritizing IT project and existing mission imperatives; proposing capital and operating budget envelopes; validating the selected implementation partners and IT products and solutions; and balancing the degrees of centralization versus decentralization (i.e. the operational and IT hierarchy in executing the strategy). This last point is important as there are numerous tactical decisions in projects of this scale. Leaders should develop and set clear delineations of authority and responsibility across the central bank to enable the strategy to be deployed at an appropriate pace.

Central banks can achieve the institutional resilience and flexibility that optimized digitization provides. Legacy systems will continue to age and strain to fulfil their purposes, but with thoughtful governance and deliberate action, management can balance the immediate mission and make progress towards a world class IT operational model.

“To make the best-informed decisions, management should also prepare a comprehensive baseline of the “all-in” costs of IT legacy systems themselves.”

How the KPMG Central Bank network can help

The KPMG network of central banks professionals and partners understand the unique nature of central bank operations and possess the multi-disciplinary skills to assist a central bank in its progress towards a future state, digitalized IT operating model.

Some of the ways KPMG firms clients balance IT performance, cost and risk:

- evaluate optimal IT governance, reduce risk, and increase people and organizational effectiveness
- define the IT vision and principles, target operating model and change management
- assess cloud suitability and define the target architecture that defends against the latest threat vectors
- design and implementation of improved processes and tools for IT service management, IT asset management, data and system security safeguards, project and portfolio management, and technology business management.

2

Greening the financial system

Central banks can have an important role in the greening of the financial system, delivering sustainable finance and taking account of ESG risks.

The financial system is undergoing a transformation in which ESG (environment, social and governance aspects) is integrated into financial strategies, processes, products and practices. Sustainable finance addresses the whole value chain in the finance sector and central banks are taking an increasingly active role in the development by e.g. issuing green bonds in countries such as France, Germany and Sweden. The process is backed up by regulation in many parts of the world, not least in the EU.

Financial stability is one key driver. IMF notes in its Global Financial Stability Report of April 2020 that disasters as a result of climate change are projected to be more frequent and more severe, which could threaten financial stability. The report argues that better disclosures and stress testing for financial firms can help preserve financial stability and should complement policy measures to mitigate and adapt to climate change.

In addition to climate change and the COVID-19 pandemic, there is a range of other environmental and social challenges impacting financial systems and institutions, such as aging populations, large-scale involuntary migration, the demand for diversity and resource scarcity. Insights into the

consequences of biodiversity loss and redistributed water resources are only starting to build up.

All these challenges present financial risks that impact upon a central bank's mission and core objectives, including financial stability, resilience and longer-term prosperity of countries.

Like other organizations, central banks are adapting to this changing risk landscape. Central banks must understand and assess the scope and size of the risks that arise to financial stability from societal challenges and the financial institutions that they supervise. More longer-term, forward-looking and judgment-based supervision is needed to examine these financial risks. In addition, they need to be able to determine effective strategies to make the financial system more resilient to any of these societal transitions and help the system to adjust itself efficiently, for example, by implementing policies to scale up sustainable finance.

An increasing number of central banks are taking action to adapt their scope of responsibilities, strategies, policies and organizational processes to the new risk landscape, including climate change as a systemic risk.

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In addition to these, central banks need to analyse what climate risks actually mean for them. are Assessment of the impact of adverse climate scenarios and other environmental factors on bank capital adequacy is also on the to-do list.

In December 2019, the Bank of England set out the narratives, specification and modelling approaches to three climate-risk scenarios — “orderly”, “disorderly” and “hot-house world” — intended to be the focus of the 2021 Biennial Exploratory Scenario. It also provided five alternative scenarios to help users assess the effects of different key assumptions. The BES is on hold due to COVID-19, but is expected to go ahead in due course. Similar exercises also take place elsewhere, for example in France with the bank supervisor ACPR. The central bank will provide scenarios for this.

In May 2020, the central banks and Supervisors Network for Greening the financial System (NGFS) published a

guide for supervisors on integrating climate change into prudential supervision. It sets out five non-binding recommendations for supervisors intended to co-ordinate a common regulatory response to climate-related and environmental risks.

The ECB is preparing a guide on how it expects banks to manage climate-related and environmental risks safely and prudently and to disclose these risks transparently under the current prudential framework. The guide includes supervisory expectations on governance and risk management frameworks, the formulation and implementation of business strategies, and enhanced disclosures. ECB encourages banks to develop stress-testing scenarios that incorporate climate-related and environmental risks. The 2019 EBA workplan on sustainable finance committed it to developing dedicated climate-related stress tests.

How the KPMG Central Bank network can help

KPMG firms’ network of Central Bank professionals work with central banks of varying size and sophistication to advance the integration of ESG factors in the core duties and organizational processes of the bank, including:

- quantifying and assessing the financial risks that can arise from climate change and other ESG factors
- benchmarking of sustainability performance against comparable institutions
- supporting with determining effective strategies and policy measures to mitigate financial risks from climate change and other ESG factors
- integration of ESG factors in core duties, organizational processes and systems and governance structures
- support with entering and operating on the market for green and social bonds
- providing up-to-date knowledge and understanding of regulatory changes around the world in the field of sustainable finance
- supporting with improving the central bank’s sustainability performance of it’s own organization, such as sustainable procurement and carbon footprint
- improving disclosure effectiveness of ESG performance of the bank towards society and other key stakeholders.

“

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3

Stepping up the three lines of defense

Central banks are no strangers to managing risk, but the bar for best practice on internal risk management and control is being raised. Central banks should be holding their own practices to account.

In the shadow of the 2007-2009 crisis, risk management, governance and internal control have been hot topics on board agendas across the entire financial sector. Central banks have helped to drive this focus — and it goes without saying that, as the standard bearers of quality and risk management, central banks need to hold themselves to the same high standards. What's more, central banks tend not to have the same loss absorbing capital buffers as their commercial bank counterparts. Without rigorous risk management frameworks, this can mean that a central bank governor risks picking up the phone to the national treasury and requesting further capital to absorb unforeseen losses. With central bank lending rapidly escalating in the global response to the COVID-19 pandemic, it's a risk that is only increasing.

The three lines of defense

So where should central banks focus in order to address this? Looking at commercial institutions, over the last decade many of them have brought about a rebalancing of the 'three lines of defense' within their organizations. The overall balance of employees in different areas of organizations has shifted from front line profit driven activities, into Compliance, second line risk and third line internal audit. Central banks have typically come later to this party, with the justification that they do not "take risk" to create profits and are not answerable to shareholders in the traditional sense. Nevertheless, the public and other stakeholders expect full accountability

and transparency and, when lending public funds is at stake, expectations around risk management, good control and overall operational resilience are high.

Clarity of management responsibility

As well as helping ensure the risks faced by the central bank are well-understood and within risk tolerance levels (linked to the capital agreements with the central bank's government/national treasury department), management should have clear delineation on who takes risk and who manages it. Having this structure can bring sizeable benefits to the central bank as well as its commercial counterparts. As one example, involvement of all three lines of defense in setting up new monetary policy schemes leads to dynamic and agile decision making, meaning internal controls and processes are thought through up-front rather than retrospectively.

Heads of Risk

Another interesting trend that we have observed within the Central Bank network recently is the growing number of central banks recruiting for a Head of Risk. This individual is typically responsible for establishing risk tolerance frameworks linked to capital agreements with local government and has the benefit of being an independent voice focused on risk management within the second and third lines at the governor's table, much like a commercial institution.

Not all central banks are yet equipped to meet such demands, while others are maturing and undergoing fundamental changes, such as introducing new organizational structures and processes. This may call for redesigned policies and controls, as well as training and recruitment to bring in new skills.

How the KPMG Central Bank network can help

KPMG firms' network of Central Bank professionals work with central banks of varying degrees of size and sophistication to advance governance, risk management and overall operating standards, including:

- rethinking the organizational structure, including core processes and systems for banking activities and reserves management
- refining the operation of the audit committee, executive management or risk management roles
- assessing the quality of internal audit
- enhancing financial reporting processes and associated internal controls.

4

Stepping up governance, risk management and internal controls

Good governance is not just a box-ticking exercise for central banks; it underpins the integrity and stability of a country's financial system.

Enhanced governance principles have emerged to respond to the current global financial and corporate crisis resulting from COVID-19. This has highlighted the importance central banks play in a country's security and protection of society. As the standard bearers of quality, central banks need to visibly raise the bar in terms of independence, expertise and professionalism, not just as an example to other institutions, but to help ensure the smooth running of the wider economy. In addition to robust policies and systems, the governor and the executive and non-executive board members should possess exceptional skills and independence in order to manage and oversee the bank's activities.

Like any organization, central banks have to manage performance, approve

budgets, use resources efficiently and build strong teams with the right capabilities. They need clear reporting frameworks and benchmarking of performance against comparable institutions.

The public and other stakeholders expect full accountability and transparency to uphold political independence and demonstrate that central bank policies are contributing to lasting economic growth.

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Case studies

Rehabilitating the national banking system

In a substantial exercise to value assets and liabilities, a KPMG Central Bank network team assisted the central bank and two commercial banks in the country to recapitalize. The KPMG Central Bank network mobilized a cross-border team of specialists in valuations, real estate, insurance and accounting, whose work has underpinned discussions between international creditors, the Ministry of Finance and the central bank. The subsequent full recapitalization (via the conversion of uninsured deposits into shares in the commercial banks) has formed a vital part of the restructuring and rehabilitation of the national banking system.

Enhancing the risk management system

The risks faced by central banks can be significantly different to those faced by commercial banks. Several years ago, one of the world's major central banks decided to apply certain risk management requirements, which are obligatory for commercial banks in its jurisdiction, to its own internal processes. The KPMG Central Bank network team analyzed the application and implementation of those requirements. This resulted in recommendations to the board on updating and enhancing the internal requirements and on making the internal processes more effective in practice.

5

Central bank digital currencies: Which way forward?

Bitcoin and other altcoins have been around for more than a decade now, yet they haven't replaced traditional currencies, money systems and banks. Nor could they have done, given their inherent nature. They remain a minority affair, an avant-garde phenomenon.

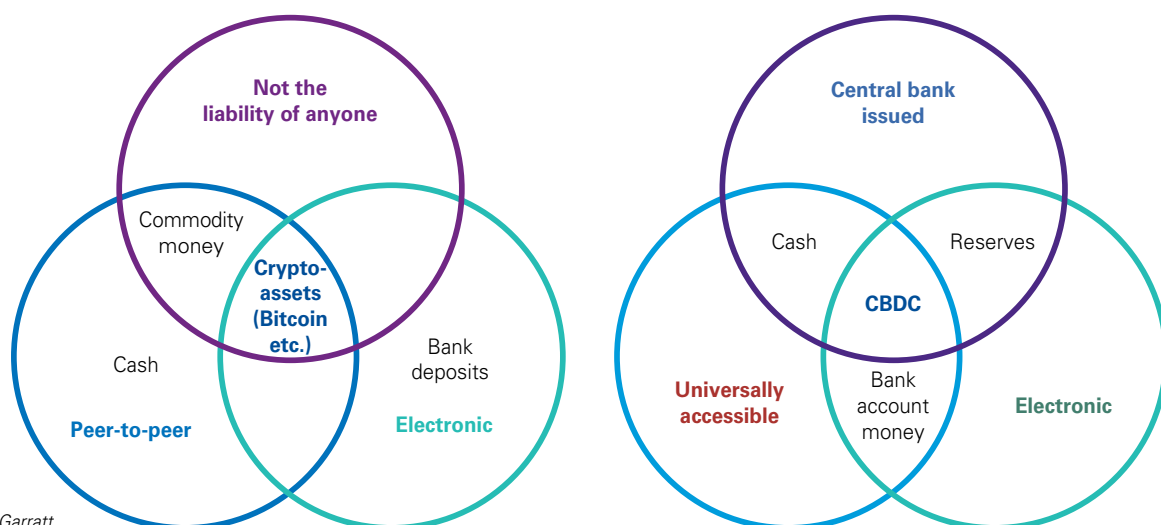
We no longer even regard Bitcoin and altcoins as cryptocurrencies, because for the most part they don't meet the definition, or any of the traditional features, of money. Instead, we treat them as a special category — crypto-assets.² Their biggest benefit for the mainstream system has been that of **intellectual stimulation**, spurring us to think of money in a new and different way.

One of the key consequences of this stimulation is the concept of **Central Bank Digital Currencies (CBDC)**, which has been under development for years. Intended as an electronic

alternative to cash, CBDC would maintain the direct link between the end users of money (households and firms) and their central bank. Normal bank deposits do not perform this role, despite also being digital records consisting of zeros and ones. There is *always* a third person between the depositor and the central bank — a commercial bank, often a private one. The differences between cryptocurrencies/crypto-assets, bank deposits and CBDC were neatly illustrated by Morten Bech and Rodney Garratt in their influential and still much cited article.³

Squaring the circle?

Trying to create an electronic alternative to cash can seem like squaring the circle. Cash is materialized and totally anonymous, whereas digital money is dematerialized and extremely difficult or even impossible to circulate entirely anonymously — which has kicked off a large debate about the *technological infrastructure* on which to base CBDC. Inspired again by crypto-assets, some central banks are considering using distributed ledger technology (DLT), a more general version of blockchain, but one that has little in common with the original blockchain created for bitcoin



Source: Bech, Garratt

² This definition has been established by key international authorities like the Bank for International Settlements (<https://www.bis.org/bcbps/publ/d490.pdf>), or the Financial Stability Board (<https://www.fsb.org/wp-content/uploads/P160718-1.pdf>).

³ Bech, M., Garratt, R.: *Central bank cryptocurrencies*, BIS Quarterly Review, September 2017, based also on Bjerg, O.: *Designing New Money — the policy trilemma of central bank digital currency*, Copenhagen Business School Working Paper, June 2017; and Committee on Payments and Market Infrastructures: *Digital Currencies*, November 2015.

by the mythical *Satoshi Nakamoto*. The original blockchain was designed as a completely public and open network where transactions are verified through a complex, slow and energy-intensive process of decentralized approval based on economic incentives for ecosystem participants (known as “miners”). Central banks are not planning to use an open, public and fully decentralized network, and it seems that DLT is being employed rather to enhance the technological attractiveness and innovative image of CBDC. No wonder, then, that no fully functional CBDC has been rolled out to date, even after years of intensive work.

The Swedish model

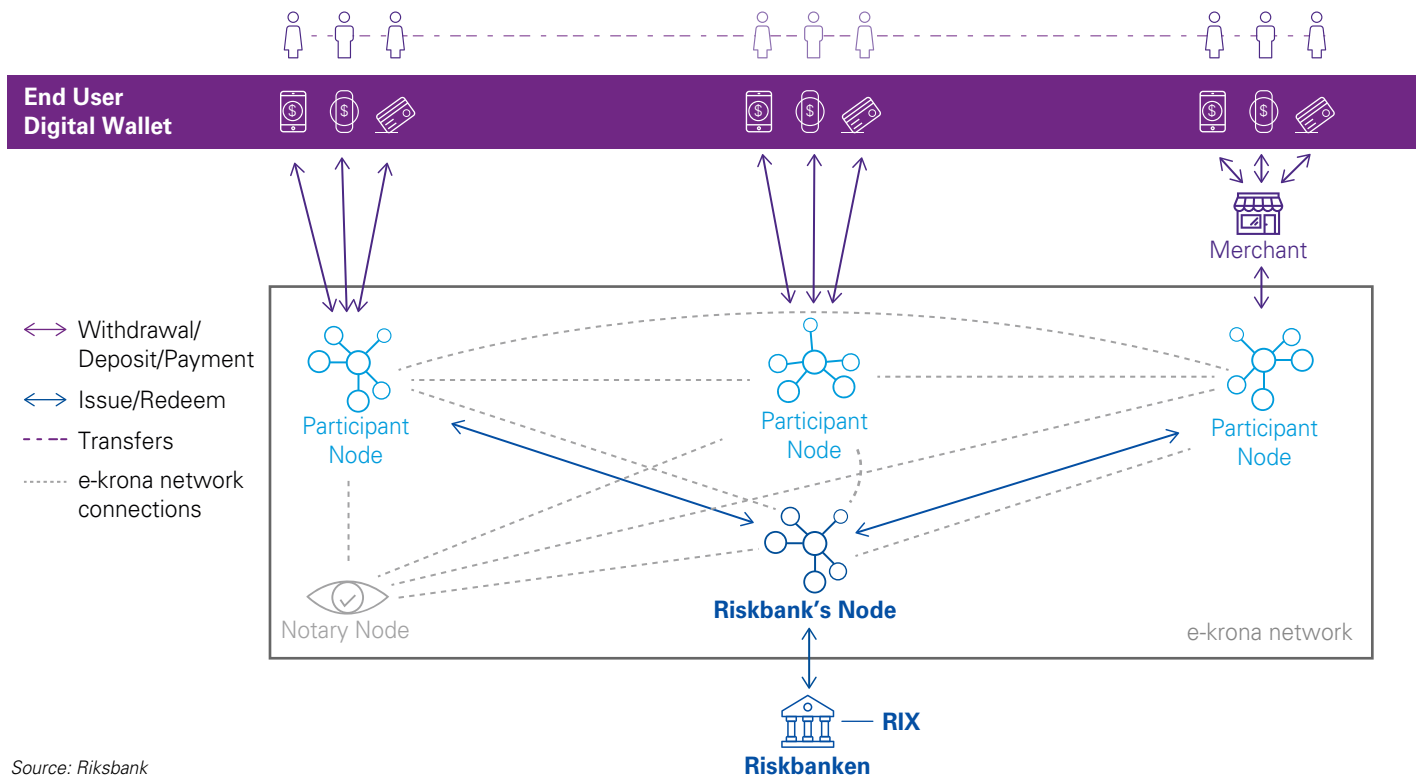
Not surprisingly, the CBDC front-runners are either countries where traditional cash is rapidly disappearing from circulation and central banks are therefore losing seigniorage income, or countries where new electronic

forms of payment are booming. A representative of the first category is Sweden, where the share of cash in the stock of money has fallen below 2 percent. The Swedish central bank, the Riksbank, was one of the first to start experimenting with CBDC. This February, just before the outbreak of the COVID-19 pandemic, it initiated a pilot for its own CBDC, the “e-krona”.⁴ This token system — based on the company *R3’s Corda* DLT platform — offers a parallel infrastructure to the existing payment system. It’s a very long way from the original blockchain, as it is a closed system fully controlled by the central bank. The central bank alone decides who gets to participate in the system. Payments are made through a digital wallet installed as an app on a mobile phone or PC. As the following figure shows, the Riksbank runs the network, but transactions are made between the participants themselves, each of which has their own node. The system also has a

notary node which, as an authority, assists in verifying token transactions. It’s a two-tier system in which e-krona are issued to commercial banks in the first tier and distributed to end users in the second. The pilot is to test whether this non-anonymous mechanism can work as a cash substitute.

The Chinese approach

A representative of the second category is China, where the number of mobile payments increased 36-fold between 2013 and 2018 (from 1.7 billion to 61 billion)⁵ and platforms such as Alipay and WeChat Pay have become technological leaders in the field. The Chinese central bank is therefore developing and — this year — piloting its “digital currency electronic payment” project, known as E-CNY.⁶ This, too, is a two-tier system, one in which new renminbi — forming a cash complement not a cash replacement — are distributed through banks. It again



Source: Riksbank

4 The Riksbank’s e-krona pilot, Sveriges Riksbank, February 2020.
 5 Retail CBDCS — The next payments frontier, OMFIF, London, 2019.
 6 Wilson, K.-A.: China’s next world-first, OMFIF Daily Commentary, London, 7 July 2020.

takes the form of an e-wallet app, although in this case the e-renminbi visually resembles the existing banknotes as faithfully as possible. The system contains a range of regulatory elements whereby the central bank limits transaction numbers and volumes and there will be mechanisms to limit the amount or to slow down the speed of E-CNY withdrawal to avoid the risk of a sudden outflow of funds. Like cash, E-CNY will be non-interest bearing. According to the central bank, the system will be in “controllable anonymity” mode. E-CNY will be rolled out more widely after it has been piloted under limited conditions.

A key area of innovation

Despite this progress, CBDC may seem to be jinxed by the problems mentioned at the start. Driven by the vogue for DLT, to sceptics it sometimes might appear to be a solution seeking a problem.

Nonetheless, it's a key area of innovation in central banking, and KPMG firms are prepared to provide consultancy in the following areas:

- advising on the current state of the conceptual, technological and technical debate on CBDC in key countries

- designing CBDC infrastructure based on state-of-the-art principles, respecting the requirement for transparency, operational resilience and tokenisation on one side and scalability plus interoperability on the other
- defining necessary and desirable regulatory and supervisory CBDC infrastructure elements
- performing the data analytics necessary for the correct calibration of CBDC pilots.



Case study

Helping to investigate alternatives

KPMG's Central Bank network professionals supported a European central bank in its effort to examine the pros and cons of the current monetary system of elastic money, and the ways that central bank and commercial banks interact in the existing monetary framework against the backdrop of the last financial crisis. Moreover, KPMG experts helped to analyze some alternative systems, their features and also practical challenges that would need to be addressed should the core of the banking system be remodeled along an entirely new set of principles of money creation.

6

Cyber security in a digital financial services landscape

How central banks are transforming their posture to deal with cyber risks in the financial services system.

Like all organizations, central banks are heavily reliant upon technology for operational continuity. A reliable, uninterrupted process gives the central bank, the government, financial market counter-parties and the wider population confidence that transactions (increasingly in real time) will proceed smoothly. Those central banks that oversee commercial banks' payment systems need to have the necessary skills and IT and reporting structures in place to identify systemic risks.

The risks are increasing, with new threats and attacks targeting several banks worldwide in recent times. The current COVID-19 crisis has exacerbated this risk. Customers who were originally reluctant to adopt online banking found themselves with few alternatives during lock-downs.

Banks have transformed their businesses models. Not only by enhancing services such as cashless payments and transactions, but also through the adoption of technology like APIs and artificial intelligence to interact with customers and provide new offerings. Central banks face the challenge to establish additional methods to identify and protect the banking system against cyber threats and to detect, respond to and recover operations during or after cyber security incidents.

Organizations can no longer rely on traditional techniques to protect themselves adequately against new threats because the attackers know what works. There are state and non-state actors present who possess significant resources to create complex attacks, which are neither easy to detect nor contain. The sophistication of attacks is increasing, along with the

expectations of counter-parties, the general public, management and data protection requirements.

Central banks work closely with commercial banks and other financial institutions and engage outsourced commercial service providers to enhance operational efficiency and effectiveness. These relationships often require the exchange of sensitive information and connection to external systems that introduce an assortment of risks. An external party's failure to restrict access to its IT environment could render connected central bank systems vulnerable to intruders.

Several initiatives have started to demonstrate commitment to cyber-security risk management and to provide ways to reduce central banks exposures. For example, The Bank for International Settlements (BIS) has carried out important initial work in this area over the past 2 years. The European Central Bank has recently started to collect information from 18 of the Eurozone's biggest banks, which will be obliged to inform regulators of 'significant' cyber attacks, the main objective being to identify trends and to inform banks of possible impending events.

Given the highly sensitive nature of central banks, any kind of negative incident could attract unwelcome publicity and undermine trust and confidence. Therefore, management will be keen to develop strong defenses against external threats. The KPMG Central Bank network has assisted central banks in developing a preventative approach to protect the digital environment. With improved threat detection, security analytics and response capabilities in all digital initiatives, banks

can better identify, investigate and respond to incidents in order to limit and reduce the impact of undesired events.

How the KPMG Central Bank network can help

KPMG firms' network of Central Bank professionals can assist by developing a clear digital strategy that fully supports central banks' objectives and which places a greater focus on the economic and business impact of technology. With organizational continuity as a key objective, the main risks facing organizations are addressed. As trusted advisors to governments and industry around the world, the KPMG Central Bank network helps to find creative and forward-thinking ways to address cyber security and enhance internal controls during the digital transformation. This includes:

- establishing digital and technology strategies
- project management, vendor selection and system testing
- carrying out business process reengineering and recommending new IT infrastructure and applications for existing and new payment systems
- assessing and developing strategies to mitigate external party risk
- carrying out digital risk assessments, including full cyber security transformation assistance
- evaluating and improving controls over insider trading, money laundering and procurement.



Case studies

Transforming core banking services

Over 3 years, a team of professionals from the KPMG Central Bank network worked closely with the central bank in one of the largest developing economies to produce a step change in efficiency, improving transaction processing, introducing real-time reporting, internet banking for customers and automated settlements and enhancing liquidity management processes. The team led the business process reengineering, helped with tenders and subsequent vendor evaluation, contracts and service level agreements and project managed the transition. The client now provides a far more effective core banking service to its stakeholders, with better funds flow.

A step change in IT performance

Through an understanding of the unique challenges of IT in central banking, along with the KPMG Central Bank network's commercial banking experience, the KPMG Central Bank network team was able to help a major European central bank with a wide range of important programs. The KPMG Central Bank network team worked on IT strategy (including infrastructure architecture), IT management (such as process optimization and IT compliance) and systems design. The central bank now has a far more comprehensive reporting and analysis capability and greater confidence in managing the monetary infrastructure, with higher levels of resilience, continuity and security.

Providing cyber security assessments

KPMG in Qatar was selected by the central bank of Qatar to conduct a cyber security maturity assessment (CMA) across the banking sector. Working with the support of KPMG in India, the KPMG Central Bank network team worked closely with the Qatar Central Bank to design a framework for the assessment that comprised leading cyber security standards. All banks were individually assessed across various parameters and each bank was then provided with a view on their CMA, and a holistic view across the banking sector was provided to the central bank with recommendations and a roadmap.

Providing cyber security transformation

KPMG in Brazil has been working together with complex clearing organizations, helping clients transition from a reactive to the proactive operating mode required for transformative change. The KPMG Central Bank network team assists clients to manage technological and system vulnerabilities and to address the core people processes, culture and behaviors related to the cyber security posture needed to properly manage cyber threats and risks. By bringing together specialists in information protection and business continuity, risk management, organizational design and digital, KPMG's Central Bank network team tailors strategies relevant to our clients. Using their extensive experience, they were able to design, structure and implement programs that deliver sustainable benefits.

Benchmarking the central bank's cyber security

Cyber risks are a top priority for many central banks, not only due to the criticality of central bank systems and the high confidentiality of their information, but also due to the rapid rate of evolution of new cyber weapons. One of the world's major central banks engaged a team from the KPMG Central Bank network to review and benchmark its processes and controls to manage cyber risks. The results showed the board that the bank was indeed up to the extremely high standard expected of a central bank, but also provided some recommendations to further optimize the internal controls and processes.

7

Supervising stability and regulatory compliance

Central banks have been at the heart of discussions and new rules on regulating and supervising commercial banks.

Commercial banks face a huge increase in regulatory demands for liquidity, capital requirements, recovery and resolution planning and customer-centric operations. Not surprisingly, many struggle to cope with the organizational and cultural change and the associated reporting and data aggregation requirements.

Central banks often have regulatory and supervisory authority over financial institutions to ensure they are safe and operating in a stable financial environment, to retain the trust of customers and the wider financial markets.

Central banks may assess which banks (if any) pose a risk to financial stability and work more closely with these institutions. They also coordinate with central banks and financial supervisors

of other countries when managing international financial crises and overseeing multinational groups.

Regulatory oversight has taken on new urgency in the wake of the global financial downturn and central banks want to be confident that they can perform this task competently, spot systemic or institutional weaknesses and reassure financial markets.

The recent crisis demonstrated starkly the need for stability in the economy, the currency, the financial sector and within individual financial institutions. Through monetary policy and macro- and micro-supervision, central banks can steady the economic conditions. To achieve this, they may also have to redesign their internal processes and systems.

How the KPMG Central Bank network can help

Operating in firms throughout the world, KPMG Regulatory Centers of Excellence offer telling insights into the implications of regulatory change and the direction of developments around the world, including Basel III, Solvency II, EU initiatives and the Dodd-Frank Act. This expertise is invaluable in:

- improving regulatory supervision, to ensure that commercial banks adapt their structure, conduct and culture, data and reporting and risk governance
- providing up-to-date knowledge and understanding of regulatory changes around the world.



Case study

Getting up to speed with Basel

Basel compliance is a critical objective for all commercial banks and an emerging markets central bank asked the KPMG Central Bank network team to carry out a comprehensive training program for all the country's banks. KPMG's Central Bank network professionals prepared and delivered country-specific training, covering necessary reforms, risk management and regulatory reports. Through a mix of classroom and breakaway sessions, the participants helped to provide far greater confidence in the banks' ability to meet the new standards.

8

Transformation: Building a high-performance organization

Increasing quality and efficiency with a view to becoming a high-performance and innovative central bank.

Central banks need to stay ahead of the financial ecosystems in their countries by embracing the dynamics of new technologies and current working trends. To achieve its strategic objective, a central bank needs to ensure it is fit for purpose and has the higher motivation to move forward.

In order to achieve its higher purpose of a motivated organization, the central bank needs to place the transition of the institution as a priority program. A key objective is to build a human resource framework that has the leadership skills to follow through the strategic values of the bank.

Transforming a central bank is always a challenge, as it traditionally has a

long-established work culture (some over many decades) impacting its employees. Any transformation and change requires tailored change management initiatives.

How the KPMG Central Bank network can help

KPMG firms' network of Central Bank professionals provide the understanding and insight to help central banks effectively navigate the transformation journey and help avoid the major causes of failure.

Most transformations are relentlessly complex whether they involve rolling out an incubated business, undertaking a major operating model upgrade, or implementing major organizational reform.

To help clients predict and avoid these pitfalls, the KPMG Central Bank network has a core set of project managers and directors who work with all of KPMG's service networks to assemble the right team, the right approach and the right delivery capability for any given transformational project or program.

- Conduct macro and micro organization design.
- Develop job grading and remuneration framework.
- Prepare job description, and workforce analysis.
- Prepare change strategy and plan.



Case study

An organization fit for purpose

A central bank in a high-growth market embarked on a transformation program to increase its quality and efficiency and to be the most innovative central bank in the region.

A team of professionals from the KPMG Central Bank network assisted the bank to validate its strategy and translated that into an organization design blueprint, which includes the enhancement of their operating model and recommendations for job profile, job level and FTE analysis to ensure the right people are at the right place in the right number.

The team also helped the bank to review the existing job grading and remuneration system and enhance it to ensure the criteria and weightings match the needs of the bank and that it is fit for purpose to support the execution of the bank's strategy of transition to a high-performing culture.

The central bank's governance framework was also enhanced by the KPMG Central Bank network team. The work included decision-making authority and reporting lines to ensure the governance framework facilitates the implementation of a robust review mechanism and promotes transparency in decision-making.

9

Implementing International Financial Reporting Standards (IFRS)

The harmonization of financial reporting across the globe is already a reality for most countries — following or converging to International Financial Reporting Standards (IFRS).

The convergence of central banks has been much slower, as illustrated in the accompanying diagrams. The primary reason is that IFRS have been developed with the main objective of responding to the necessities of capital markets and investors. This does not perfectly match the requirements of central banks, due to some specific reporting challenges of IFRS such as:

- Technical accounting issues:
 - foreign exchange revaluation
 - unrealized gains/losses and fair value measurement
 - gold accounting and reporting
 - cost of production of banknotes and issue of banknotes
 - special economic/financial assistance programs
 - provisions and pension liabilities.
- Disclosures requirements, namely:
 - IFRS 7 and cash flow statements
 - significant management estimates and uncertainties
 - related party disclosures.
- Consistency with the central bank law and distribution of realized/unrealized gains.
- Independence of the central bank.

How the KPMG Central Bank network can help

KPMG firms' network of Central Bank specialists have extensive experience in assisting central banks worldwide in transitioning to IFRS. KPMG's Central Bank network professionals have a unique blend of skills and long-standing experience in IFRS, the Eurosystem Accounting Guidelines and other recognized standards. Our experience enables us to recommend approaches for virtually any challenges that an IFRS conversion project may bring to a central bank.

An IFRS conversion project encompasses several components and perspectives:

- diagnostic and assessment of IFRS transition impacts and recommendations on potential measures to mitigate significant and unwanted effects
- solving specific technical challenges related to complex transactions and specific issues that affect central banks
- potential impact on the financial positions and statements of performance of central banks — the adoption of IFRS 9 requires detailed assessment of financial, operational and market impacts.
- recommendations to help ensure compliance with central bank laws and regulations as well as with reporting requirements to other organizations (such as the IMF)

- benchmark with peers on accounting practices, reporting models and finance function
- development of accounting manuals and procedures related to the preparation of financial statements and disclosures
- transforming and optimizing the finance function
- adjustment to accounting systems in order to bring them to compliance with IFRS
- extensive training programs delivered to the finance department of central banks.

KPMG Central Bank network professionals have collaborated with central banks across the world in IFRS matters:

- Bank of Portugal
- Central Bank of Kosovo
- Nacional Bank of Angola
- Central Bank of Nigeria
- Bank of Mozambique
- Central Bank of Banco Cape Verde
- Central Bank of São Tomé e Príncipe
- Nepal Rastra Bank

10

Dynamic Risk Assessment (DRA): Is it possible to predict the impact of a crisis like COVID-19?

The recent incorporation of increasingly rigorous mathematics into the science of economics has turned financial mathematics into a separate branch of learning, and has enhanced the quantification and measurement of risk.

Our existing human-economic network is being challenged by a viral pandemic network. Indeed, COVID-19 is essentially a network distributed threat that has piggy-backed on our human and economic networks to wreak havoc on global trade and capital.

Until a medical breakthrough is achieved, it seems the only way to break the viral network is by breaking the favorable, human-economic networks that it thrives on. We deny the virus the ability to spread by reducing our ability to interact – we restrict freedom of movement, curtail personal and physical interactions and reduce shared human experiences – essentially removing the human touch points.

The problem is that these human and economic network activities are the very core of what underpins modern day businesses' supply chains and workforces – indeed, the very essence of how they operate. The big challenge facing businesses today, therefore, is how to preserve these beneficial human-economic networks when we need to destroy them in order to prevent COVID-19 from spreading. Simply put, how do we stay connected when we have to isolate?

Staying connected

One answer lies in virtualization. Fortunately, recent years have seen a plethora of virtual tools emerge into the enterprise environment. They include mobile hardware such as smartphones and laptops; digital tools like virtual meeting and sharing forums; new communications models that combine web conferences, facetime and conference calls; and new workplace models that include long distance learning programs and established work from home policies and supports. While the virtualization of human interactions and networks has served many businesses well during the initial phases of the pandemic, few business leaders feel this is the optimal approach for the long-term. Productivity losses have been experienced along the way. And many are noting the unravelling of some of the network effects and productivity gains they had enjoyed through the centralization of business activities in major city centers.

Of course, given the alternative – allowing the business to grind to a halt and relying on government assistance or insurance pay-outs that may or may not carry the business through the crisis – virtualization is preferable. Indeed, overcoming COVID-19 will

require human ingenuity and financial resources. And that, in turn, requires institutions and business – keep functioning – responsibly – and in keeping with local health and safety requirements.

Understanding the risks

As the pandemic evolves, stakeholders are starting to ask tough questions about the organization's governance and risk management. Having now suffered a 'black swan' event, stakeholders will want to ensure the organization will be better equipped the next time.

Boards will be asking management for clarity on their supply chains' interlinkages and for assurance on their resulting networking resilience. The Finance Function will be seeking to understand the weaknesses in (and dependencies on) counterparties, credit and cash flows, as well as contemplating a revised approach to investment and capital allocation. The Chief Risk Officer (and the Board Committee to whom they report) will question whether the risk methodologies and Business Resumption Plans are best-of-breed and fit-for-purpose, and whether they make allowance for the networked dimension of risks.

In essence, the inter-relationships and co-dependencies between all factors of production – including the impact of the socio-economic environment – will need to be identified, understood and managed as a networked, complex and adaptive system.

See the linkages

KPMG Dynamic Risk Assessment (DRA) helps businesses quickly identify the relationships and inter-dependencies that need to be addressed; be it in their supply-chains, business environments (ecosystems) or chosen strategies.

DRA leads to a deeper understanding of how a business operates within an ecosystem. It highlights the critical flows that require major focus and uncovers the opportunities and vulnerabilities hidden in its idiosyncratic configurations. In the current environment, these 'wins' can help organizations off-set some of the efficiency losses that came from reducing and virtualizing human touch points.

COVID-19 is a network distributed threat. And its current mitigation requires the fragmentation of our beneficial networks. DRA provides businesses with a unique, expeditious network-illuminating and informing process to help them act quickly and cost-optimally in the face of today's network based-challenges.

How the KPMG Central Bank network can help

KPMG firms have spent over 15 years developing and enhancing Dynamic Risk Assessment (DRA).

The methodology identifies future risks, including unprecedented risks, which result from combinations of individual risks (i.e. recognizing their interconnectedness and causal relationships to other risks), future potential tail events, the opportunities to be found in systemic risk networks and the combination of discrete risks that present the greatest systemic threat to organizations. It also distinguishes between individually benign risks that can trigger severe

aggregate outcomes, and those individually benign risks that are unlikely to trigger severe aggregate combinations of risks.

These insights are helpful in assessing a bank's resilience:

- the most likely future combinations of risks present the combinations of risks to be tested in scenario analyses
- potential future tail events inform capital adequacy and liquidity management assessments
- the combination of future risks that present the greatest systemic risk to organizations inform the individual risk combinations to be tested and assessed for disaster recovery and business interruption(s)
- and the opportunities to be found in systemic risk networks are helpful in obtaining an understanding of the optimum order in which individual risks are to be mitigated (i.e. optimizing the mitigation spend/risk reduction outcome).



Case studies

KPMG's Central Bank network assisted a reserve bank in identifying and quantifying the consequences of expected future combinations of unprecedented risks, the identification of future tail events, combinations of individual risks that can undermine the credibility and reputation of the central bank and the individually benign risks that are scientifically likely to combine with other risks to produce severe aggregate outcomes.

The central bank used these insights to identify potential root causes to discrete but interconnected risks, identify the controls for the prevention, detection and remediation of these controls and to assign first, second and third lines of defense responsibilities to each of these.

Periodic reporting to the board was refined by decreasing the cadence of reporting on unconnected and individually benign risks, and increasing the frequency of reporting on individually significant and/or highly connected and/or high-velocity risks.

KPMG assisted a national securities regulator in identifying its strategic priorities and the future areas where it can make the biggest difference/contribution to society and the economy. DRA also identified the scenarios potentially most detrimental to the future economy, allowing realistic and practical scenarios and stress testing to be formulated, and response plans to be developed in advance. Future risks were stratified into contagious and more isolated risks, to be regulated accordingly.

The KPMG Central Bank network

The KPMG Central Bank network brings together knowledge and experience from its specialists around the world to help central banks deal with their unique challenges.

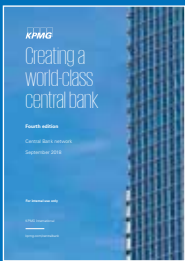
The KPMG Central Bank network has a wealth of industry experience and specialist knowledge, tapping into a global network of audit, tax and advisory services. KPMG's Central Bank network has worked with central banks in mature and emerging economies and has close relationships with many of the

major financial market players, regulators and leading industry bodies.

KPMG Central Bank network specialists engage closely with central banks around the world, advising them and providing input on key strategic challenges. In addition, the practice's steering group regularly considers emerging issues and studies central bank accounting practices through benchmarking studies and other thought leadership publications.

KPMG's Regulatory Centers of Excellence help drive and shape the latest regulatory developments and provide cutting-edge advice and support in supervising compliance. For central banks in fast growing economies, our Financial Services Growth Markets Network champions new innovations and coaches and challenges financial institutions and their regulators on strategies and operations.

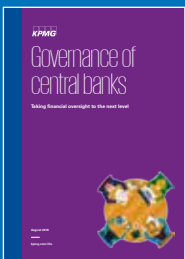
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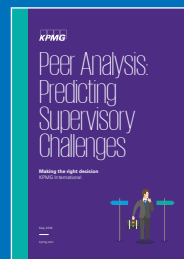
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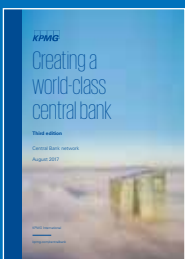
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