



1930
2020

Promoting monetary
and financial stability

The background of the cover features a stylized, overlapping graphic of economic data. The upper portion shows a series of vertical bars in blue, yellow, and light blue, with the text "Containment measures" overlaid. The lower portion shows several colored lines (orange, green, red, yellow) representing different data series, with the text "Policy interventions" overlaid. The entire graphic is set against a light gray background with a subtle grid.

Containment measures

Policy interventions

Annual Economic Report

June 2020

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Conventions used in the Annual Economic Report

std dev	standard deviation
\$	US dollar unless specified otherwise
mn	million
bn	billion (thousand million)
trn	trillion (thousand billion)
% pts	percentage points
bp	basis points
lhs, rhs	left-hand scale, right-hand scale
sa	seasonally adjusted
saar	seasonally adjusted annual rate
mom	month on month
yoy	year on year
qoq	quarter on quarter
...	not available
.	not applicable
–	nil or negligible

Components may not sum to totals because of rounding.

The term “country” as used in this publication also covers territorial entities that are not states as understood by international law and practice but for which data are separately and independently maintained.

Country codes

AE	United Arab Emirates	GB	United Kingdom	NZ	New Zealand
AR	Argentina	GR	Greece	PA	Panama
AT	Austria	HK	Hong Kong SAR	PE	Peru
AU	Australia	HR	Croatia	PH	Philippines
BA	Bosnia and Herzegovina	HU	Hungary	PK	Pakistan
BE	Belgium	ID	Indonesia	PL	Poland
BG	Bulgaria	IE	Ireland	PT	Portugal
BR	Brazil	IL	Israel	QA	Qatar
CA	Canada	IN	India	RO	Romania
CH	Switzerland	IS	Iceland	RU	Russia
CL	Chile	IT	Italy	RS	Republic of Serbia
CN	China	JP	Japan	SA	Saudi Arabia
CO	Colombia	KR	Korea	SE	Sweden
CY	Republic of Cyprus	KW	Kuwait	SG	Singapore
CZ	Czech Republic	KZ	Kazakhstan	SI	Slovenia
DE	Germany	LT	Lithuania	SK	Slovakia
DK	Denmark	LU	Luxembourg	TH	Thailand
DO	Dominican Republic	LV	Latvia	TR	Turkey
DZ	Algeria	LY	Libya	TW	Chinese Taipei
EA	euro area	MK	North Macedonia	US	United States
EE	Estonia	MT	Malta	UY	Uruguay
ES	Spain	MX	Mexico	VE	Venezuela
EU	European Union	MY	Malaysia	VN	Vietnam
FI	Finland	NG	Nigeria	ZA	South Africa
FR	France	NL	Netherlands		
		NO	Norway		

Currency codes

AUD	Australian dollar	KRW	Korean won
BRL	Brazilian real	MXN	Mexican peso
CAD	Canadian dollar	NOK	Norwegian krone
CHF	Swiss franc	NZD	New Zealand dollar
CLP	Chilean peso	PEN	Peruvian sol
CNY (RMB)	Chinese yuan (renminbi)	PHP	Philippine peso
COP	Colombian peso	PLN	Polish zloty
CZK	Czech koruna	RUB	Russian rouble
EUR	euro	SEK	Swedish krona
GBP	pound sterling	THB	Thai baht
HUF	Hungarian forint	TRY	Turkish lira
IDR	Indonesian rupiah	USD	US dollar
INR	Indian rupee	ZAR	South African rand
JPY	Japanese yen		

Advanced economies (AEs): Australia, Canada, Denmark, the euro area, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States.

Major AEs (G3): The euro area, Japan and the United States.

Other AEs: Australia, Canada, Denmark, New Zealand, Norway, Sweden, Switzerland and the United Kingdom.

Emerging market economies (EMEs): Argentina, Brazil, Chile, China, Chinese Taipei, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, Thailand and Turkey.

Global: All AEs and EMEs, as listed.

Commodity exporters (countries whose average share of commodities in export revenues in 2005–14 exceeded 40%): Argentina, Australia, Brazil, Canada, Chile, Colombia, Indonesia, New Zealand, Norway, Peru, Russia, Saudi Arabia and South Africa.

Country aggregates used in graphs and tables may not cover all the countries listed, depending on data availability.

Annual Economic Report 2020: Editorial

A global sudden stop

The past year has felt like an eternity. It is probably too early to tell, but future economic historians might consider the Covid-19 pandemic a defining moment of the 21st century. When, just over a decade ago, the Great Financial Crisis (GFC) hit the global economy, it was rightly considered such a moment. The pandemic's legacy could be even deeper and longer-lasting.

The economic impact of the coronavirus has been variously described as suspended animation, a hibernation or an induced coma for much of the global economy. These metaphors bring to mind two key features.

First, this sudden stop has been extraordinarily abrupt. Economic activity has collapsed even more steeply than in the Great Depression, to even greater depths than those of the GFC. Many economies shrank by an annualised 25–40% in a single quarter, and some saw unemployment rates soar into the teens within a couple of months. Moreover, and unlike the GFC, the crisis has been truly global, sparing no country in the world. The collapse has elicited a monetary, a fiscal and, for the first time, a prudential response that exceeds in scale and scope the one to contain the GFC. And, again, central banks have acted as the first line of defence, pulling out all the stops in order to stabilise financial markets and the financial system more generally and to preserve the flow of credit to firms and households.

Second – and this is what makes the crisis so unique – it is a policy-induced recession generated by repressing economic activity. It results from efforts to tackle a health emergency and to save lives through containment measures and social distancing – previously obscure terms that have thrust their way into our day-to-day vocabulary. This unprecedented configuration greatly heightens uncertainty about the economy's future evolution.

But, before turning to policy in detail, how has the economic crisis unfolded so far? In particular, what role have financial factors played?

A real crisis turns financial

The current economic crisis differs starkly from the GFC and previous financial crises. On this occasion, it was not the financial sector that toppled the real economy, but rather the real economy that has threatened to topple the financial sector, with potentially devastating knock-on effects as financial sector problems spill back onto the real economy. Non-financial firms were the first to take a hit, absorbing the full brunt of the blow as activity came to a halt.

The real economy has sustained immense damage. Locking people down has crippled the supply side. It is impossible to produce goods and many services remotely, without a physical presence at the workplace. Technology facilitates working from home, but factories still need workers. Moreover, the impact has been even greater on the demand side. Consumption shrivels when people stay at home all day. Online shopping helps, but the range of goods one might want to buy is limited and that of feasible services minimal. Tourism cannot take place without travel. The widespread loss of jobs and reduced income naturally depress spending.

In addition, investment has taken a hit from heightened uncertainty and supply disruptions, including those to global supply chains. It is as if, from one day to the next, once affluent societies dropped to the subsistence level.

Of course, the lockdowns did not affect all countries and sectors to the same extent.

The timing and stringency of the measures differ. At one end of the spectrum, China was the first to implement tough containment measures. At the other end, as the virus spread around the world, countries such as Sweden and, more hesitantly, the United States took a milder approach, at least initially. That said, the high degree of openness of economies nowadays has reduced, through trade, any local differences in the impact of the lockdowns – a reminder of how integrated the global economy has become.

The structure of production differs. For instance, as demand in China and worldwide ground to a halt, commodity exporters suffered the most. Oil producers were hit hardest, as the collapse of demand coincided with that of the oil cartel, leading to an unprecedented oil glut. Despite a renewed, albeit fragile, agreement among suppliers, by mid-April the oil price measured in nominal terms had reached its lowest level since 1986; in inflation-adjusted terms, it had fallen by around half. Indeed, at one point, the imbalance between supply and demand was so large that the price of WTI futures for near-term delivery turned negative. Countries specialising in sectors such as tourism saw larger drops in output. And so did countries at the heart of global supply chains.

Finally, countries also differ in terms of their exposure to financial factors and structural weaknesses. In this respect, emerging market economies (EMEs) stand to lose more. They have already faced huge pressure, with more no doubt to come. EMEs have experienced a triple sudden stop: in domestic economic activity, in capital flows and, for many, in commodity exports and remittances. Above all, they have faced this storm with much more limited fiscal space than most of their advanced economy peers. For many of them, poorer health systems and large informal sectors have further complicated the policy trade-offs.

Regardless of financial conditions, the shock would have been enormous. But, while not at the origin of the shock, the financial sector has played an important dual role. It has acted as a key transmission channel for the shock back onto the real economy, although central banks have been quick to neutralise this impact (see below). And, less appreciated, it has also helped shape initial conditions, heightening the economy's sensitivity to the shock. Consider each aspect in turn.

Given their forward-looking nature, global financial markets reacted faster than the real economy. True, when problems appeared to be confined to East Asia, markets hardly moved: in fact, by end-January, equity prices had reached a historical peak. But when news about the surprisingly rapid spread of the virus in Europe hit the wires in late February, equity markets buckled, volatilities spiked and bond yields bottomed. While, at the outset, markets functioned rather well, they continued to dance to the tune of the virus and became increasingly disorderly. Spreads soared on corporate and EME debt securities, which had largely been spared in the first phase. In March, a flight to safety turned into a scramble for cash, in which even gold and US Treasury securities were dumped to meet margin calls. It was precisely at this point that markets threatened to freeze entirely. While the US dollar markets, both on- and offshore, stood at the epicentre, other markets too were roiled to varying degrees.

Just like a virus, the crisis has been evolving. In some respects, the success of central banks in calming markets and shoring up confidence has even helped spark some market exuberance: at the time of writing, equity prices and corporate spreads in particular seem to have decoupled from the weaker real economy. Even

so, underlying financial fragilities remain: this feels more like a truce than a peace settlement. And more fundamentally, what first appeared to be a liquidity problem, more amenable to central bank remedies, is morphing into a threat to solvency. A wave of downgrades has started, alongside concerns that losses might cause widespread defaults.

Equally important has been the role of financial factors in shaping initial conditions. After slowly building up, partly on the back of unusually low and persistent interest rates post-GFC, financial vulnerabilities have exacerbated the impact of the shock on economic activity – and may continue to do so as the crisis unfolds. These vulnerabilities can be summed up as overstretched financial markets and high non-bank leverage.

First, aggressive risk-taking prevailed in financial markets before the pandemic. Valuations were frothy. Credit risk showed clear signs of underpricing in both advanced and emerging market economies. For instance, credit spreads were on the narrow side in the United States and even more so in the euro area. Moreover, as is typical in such cases, market liquidity was fragile. This was reflected in the popularity of illiquid investments financed through short-term funding, investment funds and other such vehicles; or in widespread relative value “arbitrage” trades by hedge funds that ended up causing turmoil in the US Treasuries market.

Second, and closely related, non-bank leverage was high. Corporate debt was elevated in many advanced and emerging market economies. Examples are leveraged loans, collateralised loan obligations and, much underappreciated, private credit – a form of financing for smaller and typically riskier firms that is a locus for highly illiquid investments, almost as large as the leveraged loan market and just as overstretched. Corporate debt levels burgeoned while credit quality deteriorated, as reflected in the rising share of debt rated BBB, just one notch above non-investment grade (“junk”). Household debt was high in several countries less affected by the GFC, typically “small” open advanced economies such as Canada, Australia and the Nordics as well as a number of EMEs, including Korea. Moreover, sovereign debt loomed large in several advanced economies and, above all, in EMEs, partly as a result of the policy response to the GFC. Finally, there was a strong increase in offshore US dollar borrowing, both on- and off-balance sheet, notably via FX swaps.

So far, these vulnerabilities have manifested themselves in various ways. These include the outsize initial market reaction to the first concerns about the virus; the liquidity squeeze on firms and the broad swathe of rating downgrades; the aggravated tensions in US dollar funding markets; and the sudden stop in capital flows to EMEs. But should the crisis not let up, we could see broader strains emerging among households and sovereigns too. Indeed, rating agencies have already started to downgrade some sovereigns or put them on a negative outlook.

A silver lining in this sobering picture is the state of the banking system. In contrast to the GFC, the pandemic found banks much better capitalised and more liquid, thanks largely to the post-crisis financial reforms coupled with a more subdued expansion. Indeed, as discussed further below, policymakers have looked at banks as part of the solution rather than as part of the problem. Huge drawdowns on credit lines have stretched banks’ balance sheets, but not by enough to force them into sharply cutting other lending. Banks have so far absorbed shocks rather than amplified them. In fact, the strains have shown most in the non-bank financial sector, which has grown in leaps and bounds post-GFC and was at the centre of the financial storm.

Nevertheless, banks face challenges. This real-life stress test is more severe than the scenarios supervisors adopted in their pre-crisis solvency exercises. One challenge is chronically weak profitability in a number of banking systems, most notably in the euro area and Japan. Profits are important: they form the first line of defence against losses and determine how fast banks can bounce back when they

struggle to obtain external equity and find themselves under pressure to keep paying out dividends, especially where price-to-book ratios languish below one. Both markets and rating agencies have taken notice: bank share prices have underperformed overall indices, credit spreads have widened and rating agencies have put banks on negative watch.

The policy response so far

What have policymakers done so far? The simple answer is that they have gone “all in” to cushion the blow. The response has generally been swifter, bigger and broader-based than it was for the GFC. The authorities have deployed monetary, prudential and fiscal policies in a concerted way that probably has no historical precedent. Consider each of the policies in turn.

Monetary policy

Central banks once again reacted swiftly and forcefully to stabilise the financial system and support credit flows to firms and households. The initial interest rate cuts, while called for, were limited in their soothing effect. The impact was much larger once central banks started to act in their time-honoured role of lenders of last resort, supplying badly needed liquidity and addressing dysfunctional markets. By stabilising the financial system and restoring confidence, these measures also prevented the transmission of monetary impulses to the economy from breaking down.

In so doing, central banks tailored their measures to the specific characteristics of both the shock and the financial system.

The size of the shock called for a response on an unprecedented scale. And because no country was spared, the response was truly global.

The nature of the shock required central banks to push harder than in the past. While some central banks could simply extend previously applied measures, others broke new ground. In addition to purchasing government debt on a massive scale, many central banks also bought private sector securities or relaxed their criteria for collateral, venturing further down the creditworthiness scale than ever before. Some extended support to local authorities or bought equities. Outright purchases went hand in hand with backup facilities for bank lending or for commercial paper programmes. Importantly, the funding support reached all the way to small and medium-sized enterprises. In the process, some central banks crossed former “red lines”, resorting to measures that would once have been seen as off-limits.

The rapid growth of market finance since the GFC meant that central banks once again broadened their historical role of lenders of last resort to that of buyers or dealers of last resort. Hence the greater incidence of outright purchases of securities, or commitments to do so, sometimes even open-ended ones. Indirectly, this relieved the pressure on banks, given their symbiotic relationship with markets, not just as dealers but also as suppliers of backup credit facilities. For instance, the Federal Reserve’s purchase of US Treasuries helped clear dealers’ crowded inventories, and its backup facility for commercial paper helped ease the pressure on bank credit lines. Furthermore, a larger number of central banks, in EMEs too, moved to stabilise a dangerous run on money market mutual funds.

The dominance of the US dollar in global finance again required the Federal Reserve to act as the international lender of last resort. Indeed, the Fed granted foreign currency swap lines to as many as 14 central banks, from both advanced and emerging market economies, reactivating many lines that had expired since the GFC. Moreover, it put in place a repo facility, open to all central banks, so that

they could use their Treasury securities to obtain dollar funding off-market. The huge scale of the Fed's actions, when contrasted with the much smaller firepower of international organisations such as the IMF, points to an unresolved vulnerability in the international monetary and financial system.

In addition, the crisis has shown that the development of domestic currency bond markets in EMEs – a priority ever since the Asian crisis of the 1990s – does not fully overcome the external constraints typically associated with foreign currency borrowing. In fact, it has largely shifted currency mismatches from borrowers to lenders, typically foreign investors. The outsize reaction of investors to losses on their domestic currency positions and exchange rate exposures elicited a forceful central bank response. As foreign investors unwound their carry trades, several EME central banks not only intervened in the FX market but also acted as buyers of last resort in their domestic currency markets, very much like their advanced economy peers. In addition, the much improved policy frameworks of EMEs allowed many to cut, rather than raise, policy rates in response to the output drop, as inflation expectations remained stable.

Prudential policy

In a remarkable development, prudential policy has played a key role in helping sustain credit to the economy and preventing banks from deleveraging. This is yet another illustration of the ground gained since the GFC by the macroprudential or systemic-oriented perspective on regulation and supervision. The banks would not have been able to support lending without the major international efforts to strengthen their balance sheets.

The authorities – many of which are central banks – adopted a wide array of measures. In particular, they encouraged banks to make free use of the buffers they had accumulated after the GFC. They released, where previously activated, the countercyclical capital buffer; they temporarily eased other capital and liquidity requirements; and they allowed a more flexible interpretation of the newly implemented expected loan provisioning standards or extended the corresponding transitional arrangements. Many also introduced restrictions on distributions, notably dividends, to further bolster banks' lending capacity.

Fiscal policy

The bulk of the response has rightly consisted of fiscal measures. Some, especially at the outset, were aimed at shoring up liquidity by, for example, postponing taxes or allowing debt moratoriums. But the vast majority transferred real resources to households and firms, either outright or conditionally.

Conditional transfers have taken the form mainly of credit guarantees, which are activated only in the event of default. Their key role has been to back up risk-taking so as to keep credit flowing. In some cases, the beneficiaries have been banks: it is one thing to have the resources to lend, quite another to deploy them without a clear incentive to do so when prospects are deteriorating and uncertainty looms large. In other cases, the recipient has been the central bank itself. Governments have provided full or partial indemnities to insulate central banks from losses, sometimes by taking equity stakes in special purpose vehicles funded by central banks. In a similar vein, some beneficiaries have been the creditors of non-financial firms, such as in rescue operations for airlines or other large businesses.

Outright transfers have focused on jobs, the unemployed and households more generally. Furlough schemes have been quite popular, taking over a certain share of the wage bill to keep people employed. Given the prevalence of safety

nets, many jurisdictions have also chosen to strengthen their unemployment insurance schemes; the need for discretionary measures in this area has naturally depended on the size of automatic stabilisers. Some governments have also made direct cash transfers to households. But many EMEs have faced serious challenges in reaching beneficiaries working in the large informal sector.

Institutional factors aside, the initial room for manoeuvre has strongly influenced the size and shape of fiscal packages. They have tended to be smaller in countries with less fiscal headroom. Here again, EMEs have generally been at a disadvantage.

Looking ahead

What are the policy challenges ahead? How do they depend on the evolution of the crisis?

To help frame the issues, it is useful to consider the phases that tend to characterise economic crises with strong financial elements, like the current one. There are three possible phases: illiquidity, insolvency and recovery. Importantly, the dividing line between phases is fuzzy and they overlap. In the economy at large, just as it is possible to see insolvencies when illiquidity is still widespread, so insolvencies may well occur as the economy recovers. And since, in the current crisis, the shock has initially hurt the business sector, it is there that the risk of insolvencies is greatest. Relatedly, unless banks run into trouble, it is easier to imagine a recovery even in the presence of bankruptcies. The general configuration and timing of the phases will naturally also depend on the initial financial vulnerabilities, notably the high debt levels, on the evolution of the pandemic and hence on the need for containment measures.

The immediate objectives of policy vary with the phase. When illiquidity is widespread, the objective in a standard financial sector-induced crisis is to stabilise the financial system, to ensure that intermediaries continue to function and to support the economy. In the current crisis, which started in the non-financial sector, the authorities may need to fund households and firms directly, especially if the financial sector is overburdened. If and when insolvencies emerge, policy has two aims. First, to restructure balance sheets – the size as well as the debt and equity mix – so as to deal with a debt overhang. Second, to promote the underlying real adjustment, by reducing excess capacity and helping shift resources from less viable sectors and firms to the more promising ones. If these measures succeed, they can pave the way for a healthy recovery. In that phase, the aim is to support the economy so that it can grow sustainably.

The role of monetary, prudential and fiscal policy differs according to the problem addressed. Monetary policy is critical in addressing illiquidity but is badly suited to dealing with insolvency: central banks lend but cannot spend. The comparative advantage of fiscal policy is to address insolvency, by temporarily transferring real resources to prevent it and by supporting balance sheet restructuring, as needed, once it occurs. Prudential policy's role falls somewhere in between: its primary function is to ensure that banks remain solvent and functional but, subject to that overriding objective, it can also help sustain lending. All three policies, in their own way, can support the recovery. The special feature of this crisis is that standard macroeconomic stimulus can have relatively little impact during the illiquidity and insolvency phases because of the containment measures and the shock to supply.

The current crisis is evolving rapidly. It is generally on its way out of the illiquidity phase: now the risk of insolvencies is looming while the timing of the

recovery is uncertain. And so is the shape of the possible recovery. It could be relatively swift if the containment measures are relaxed quickly and successfully, and if only limited sectoral adjustments are needed. It could falter, or stutter, if renewed lockdowns are implemented to deal with new waves of infection. It will be weaker if the shock is prolonged, scarring both corporate productivity and the consumer psyche, thus weighing on both demand and supply for a long time. In a slow or faltering recovery, debt overhangs could act as a major drag unless they are promptly dealt with. As time passes, it is likely that the authorities will be able to better calibrate their containment measures, thereby improving the near-term trade-off between saving lives and supporting the economy. Even so, policy choices are greatly complicated by the non-economic nature of the underlying forces, which are both unfamiliar and impervious to economic remedies.

The impact of uncertainty on policy is already clear. Two effects stand out: on the policies designed to help reallocate resources, and on the utilisation of policy buffers.

The post-crisis pattern of demand could be quite different from the pre-crisis one, with significant implications for resource reallocation. Some of the hardest-hit sectors and firms may have no viable future; others could thrive. Heightened uncertainty makes it harder to distinguish between insolvent but viable firms, which require restructuring, and insolvent, unviable ones, which should be liquidated. Complicating matters further are the initial vulnerabilities in the non-financial sector and the size of the shock. In the fog of battle, unviable firms may ask for protection and get it. Meanwhile, bankruptcy proceedings and the other mechanisms usually used for reallocating resources may prove ill-suited to dealing with large-scale problems. Governments could play a useful but delicate role. This could range from setting some broad directions for restructuring to introducing some abbreviated, less granular, processes, or possibly taking equity stakes in firms. Of course, this would raise governance issues of its own. The worst outcome would be failing to address the debt overhang altogether and allowing a persistent misallocation of capital, which, aggravated by low-for-long interest rates, would sap aggregate productivity.

Uncertainty as to how the pandemic will evolve raises especially tricky challenges for the use of policy buffers. After all, the buffers are limited in size. At some point, if credit quality continues to deteriorate, banks will need to replenish their buffers, not draw them down further. At some point, central banks may face the unpalatable choice of nudging even deeper into negative interest rates, and increasing their already outsize ownership of financial assets in the economy. And at some point, fiscal policy will need to change tack in order to prevent fiscal positions from becoming unsustainable. For some countries, the limits of sustainability are already in sight, particularly but not only for EMEs. All this puts a premium on taking a measured and targeted approach – just as with the policies designed to contain the pandemic. This would also make it easier to exit policies when needed – an absolute must. All this is a further reminder that precautionary cushions in all policies, far from being a luxury, are absolutely essential, regardless of how unlikely any adverse outcomes may appear. On this occasion, the exogenous shock started out in the form of a pandemic – which was very much on the radar screen of epidemiologists, albeit far less expected by others. Future shocks could come from climate change or less foreseeable hazards.

As the future unfolds, monetary policy will face serious challenges. This is so whether it is disinflationary or inflationary pressures that come to the fore. In either case, exit difficulties combined with limited policy space are likely to play a role.

While the future course of inflation is uncertain, disinflationary pressures are likely to prevail for some time. To be sure, the pandemic shock has tended to reduce

productivity. Unable to accommodate the usual number of customers because of social distancing rules, airlines, restaurants and hotels will face cost pressures. Global value chains are likely to sustain long-lasting damage, which may be partly irreversible. Even so, precautionary saving and the limited pricing power of firms and labour will probably persist, limiting any second-round effects. Indeed, the experience with previous pandemics is consistent with this picture. This scenario would rather closely resemble the pre-pandemic shape of things. It is a world in which central banks test the limits of their expansionary policies and struggle to push inflation up.

But as we peer further into the future, a quite different picture could emerge. In this case, we would be speaking not of inflation evolving within the current policy regime, but of a more fundamental change. Here the economic landscape would, in some respects, look like the one that materialised immediately after the Second World War. This scenario could come into being if a lengthy pandemic were to leave a much larger imprint on the economy and the political sphere. In this world, public sector debt would be much higher and the public sector's grip on the economy much greater, while globalisation would be forced into a major retreat. As a result, labour and firms would gain much more pricing power. And governments could be tempted to keep financing costs artificially low, allowing the inflation tax to reduce the real value of their debt, possibly supported by forms of financial repression. At that point, it would be critical that central banks should be able to operate independently to pursue their mandate in order to resist any possible pressures not to increase interest rates.

So far, the objectives of central banks and governments have coincided. Cooperation has come naturally. Central banks have not deviated from the pursuit of price and financial stability. But should inflationary pressures emerge at some point, tensions could arise. Then, the main institutional safeguard against such pressure would be central bank independence – a safeguard that raises the bar for successful government intervention. In this context, growing calls for “monetary financing”, regardless of their motivation, raise the risk of inching economies down that path. If taken far enough, this process could over time dent confidence in a country's monetary institutions, exacting a high price in the pursuit of ephemeral short-run output gains. After all, the hard-won anti-inflation credibility of central banks has been instrumental during the recent crisis in allowing them to cross a number of previous “red lines” to stabilise the financial system and the economy.

This analysis underlines once more the importance of striving to raise growth sustainably, while maintaining price and financial stability. The policy mix has been discussed in more detail in previous Annual Economic Reports. Today, more than ever, a premium needs to be put on keeping fiscal policy on a sustainable path through timely consolidation. The limits of monetary policy need to be recognised, as well as the importance of preserving and extending the post-GFC gains in strengthening the financial system's resilience. Finally, renewed efforts are needed to implement the necessary structural economic reforms, a path that has proved quite elusive both before and after the GFC. This calls, above all, for taking a longer-term view than hitherto. It means avoiding shortcuts and not being tempted by policies that, while beneficial in the short term, may raise significant costs in the long term. After all, however distant it may appear, the future eventually becomes today.

Central banks and payments in the digital era

That banks were in better shape than during the GFC was not the only silver lining in this crisis. Less appreciated perhaps, but no less important, financial market

infrastructures and payment systems withstood the shock remarkably well. They rode out episodes of market dysfunction and provided critical support for the smooth functioning of the financial system.

This puts the spotlight on a central bank function often taken for granted. This function does not make headlines as the central bank's role in crisis management or macroeconomic stabilisation does. Nevertheless, it is essential for any economy: serving as the foundation of payment and settlement systems.

At their heart, payment systems are a partnership between the private sector and central banks. The private sector plays the more visible role. It provides most of the payment instruments used by the public and it spearheads innovation, applying its ingenuity and creativity to serve customers better. The central bank supplies only one visible, if invaluable, means of payment to the public (cash), but it supplies the ultimate medium in which banks settle claims against each other (bank reserves). Moreover, and more fundamentally, the central bank ensures trust in the value of money and the payment system more generally – a core public good. And it is a discrete actor that, typically behind the scenes, promotes the efficiency of payments by encouraging competition and innovation.

This role has become more important than ever at a time when technology is transforming payments. New payment methods and consumer interfaces, including web- and mobile-phone-based payments, are flourishing. The Covid-19 crisis has accelerated the trend towards contactless payments. Large non-bank providers, such as big tech firms, have started to enter payment services, both improving them but also threatening to become monopolies themselves. There is little doubt that the digital revolution has helped reduce costs, improve convenience and broaden access to payments. That said, there is still considerable room for improvement, both for domestic and, above all, for cross-border payments. And many of these improvements will not just arise spontaneously; they require wise interventions that steer powerful private sector forces towards the public interest.

In this context, central banks play a key triple role as catalysts, operators and overseers. While most of the building blocks and policy imperatives for these roles have not changed, the new developments have changed their relative significance. In their role as operators and catalysts, central banks play a key part in fostering interoperability. This can help level the playing field, fostering competition and innovation. As operators, they can also pursue similar goals by directly providing public infrastructure, as in an increasing number of fast retail payment systems in recent years. In their role as overseers, central banks can safeguard the payment system's soundness and integrity, as well as boost its efficiency by directly altering private sector incentives and influencing market structure, not least by helping to shape laws and regulations that tackle anti-competitive practices.

Central banks can and should stand at the cutting edge of innovation themselves, not least when directly providing services to the public. Central bank digital currencies (CBDCs) are a prime example. CBDCs could represent a new, safe, trusted and widely accessible means of payment. They could also spur continued innovation in payments, finance and commerce. For CBDCs to fulfil their potential and promise as a new means of payment, their design and implications deserve close consideration, especially as they could have far-reaching consequences for the structure of financial intermediation and the central bank's footprint in the system.

Technology opens up exciting future opportunities for payment systems. It is up to central banks to harness those forces for the common good.

I. A global sudden stop

Key takeaways

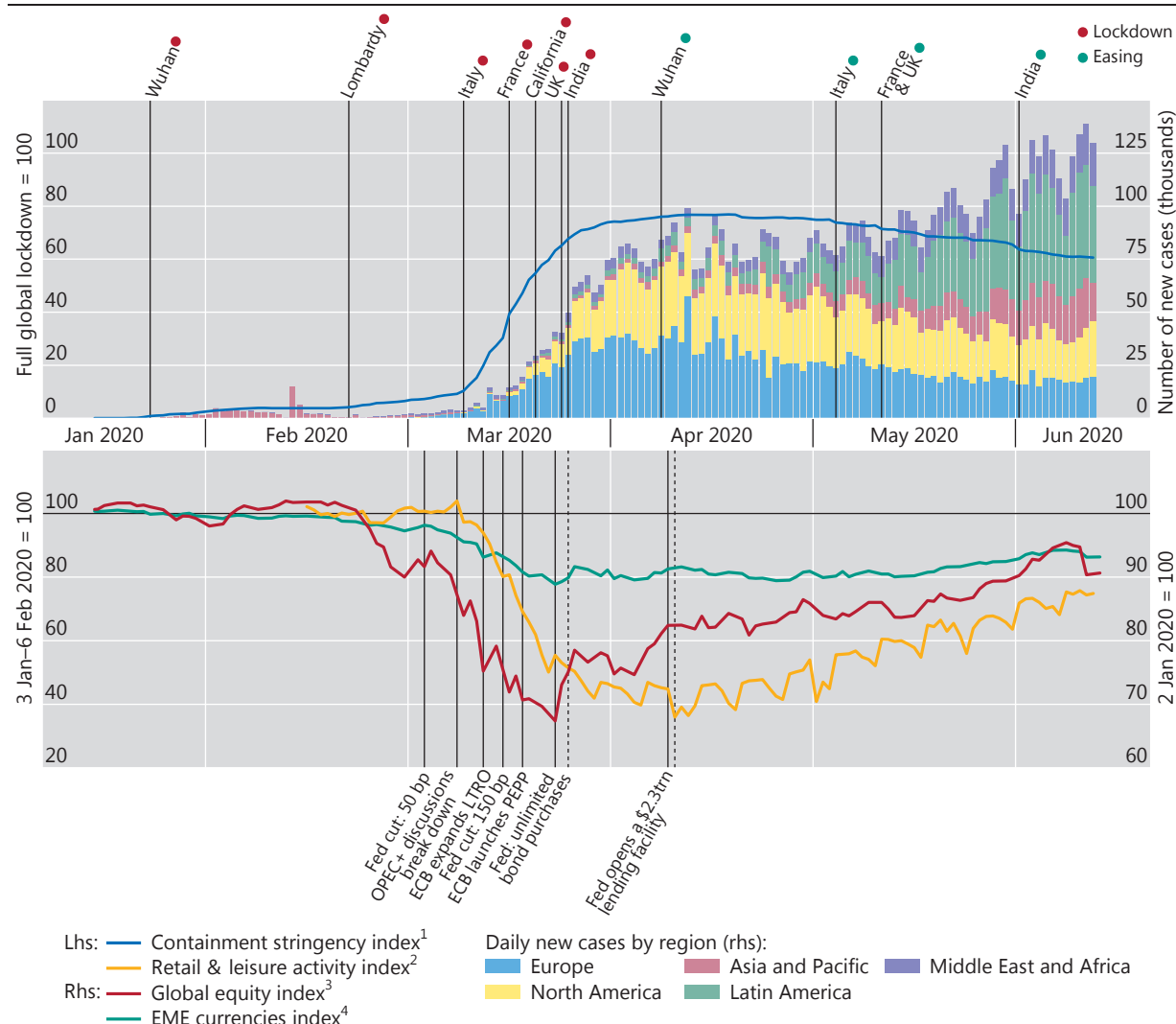
- *This is not a normal recession but a sudden stop in order to prevent a public health disaster. The policy response therefore had to be different too. Monetary and fiscal policies cushioned the blow mainly by providing financial assistance to companies and workers. The purpose is to limit social distress and avert unnecessary bankruptcies that could hold back the recovery.*
- *Financial amplification threatened to turn a deep but hopefully short-lived contraction into a calamity as investors ran for safety. A massive and unprecedented response by central banks and other authorities prevented a financial collapse from compounding the drop in output.*
- *Emerging market economies faced a perfect storm. In addition to the health toll, they had to deal with the losses in activity from domestic containment measures, plummeting foreign demand, collapsing commodity prices and a sudden stop in capital flows.*
- *The strength of the recovery will depend on how the outbreak evolves and how much economic damage it leaves in its wake. Debt restructuring will be required as resources shift from shrinking to growing sectors.*

The Covid-19 pandemic is the most devastating shock to hit the global economy since the Second World War (Graph I.1). Policies to contain the virus have deeply undercut economic activity. The recession's unique character poses unfamiliar policy challenges. On the demand side, lockdowns and social distancing measures have not only triggered a sudden stop in spending but have also made it highly insensitive to policy stimulus. On the supply side, containment measures have directly hindered production, with the repercussions spreading through local and global supply chains. The overall damage could leave permanent scars if persistent unemployment and bankruptcies follow.

Financial markets were profoundly shaken by the pandemic. Heavy sell-offs across a wide range of assets and an abrupt tightening of financial conditions threatened to derail the economy further. Key funding markets seized up as market participants became unwilling or unable to take on risk. Financial amplification and disorderly global market dynamics returned with a vengeance, as in 2007–09. It took a global swift and broad-based central bank response on an unprecedented scale to stabilise the situation.

There is no parallel for this cocktail of economic forces. The economic damage is much greater than in previous epidemics. Except for the “Spanish flu” of 1918–19, these were locally confined, and even then containment measures were nowhere as comprehensive as the current ones. Past financial crises, disruptive as they were, yielded to known remedies. By contrast, tackling the 2020 recession has involved a balance between averting a healthcare disaster and maintaining a functional economy (Box I.A).

This chapter reviews the economic disruptions wrought by the pandemic. It begins by discussing the various mechanisms through which the outbreak caused a collapse in economic activity. It then looks at the financial system's ability to provide



LTRO = long-term refinancing operations; PEPP = pandemic emergency purchase programme.

The vertical dashed lines indicate, respectively, 25 March 2020 (US: \$2trn fiscal package) and 10 April 2020 (EU: €500bn rescue package).

¹ Simple average of containment stringency index for countries with more than 1,000 cumulated Covid-19 cases. Country-level indices calculated from eight indicators of government response. ² Index shows mobility relative to baseline corresponding to median value of the same day of the week during 3 January–6 February 2020; simple average of the retail and leisure activity index across all countries covered by Google Covid-19 Community Mobility Reports. ³ MSCI all-country world equity index (in US dollars). ⁴ Federal Reserve Emerging Market Economies Dollar Index. An increase indicates a depreciation of the US dollar.

Sources: Federal Reserve Bank of St Louis, FRED; Johns Hopkins University; Oxford University, Blavatnik School of Government; Datastream; Google Covid-19 Community Mobility Reports; BIS calculations.

bridge financing to firms and households and identifies possible pressure points. The subsequent section focuses on the policy response. The final one looks forward and discusses possible near- and medium-term scenarios. Chapter II of this report investigates the response of central banks to the Covid-19 disruptions in more detail.

The Covid-19 pandemic and the policy trade-offs^①

A key question policymakers face in the midst of the pandemic is how to balance public health and economic considerations. Epidemiological research suggests that, without a vaccine or effective treatment, restrictions on social interactions are necessary to prevent the spread of Covid-19 from overwhelming public health systems and to save lives.^② But shutting down large parts of the economy has major costs as well.

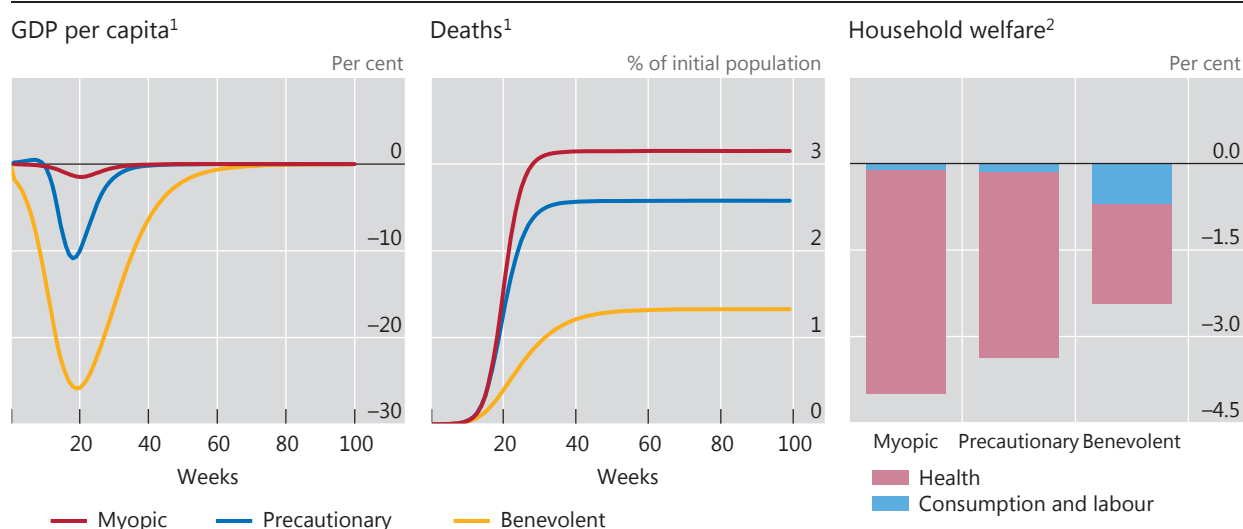
Economists have sought to evaluate this trade-off in two ways. One is to convert health and economic outcomes into a common unit of analysis so that costs and benefits can be compared. One such study estimates that three to four months of moderate social distancing measures could save about 1.7 million lives in the United States, mostly the elderly, who are at greatest risk from the virus.^③ Using the government's age-specific Value of Statistical Life (VSL) estimates (ie how much people are willing to pay for small reductions in their risks of dying from adverse health conditions), the study values the lives saved at over one third of US annual GDP. That said, VSL estimates can be much lower in other countries, tilting the balance in favour of less stringent measures.

The second approach to quantifying the benefits and costs of containment policy is to take account of epidemic and macroeconomic interactions using structural models. This approach combines a classic mathematical model of epidemics, the Susceptible-Infected-Removed (SIR) model, with a standard macroeconomic model that takes into account the death-associated probability (SIR-macro).^④ A key insight is that, even in the absence of containment measures, households have an incentive to cut back social interactions and economic activities to avoid being infected. But these actions tend to be too minor because households do not internalise the effect of their behaviour on the overall epidemic and the health of others. This creates an externality and provides a rationale for containment policy.

Calibrated SIR-macro models typically favour a containment policy that substantially restricts economic activity over milder voluntary social distancing – Graph I.A illustrates the simulations and welfare calculations of a simple calibrated SIR-macro model.^⑤ The left-hand and centre panels show, respectively, the evolution of GDP per capita and mortality rates during a hypothetical pandemic. The “myopic” case (red lines) is where households do not change behaviour to avoid becoming infected. A relatively small decline in economic activity occurs largely because some of those infected are too sick to work. But the infection spreads unchecked and stretches the healthcare system so that eventually more than 3% of the population die. The “precautionary” case (blue lines) is where households consciously avoid being infected through voluntary social distancing, by working and consuming less around the peak of the epidemic. This lowers GDP, but also the number of infections and the death toll. The “benevolent” case (yellow lines) shows a socially optimal

Macroeconomic and health outcomes from simple macro-SIR model

Graph I.A



¹ Deviation from a baseline with no pandemic. ² Effect of each scenario on household welfare expressed as an equivalent percentage change in household consumption.

Source: F Boissay, D Rees and P Rungcharoenkitkul, “Dealing with Covid-19: understanding the policy choices”, *BIS Bulletin*, no 19, May 2020.

policy response, which takes all externalities into account. This involves a larger and earlier suppression of economic activity, slowing the spread of the virus and reducing the number of deaths even further. Household welfare is highest because the gains from less illness and mortality outweigh the short-term costs of lower consumption (right-hand panel).

The high degree of externalities differentiates the present pandemic from public health challenges such as limiting the costs of smoking or car accidents. There is little middle ground between effectively containing the virus and experiencing an uncontrolled outbreak. The benefits of stringent containment may be highly non-linear – they are substantial only when containment is implemented decisively enough. Without public coordination, individual actions are likely to be suboptimally small and to last too long.

At the same time, the macroeconomic costs of containment are likely to grow with time and become more persistent the longer a lockdown remains in place, a possibility assumed away in most SIR-macro models. The destruction of organisational and human capital, from bankruptcies and layoffs, may inflict long-lasting damage on the economy and society. Keeping corporate bankruptcies to a minimum and averting a protracted slump is thus a key element in the overall evaluation. In countries with weaker social safety nets, the costs of prolonged lockdowns in terms of people's lives and livelihoods are likely to be much higher. These considerations, which highlight the complexity of the decisions facing policymakers, have yet to be incorporated into a coherent economic framework to inform the potential trade-offs between public health and economic activity.

① This box is based on F Boissay, D Rees and P Rungcharoenkitkul, "Dealing with Covid-19: understanding the policy choices", *BIS Bulletin*, no 19, May 2020. ② See N Ferguson, "Impact of non-pharmaceutical interventions (NPIs) to reduce Covid-19 mortality and healthcare demand", Imperial College Covid Response Team, *Report 9*, 16 March 2020. ③ See M Greenstone and V Nigram, "Does social distancing matter?", *BFI Working Papers*, March 2020. Moderate social distancing involves quarantine of symptomatic individuals and their households as well as stringent social distancing for those above 70 years of age. ④ An SIR model captures the joint evolution of susceptible and infected population as well as the rest who have recovered from the disease. Recent papers incorporating an SIR model into macroeconomic settings include M Eichenbaum, S Rebelo and M Trabandt, "The macroeconomics of epidemics", mimeo, 2020; C Jones, T Philippon and V Venkateswaran, "Optimal mitigation policies in a pandemic", mimeo, 2020; and F Alvarez, D Argente and F Lippi, "Simple planning problem for Covid-19 lockdown", mimeo, 2020. ⑤ The model is a modified version of Jones et al (2020), op cit. The calibration of epidemiological and macroeconomic parameters mirrors that in the literature. The cost of one death in an average household is conservatively set at five years' worth of consumption, compared with the 10 years' worth implied by the VSL analysis of Greenstone and Nigram (2020), op cit.

Economic activity plunged

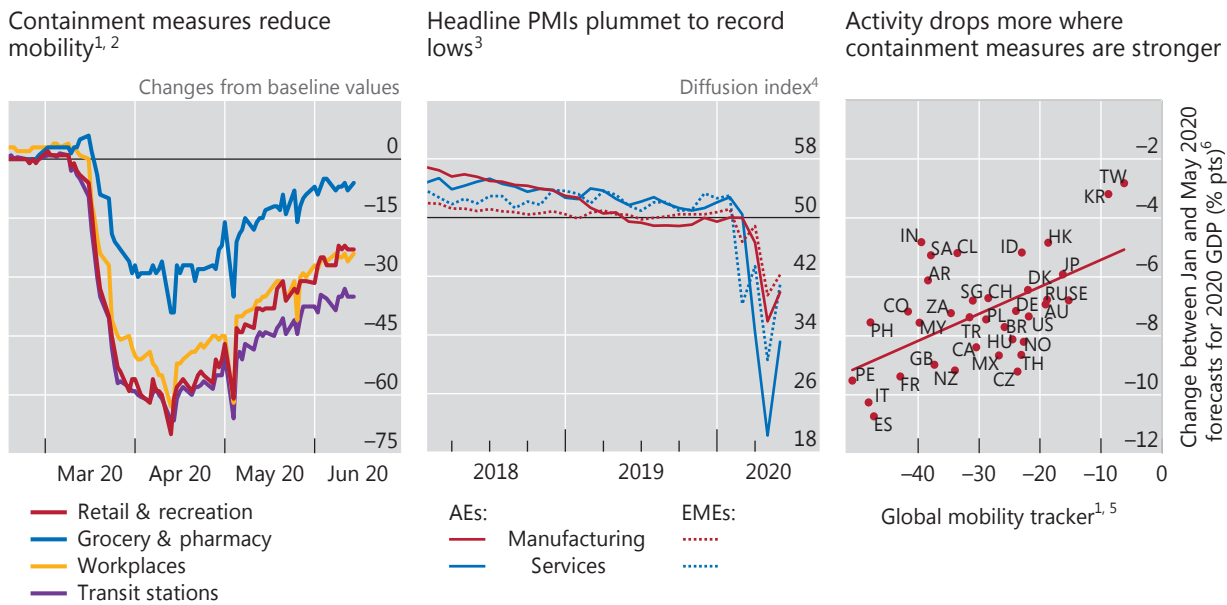
Global economic activity contracted sharply in March and April as policymakers forced an economic sudden stop. To contain the spread of the virus, authorities around the globe shut down some activities, mostly services that involve either large crowds or close human contact, such as entertainment, tourism, restaurants, retailing (other than necessities) and personal care (Graph I.2, left-hand panel). In addition, social distancing measures disrupted production in other sectors that require a high degree of collective activity on-site, such as manufacturing and construction. In manufacturing, disruptions also percolated along the (local and global) supply chain. Output may also have suffered if working from home reduced productivity.

Economic activity indicators plummeted. Purchasing managers' indices (PMIs) recorded new lows. The decline was steeper for the indices covering services, which are directly affected by social distancing (Graph I.2, centre panel).

In many countries, the ensuing contraction was the largest swing in economic activity in living memory. Global GDP contracted by more than 10% in the first quarter of 2020, even though most countries imposed containment measures only towards the end of the quarter; forecasters expect a much larger drop in almost all economies during the second. The April 2020 IMF forecasts saw the global economy shrinking by 3% for the year as a whole, a downward revision of 6.4 percentage points from assessments made at the beginning of the year (Graph I.3) and far

Containment measures hit economic activity

Graph I.2



¹ Index shows mobility relative to baseline corresponding to median value of the same day of the week during 3 January–6 February 2020. ² For each category, median value across all countries covered by Google Covid-19 Community Mobility Reports. ³ Weighted average based on GDP and PPP exchange rates; country composition may be different depending on data availability. ⁴ A value below 50 indicates that more firms are reporting deteriorating than improving conditions. ⁵ For each country, simple average of the daily values across retail & recreation, grocery & pharmacy, workplaces and transit station categories; data from 15 February 2020 to 21 May 2020. ⁶ Consensus Economics forecast.

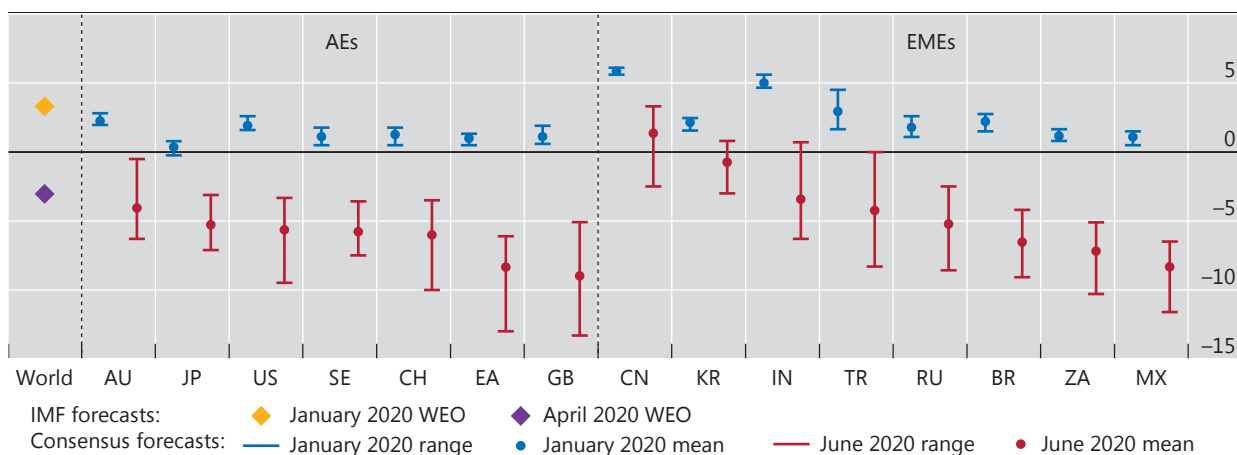
Sources: Consensus Economics; Datastream; Google Covid-19 Community Mobility Reports; IHS Markit; BIS calculations.

deeper than the slight contraction of 0.1% in 2009. Consensus forecasts for all major economies were also revised down substantially in the first months of 2020, in almost all cases to well below zero. The downturn also hit many more countries than in the wake of the Great Financial Crisis (GFC) of 2007–09. Revisions were larger in economies that put in place more stringent containment measures (Graph I.2,

Analysts expect a very deep recession in 2020

Year-on-year changes in real GDP, in per cent

Graph I.3



Sources: IMF, *World Economic Outlook*; Consensus Economics.

right-hand panel). Emerging market economies (EMEs) were particularly hard hit, given their typically less well resourced health systems and the constellation of economic forces (see below).¹

Consumption collapsed as the range of expenditure opportunities narrowed and economic prospects darkened. Many households saved more in response to high uncertainty about future income. Layoffs and wage cuts took their toll, with the blow amplified by the labour-intensive character of many of the services most affected. In the United States, for instance, over 40 million workers claimed unemployment benefits between March and June (Graph I.4, left-hand panel). In Europe, unemployment increased much less, although it would have been higher had it not been for special government schemes subsidising workers in employment.

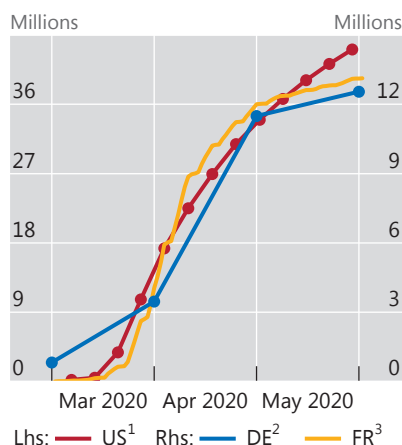
In many EMEs, the large informal economy hid the true extent of the rise in unemployment. The moderate rise in the official unemployment rate in many EMEs since end-2019 (Graph I.4, centre panel) does not cover the informal sector, which accounts for a significant share of employment in many economies, especially in Latin America and South Asia (right-hand panel). These informal workers are vulnerable to losing their jobs, as they tend to concentrate in small firms or in some of the hardest-hit services. The International Labour Organization estimates that, in the absence of income support measures, the earnings of informal workers in the first month of the crisis would have declined by up to 81% in Latin America and 69% in Europe and Central Asia.² In India, a local think tank estimates that some 90 million Indian workers, most of them employed in the informal sector as small traders and wage labourers, lost their jobs in just one month during the lockdown that began in late March.³

Depressed demand and high uncertainty also curtailed investment. Many firms cut capital expenditure and dividend payments to preserve cash holdings. Even so, simulations using firm-level data show that many firms have insufficient buffers to survive an extended shortfall in revenues without external support (Box I.B).

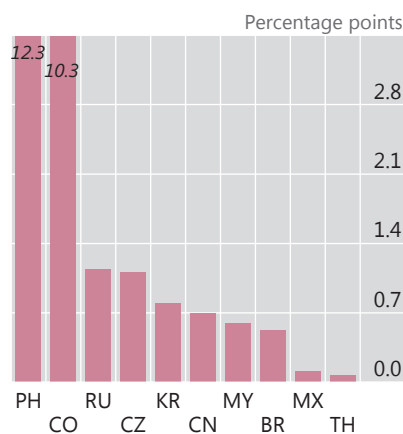
Unemployment soars

Graph I.4

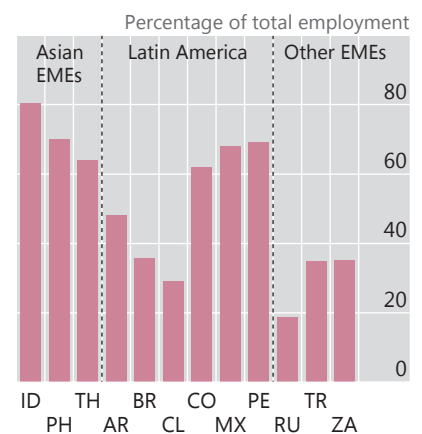
Surge in jobless, short-time workers



Unemployment rate in EMEs, changes from end-2019⁴



Widespread informal employment⁵



¹ Weekly initial jobless claims, cumulative since early March. ² Cumulative number of "Kurzarbeit" notifications, in terms of number of employees, since February 2020. ³ Cumulative number of "chômage partiel" applications, in terms of number of employees. ⁴ Data up to May 2020 or latest available, depending on country. ⁵ Data correspond to latest available data. According to ILO definition. For BR and MX, informal employment refers to workers not contributing to social security systems.

Sources: Inter-American Development Bank, Information System on Labor Markets and Social Security (SIMS); International Labour Organization; Datastream; national data; BIS calculations.

Covid-19 and the quest for lost revenues

The sudden stop in economic activity has sharply undercut corporate revenues, placing firms at the epicentre of the pandemic's economic fallout. Many firms face revenue reductions far beyond those typically experienced in recessions. Revenues have all but evaporated for some firms in the most shutdown-affected sectors – for example, air travel, restaurants, hotels and entertainment. Firms may not survive even if they use all possible levers to offset the drop, including drawing down liquid assets, rolling over debts coming due, borrowing new funds and cutting costs, particularly if the lockdowns persist for an extended period or activity recovers only very slowly.

The evidence suggests that the funding shortfalls – the additional funding needed to cover operating costs and interest expense – can be sizeable, up to about half a year's worth of revenues. This is the result based on simulations on firm-level balance sheets and financial statements for 33,150 firms from 19 major advanced and emerging market economies. Rolling over maturing debt and new borrowing can provide some relief. But even so, funding gaps remain. In many countries, government support equivalent to about two months of revenues would be needed to close the gap.

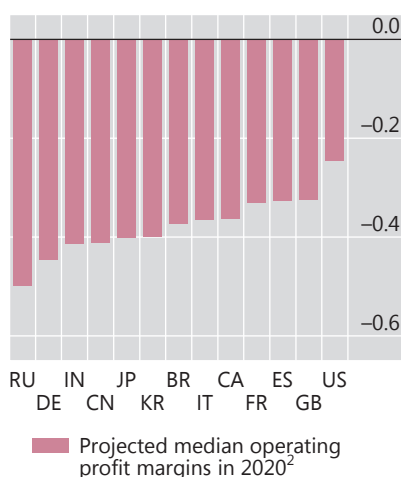
Gauging firms' funding gaps requires information about revenues and operating costs. The simulations are based on the assumption that firms' 2020 revenues either remain unchanged from 2019 or decline by 25% or fall by 50%, depending on how strongly the outbreak affects the sector. Revenues in the entertainment sector, for example, are assumed to fall by 50% and those in the utilities sector to remain constant. The cost impact is estimated for each industry based on the average relationship between changes in revenues and costs using data for firms over 2016–19. Unsurprisingly, these elasticities tend to be significantly below one, implying that lower revenues cause profit margins to shrink.

Large parts of the corporate sector face a major funding shortfall

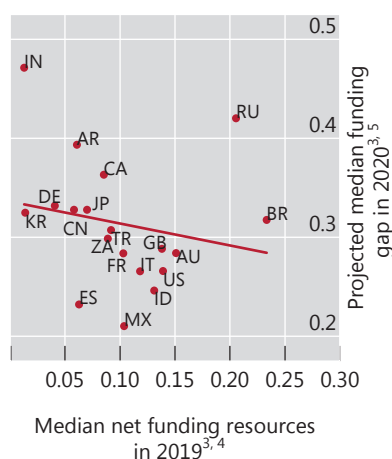
Results for the median firm in each country using 2019 data¹

Graph I.B

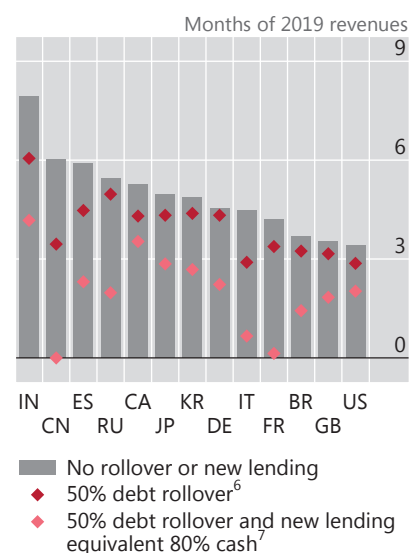
Operating profits bound to go deeply negative in 2020



Corporate sector likely to become significant net borrower in 2020



Financial support to close the 2020 funding gap



¹ Except for Spain, for which 2018 data. Sample of firms consisting of public and large private non-financial firms. ² Projected operating profits in 2020 as a ratio of operating revenues in 2019. Projection based on the assumption that operating revenues are to fall in 2020 by 50% or 25% or 0% relative to 2019 levels, depending on the sector that a firm belongs to. ³ As a ratio of 2019 cash holdings and operating revenues. ⁴ Net funding resources defined as (cash holdings + operating revenues) – (short-term debt + operating expenses). ⁵ Operating expenses in 2020 computed using sectoral cost-revenue elasticity (estimated on 2019 data) and the corresponding operating revenue scenario for 2020 (fall of 50% or 25% or 0% relative to 2019 levels, depending on the sector that a firm belongs to). ⁶ Months of 2019 revenues needed to close the 2020 projected funding gap when firms can roll over half their stock of short-term debt. ⁷ Includes the assumption from footnote 6 and, additionally, firms borrowing the equivalent of 80% of their short-term assets.

Sources: S&P Capital IQ; BIS calculations.

Based on these inputs, simulations show that a large number of firms are likely to face operating losses in 2020 (Graph I.B, left-hand panel). In all countries, the median firm would swing from comfortable profits (above 5% of revenues) in 2019 to losses well in excess of 20% of its 2019 revenues. Unsurprisingly, firms in countries with larger 2019 profit margins would face lower losses. But in some cases, this result could flip because of the sectoral composition of output. For instance, a severe revenue shock could drive Brazilian or Canadian firms deeply into the red, despite strong 2019 profits, mainly reflecting deep contractions in commodity sectors and, in Canada, transport equipment manufacturing. In Russia, oil looms large. In spite of strong profits in 2019, Russian firms could face losses in 2020 in excess of 40% of their 2019 revenues, reflecting the Russian economy's large exposure to oil.

Firms also need to continue serving their financial liabilities in addition to covering operational expenses. Given the extent of projected losses, liquid asset holdings could fall short of operating losses and debt service costs (Graph I.B, centre panel). Simulations suggest that the funding shortfall for the median firm could amount to 20% of the sum of operating expenses and debt service costs. In some countries, it could even reach 40%.^①

Large funding shortfalls suggest that firms will need financial support. This could take several forms. First, firms could ask for maturing debt to be rolled over. Second, they could borrow against their assets, even if these are temporarily illiquid. Lastly, they could benefit from grants, loan guarantees, direct loans or schemes such as furlough programmes, which reduce operating costs by covering part of the wage bill.

Such measures could make a big difference. For instance, in a scenario where firms cannot borrow and have to repay their maturing debt, the median firm in many countries would need public support equivalent to about six months of revenues (Graph I.B, right-hand panel). This would fall to an average across countries of two months of revenues if firms could roll over half the debt coming due in 2020 and borrow to the tune of 80% of their short-term assets.

These averages hide a large variation across countries. In some, such as China and France, rolling over debt and borrowing against short-term assets would allow the median firm to close the funding gap entirely. In others, such as Canada or India, where many firms belong to hard-hit sectors or where profitability in 2019 was low, firms would need significant additional fund injections – equivalent to four months of revenues – even if they rolled over debt and obtained new loans.

^① Trade credits/payables are assumed to be broadly balanced in the simulations.

International spillovers from the various supply and demand disruptions worsened the blow. Global trade volumes fell sharply in early 2020 (Graph I.5, left-hand panel).⁴ The automotive industry was hit especially hard, given the large number of suppliers in production networks spanning several countries. As early as February, shortages of parts produced in China forced car manufacturers in Japan and Korea to temporarily shut down plants. And just when production of Chinese auto parts resumed in early March, containment measures in Europe and the United States forced many manufacturers to halt production and cancel orders placed with EMEs. Mexican parts manufacturers felt the full force of plant shutdowns in the United States, as over 85% of Mexican parts exports were US-bound in 2019.

Restrictions on international cargo and passenger transport were another source of disruption. Port closures and revised customs clearance procedures created bottlenecks in international sea freight. Major port terminals in China reported a 24% year-on-year decline in containerised sea freight in February 2020 (Graph I.5, centre panel). Bans on international travel depressed air passenger traffic. By mid-May, scheduled flights had seen a year-on-year decline of more than 60% globally (right-hand panel), with many routes completely shut down. This crippled air freight capacity.

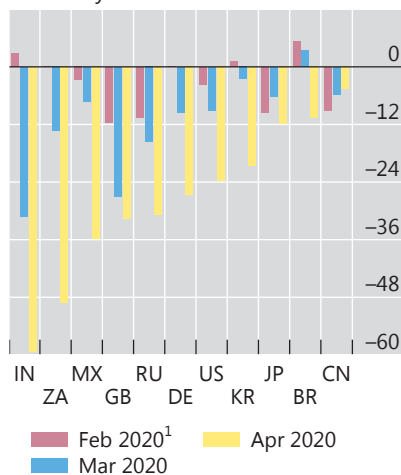
The fear of contagion and travel bans depressed tourism. Popular new-year destinations for Chinese tourists, such as Thailand, were hit first, but within a couple of months global tourism came to a halt. Inbound tourism accounts for over 10% of GDP in Greece, Iceland and Thailand. Its share in employment is even larger. The

Staggered shutdowns and traffic bottlenecks disrupt global supply chains

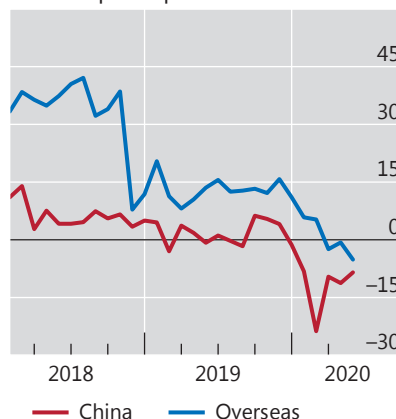
Year-on-year changes, in per cent

Graph I.5

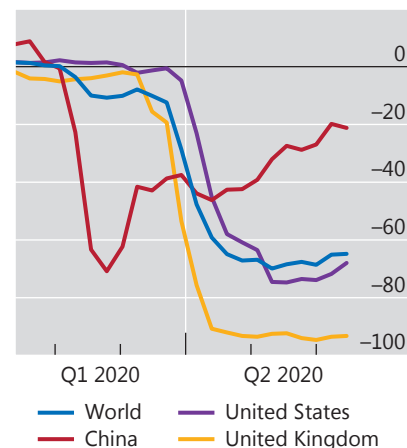
Trade volumes collapse as the global economy shuts down



Changes in sea freight shipments by Chinese port operators



Changes in global scheduled flights



¹ For China, sum of January and February figures.

Sources: OECD; COSCO SHIPPING Ports Limited; OAG; national data; BIS calculations.

United Nations World Tourism Organization predicts international tourism could contract by 60–80% in 2020.⁵

Commodity prices, especially the oil price, were another transmission channel. Lockdowns in China triggered a sharp drop in metals and energy prices in early 2020. A price war between two of the largest oil producers exacerbated the fall in early March, driving prices to a 20-year trough. An agreement in early April brought some respite. Limited storage capacity at a key petroleum hub in the United States even temporarily pushed the prices of some near-term futures contracts into deeply negative territory as investors refused to take physical delivery. Lower oil prices crippled economic activity, export and fiscal revenues in a number of oil-exporting advanced economies (AEs) and EMEs. For each 10% reduction in oil sector production, GDP growth can slow by up to 1.2 percentage points. The decline in oil prices will also lead to a sharp drop in the export revenues of oil producers and, in some cases, their fiscal revenues too (Graph I.6).⁶

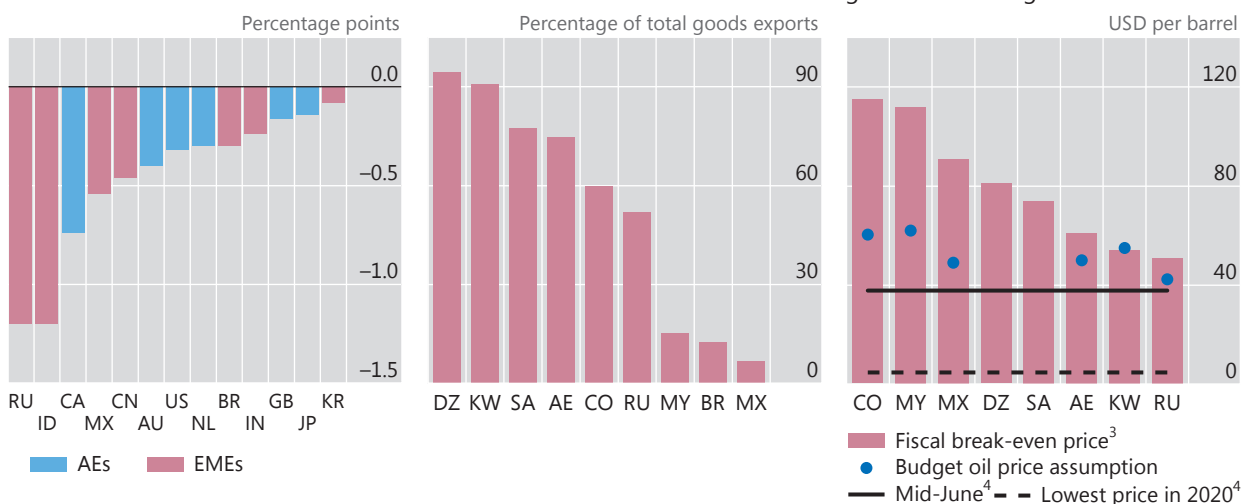
Many low- and middle-income economies are also likely to be hit by a drop in remittances. The World Bank expects remittances to decline by around 20% in 2020. This can cause large economic and social costs.⁷ In addition, many migrant workers who lose their job may return home, adding pressure to local labour markets.

A financial sudden stop

The economic contraction conspired with the darkening outlook and high uncertainty to sharply tighten global financial conditions, threatening to further depress output. An early lockdown in China barely moved global markets. But as a new infection cluster emerged in Italy in late February, financial markets were rudely awakened. A tumultuous March followed as the virus spread rapidly around the world. Equity prices dived and spreads soared (Graph I.7, left-hand panel).

Lower oil revenues slow GDP growth¹Oil accounts for large share of EME exports²

Oil prices fall to levels far below those needed to balance the government budget in 2020



¹ The estimated GDP impact of a 10% reduction in the output of oil-related sectors (ie mining of coal and lignite, extraction of crude petroleum and natural gas, and manufacturing of coke and refined petroleum products). Figures reflect only the mechanical impact of a reduction in the production of oil, based on input-output tables. The indirect effects on GDP due to induced changes in consumption or fiscal policy were not considered. ² Percentage of fuel exports (mineral fuels, lubricants and related materials) to total goods exports. Data for 2018 or latest available. ³ The oil price at which the fiscal account is balanced. ⁴ Simple average of end-of-day prices of Brent, Dubai and WTI crude.

Sources: OECD; World Bank, *World Development Indicators*; Bloomberg; Capital Economics; JPMorgan Chase; BIS calculations.

Implied volatilities, already elevated, surged even higher, in some cases to all-time peaks.

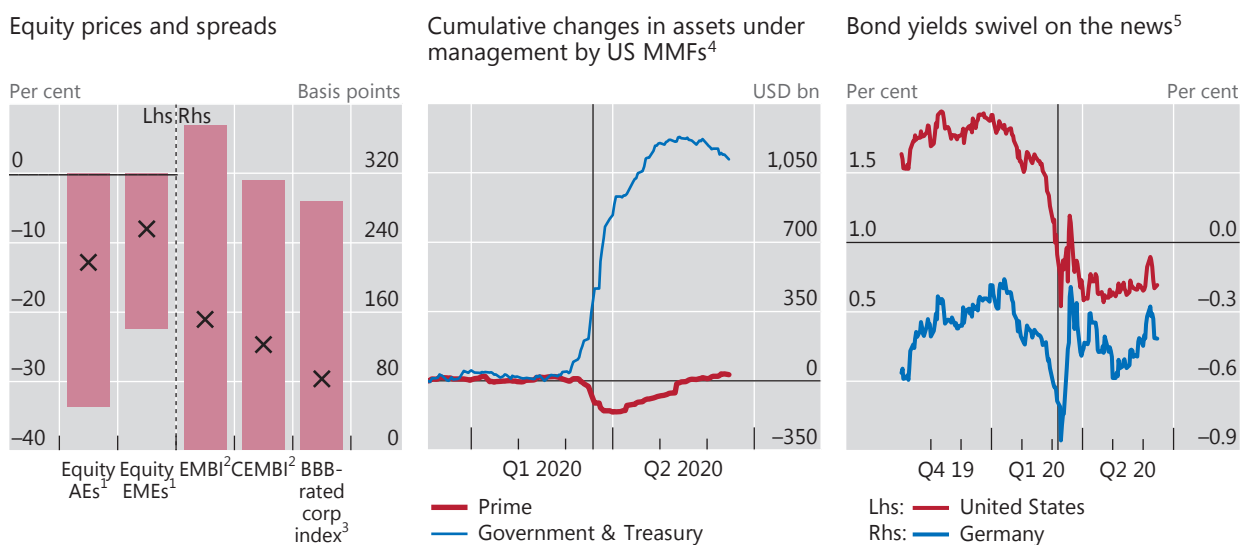
These market strains soon turned into a scramble for cash. Anticipating capital losses or the suspension of withdrawals, investors in US prime money market funds accelerated redemptions (Graph I.7, centre panel). By end-March, these funds, which invest in short-term bank and corporate paper, saw a wave of withdrawals to the tune of \$160 billion, or roughly 15% of assets under management. At the same time, leveraged investors such as hedge funds were forced to liquidate positions to meet margin calls. This “dash for cash” intensified selling pressure on all asset classes, including US Treasuries. Long-term US Treasury and bund yields soared in mid-March, after having fallen to historical lows only a week before (right-hand panel).

Corporate funding markets froze during the first half of March. From late February to March, the high-yield bond market effectively shut down (Graph I.8, left-hand panel). Conditions also deteriorated markedly in the leveraged loan and private credit markets. Weekly issuance of leveraged loans dropped well below the 2019 average, and collateralised loan obligation (CLO) issuance ground to a halt. The freeze affected even the investment grade corporate bond and commercial paper markets.

Retrenchment by global investors hit EMEs particularly hard. With threats to globalisation, commodity exports and global value chains – all fundamental to EMEs’ great leap forward during the past 30 years – investors headed for the exit. In March alone, international investors withdrew more than \$80 billion from EMEs (Graph I.8, centre panel), the largest single-month capital outflow on record. Some countries, eg Brazil and Poland, also saw net foreign direct investment (FDI) outflows. These outflows went hand in hand with a sharp depreciation of EME

Markets faced several weeks of high volatility as the pandemic worsened

Graph I.7



Change from 19 February 2020 to:
 ■ 23 March 2020 ✕ Mid-June 2020

The vertical lines indicate: in the centre panel, 18 March 2020 (the establishment of the Federal Reserve's Money Market Mutual Fund Liquidity Facility, MMLF); in the right-hand panel, 6 March 2020 ("dash for cash").

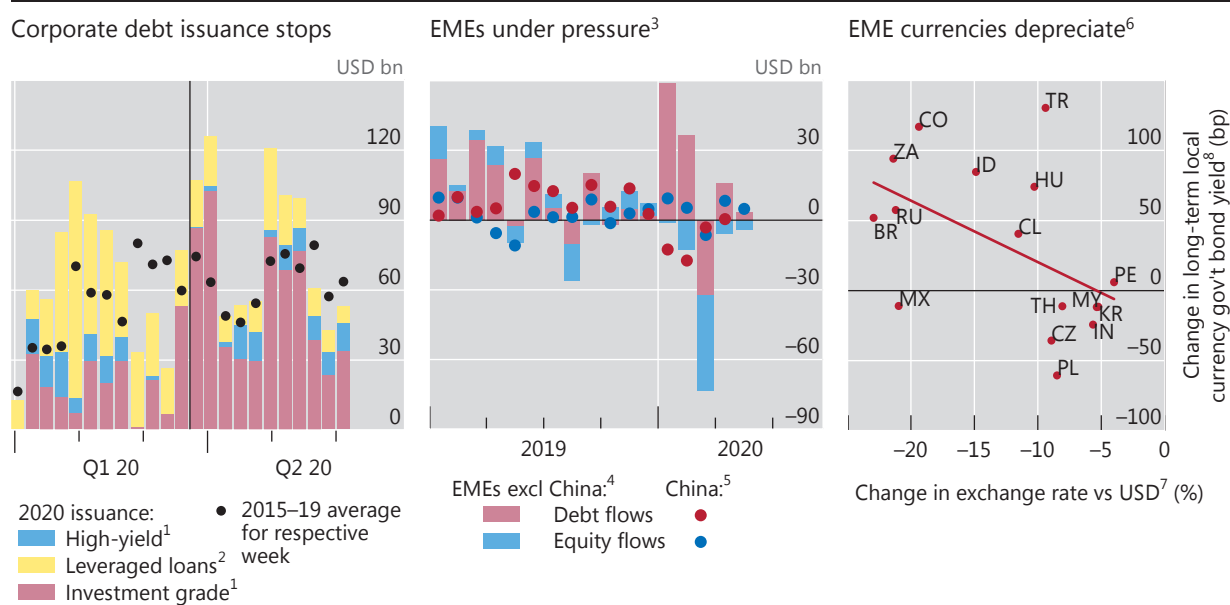
¹ Weighted average based on GDP and PPP exchange rates across indices of regional economies. ² Change in stripped spread of JPMorgan EMBI Global (USD-denominated) and CEMBI (USD-denominated) indices. ³ Change in option-adjusted spread of BBB-rated global corporate index. ⁴ Since December 2019. ⁵ Ten-year government bond yields.

Sources: IMF, *World Economic Outlook*; Bloomberg; Crane Data; Datastream; ICE BofAML Indices; JPMorgan Chase; national data; BIS calculations.

currencies, often despite significant FX intervention in the spot or, less often, the derivatives market (eg in Brazil, Indonesia and Mexico). In the first quarter, major EME currencies such as the Brazilian real, the South African rand, the Russian rouble and the Mexican peso lost more than 20% of their value against the dollar.⁸ The countries with the sharpest depreciation also saw large increases in domestic government bond yields as foreign investors, in particular, demanded a high premium to compensate for the lower dollar value of their investments (right-hand panel).

Market conditions stabilised only after central banks in both AEs and EMEs announced an unprecedented array of measures, going well beyond those adopted during the GFC. In addition to stabilising markets, the measures were designed to maintain the flow of credit to firms, households and even public entities. Interestingly, in many cases market conditions recovered well before the measures became operational. For example, the issuance of dollar-denominated corporate bonds bounced back right after the announcement of the Federal Reserve's credit facilities, two months before the central bank started actual purchases. Other funding markets, including those which were not directly targeted by the measures, reopened with a slightly longer delay.

By early June, market conditions had improved to the point of raising questions about whether they had not become disconnected from what was happening in the real economy. At the same time, many markets remained less liquid and less stable than at the beginning of the year. Equities in both AEs and EMEs had retraced about half of their previous declines; credit spreads had also narrowed somewhat. Capital outflows from EMEs eased in April and May, giving way to inflows in some economies. Yields on local currency bonds declined, often in response to central



The vertical line in the left-hand panel indicates 23 March 2020 (Federal Reserve announces corporate credit facilities).

¹ Internationally marketed, non-securitised bonds issued by non-financial corporations. ² Borrowed by non-financial corporations on all markets. ³ All debt and equity net purchase (or sale) by non-residents. ⁴ Twenty-four key emerging market economies defined by IIF. ⁵ Debt flow data not available for China in May 2020. ⁶ Changes from 2 January to 31 March 2020. ⁷ A decrease indicates a depreciation of the local currency vis-à-vis the US dollar. ⁸ Five-year government bond yields.

Sources: Bloomberg; Dealogic; Institute of International Finance (IIF); national data; BIS calculations.

bank asset purchases.⁹ EME exchange rates stabilised, though at a significantly lower level than before the outbreak.

Financial pressure points

The financial market turbulence in February and March highlighted a number of pre-existing vulnerabilities that could amplify the crisis and complicate the policy response. At the same time, there were also some silver linings. The post-GFC regulatory reforms have made the banking system much more resilient, allowing banks to offset the shutdown of capital markets to some extent. Financial infrastructure too weathered the storm successfully, including normally invisible but no less crucial payment and settlement systems as well as central counterparties.

Fragile household and corporate balance sheets

High debt levels have limited the private sector's ability to make up for lost income with new borrowing. Credit to the non-financial private sector climbed from just over 120% of GDP just before the GFC to 144% at end-2019, but this aggregate hides much larger increases in some countries and sectors. A key factor explaining this diverse picture has been the long shadow of the GFC. In general, countries and sectors that were at the heart of that crisis have tended to deleverage, and the others to leverage up, with varying degrees of intensity.

This is the case for households. Deleveraging after the GFC has left household balance sheets in the economies most affected by that crisis in better shape than in

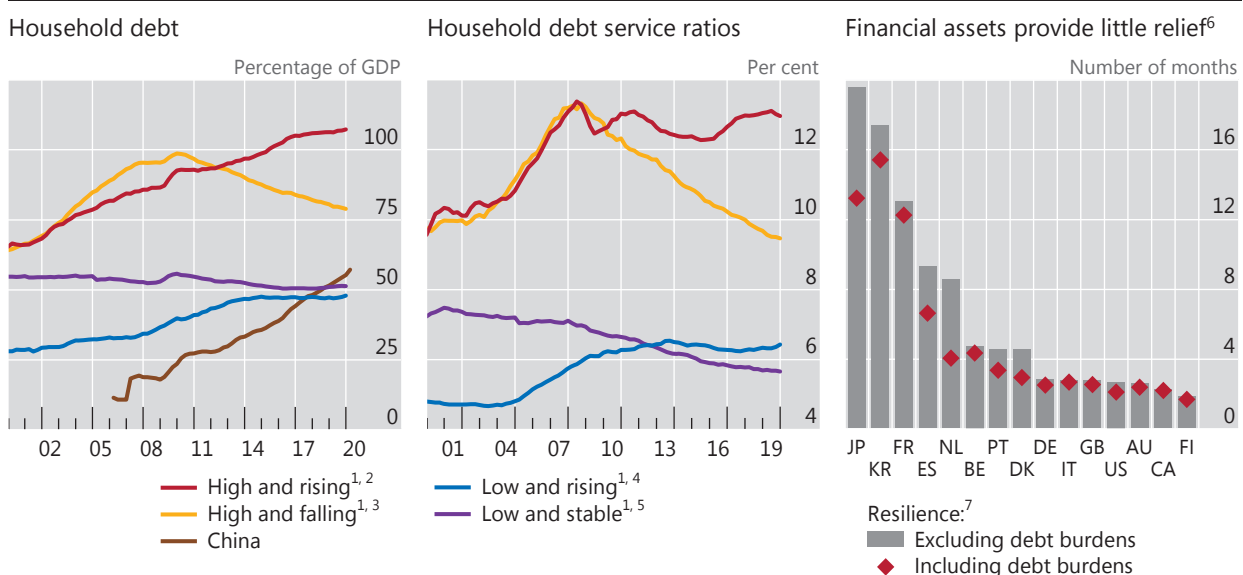
2008 (Graph I.9, left-hand panel, “high and falling” group). In combination with low interest rates, this has reduced debt service burdens (centre panel). By contrast, several other economies have seen rising debt-to-GDP ratios, notably a number of small AEs (“high and rising” group) and some EMEs, notably China. Debt service ratios in several of these economies have also gone up substantially, despite low interest rates.

Selling assets could provide only partial relief for contractions in income. Most assets are illiquid, particularly housing, and are very unevenly distributed. Even in high-income economies, the buffers of households at the bottom of the wealth distribution cover only a few months of subsistence consumption (Graph I.9, right-hand panel). This number is even lower once debt service burdens are factored in.¹⁰ And while public sector safety nets, such as unemployment insurance schemes or wage subsidies, are typically well developed in high-income countries, those in low- and middle-income ones leave households more exposed. In low-income countries, high levels of poverty, informality and financial exclusion are key vulnerabilities.

The condition of the business sector, which was not at the heart of the GFC, has deteriorated significantly over the past decade. Corporate indebtedness has tended to increase in many countries (Graph I.10, left-hand panel), even as unusually low interest rates have helped keep debt service costs in check. Granted, some firms have built up large cash holdings, in part as they have shied away from physical investments. But even so, the cash holdings of many firms, even large ones, are small relative to the scale of the sudden stop they face (centre panel). Except in China, half of the companies held cash and equivalents of less than two months of 2019 revenues (centre panel). The cash buffers of smaller firms were of similar size. A recent survey revealed that about 60% of UK small and medium-sized enterprises (SMEs) held less than 12 weeks’ cash in the bank.¹¹

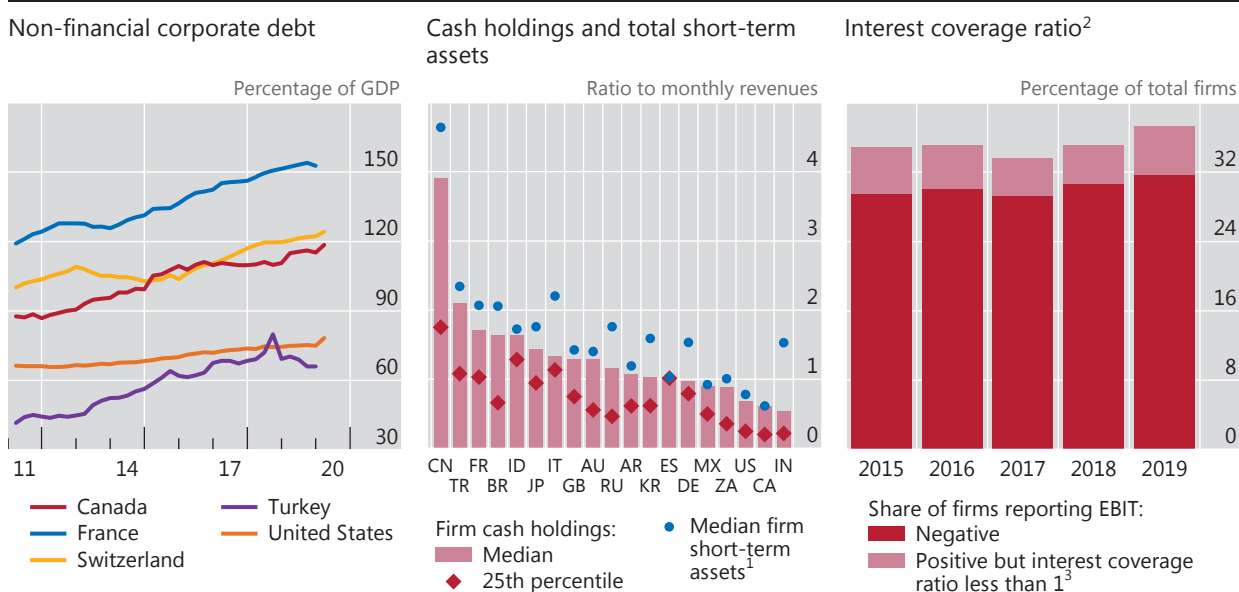
Deleveraging left households in better shape than in 2008

Graph I.9



¹ Simple average. ² AU, CA, CH, KR and SE; for debt service ratio (DSR), excl CH. ³ ES, GB, NL and US. ⁴ BR, FR and SG; for DSR, FR only. ⁵ DE, IT and JP. ⁶ Households with financial assets in the bottom quintile of the distribution. Based on household survey data up to 2014 or before, depending on data availability. ⁷ Defined as the number of periods during which a household can cover subsistence consumption (50% of median income) with liquid assets in case of income loss.

Sources: A Zabai, “How are household finances holding up against the Covid-19 shock?”, *BIS Bulletin*, no 22, June 2020; national data; BIS; BIS calculations.



¹ Defined as the sum of cash and short-term investments. ² Annual firm-level data based on selected public and private non-financial firms in the same countries as covered in centre panel. ³ Includes firms where earnings before interest and taxes (EBIT) are equal to zero. Shares might be biased downwards due to fewer firms reporting data for interest coverage ratios compared with EBIT.

Sources: S&P Capital IQ; national data; BIS; BIS calculations.

The Covid-19 shock is likely to be particularly challenging for SMEs. Smaller firms tend to be more important in sectors particularly affected by lockdowns such as hotels, restaurants or construction. They also rely more on internal financing and tend to have fewer external financing options than larger firms. For instance, in the United Kingdom more than 40% of small businesses have not borrowed at all in the last five years.¹² The lack of banking relationships could therefore compound the difficulty of accessing external financing. Furthermore, the widespread use of real estate assets as collateral could prove a major drag on the availability of SME funding should property prices fall, even temporarily. In the light of these difficulties, many governments, for instance in Switzerland, have fully guaranteed SME loans in order to roll out support quickly.

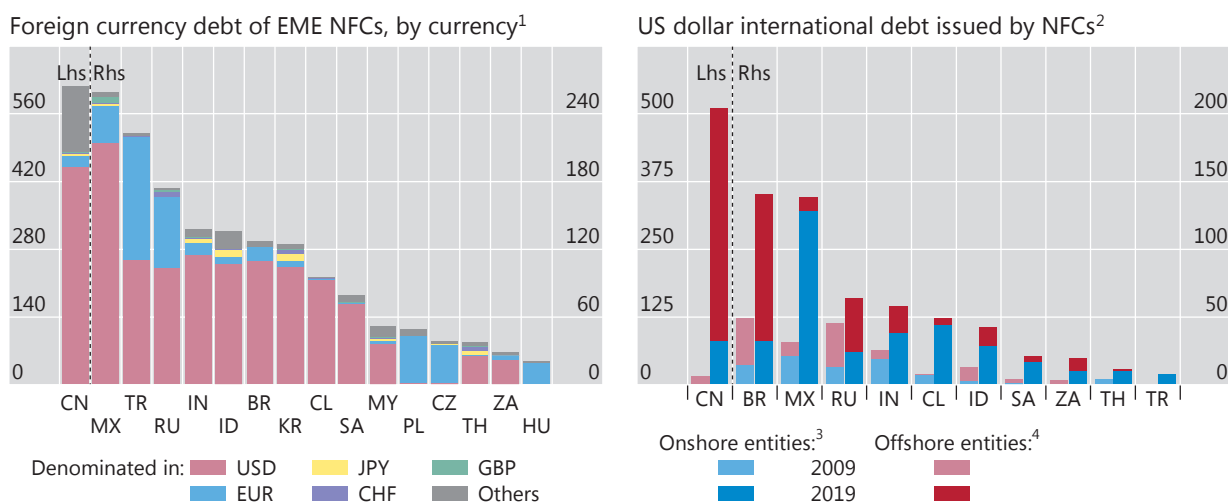
Another corporate vulnerability is that the profits of many firms have not kept pace with growing indebtedness. While some firms have been exceptionally profitable, the share of those reporting losses or earnings barely sufficient to meet interest costs has increased in recent years (Graph I.10, right-hand panel). Consistent with this picture, credit ratings have tended to decline in many key jurisdictions.

The currency denomination of the debt is a further weak spot. As measured by the standard on-balance sheet residence-based statistics, the dollar debt of non-bank borrowers outside the United States rose to \$12.2 trillion at end-2019. Of this, \$3.8 trillion was owed by EME residents, mostly non-financial corporations (Graph I.11, left-hand panel). But the amounts are considerably larger once adjusted for borrowing through offshore entities and, to a lesser extent, through FX derivatives that require repayment of notional amounts (principal). Offshore borrowing has been substantial for a number of large EMEs, such as Brazil, China, India and Russia (right-hand panel).¹³ Adding to the vulnerability, the debt servicing capacity of EME corporates has weakened since 2010 due to a broad decline in earnings.¹⁴

EMEs vulnerable to tightening in global financial conditions

In billions of US dollars

Graph I.11



¹ For details on the calculations, see Avdjiev et al (2020). ² Outstanding amounts of international debt securities issued by non-financial corporations (NFCs) as of the fourth quarter of the year specified. ³ Ultimate NFCs with their nationality and residence as listed on the horizontal axis. ⁴ Ultimate NFCs with their nationality as listed on the horizontal axis and residing elsewhere.

Sources: S Avdjiev, P McGuire and G von Peter, "International dimensions of EME corporate debt", *BIS Quarterly Review*, June 2020, pp 1–13; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; BIS calculations.

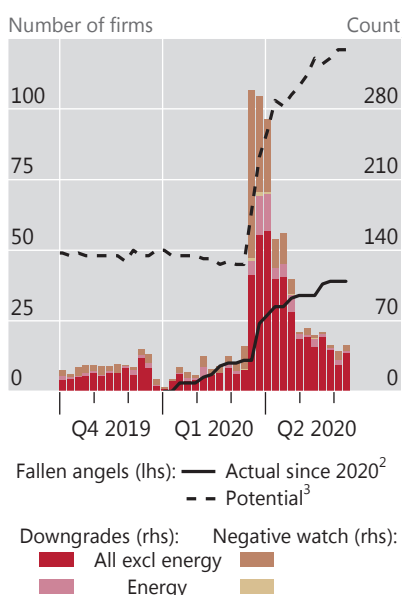
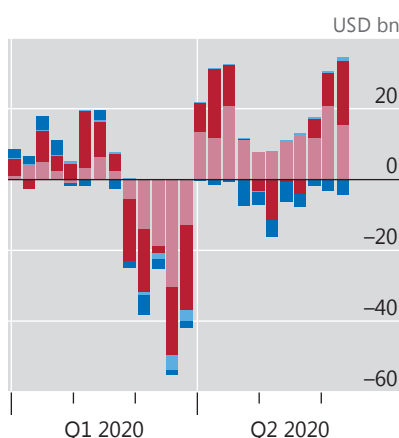
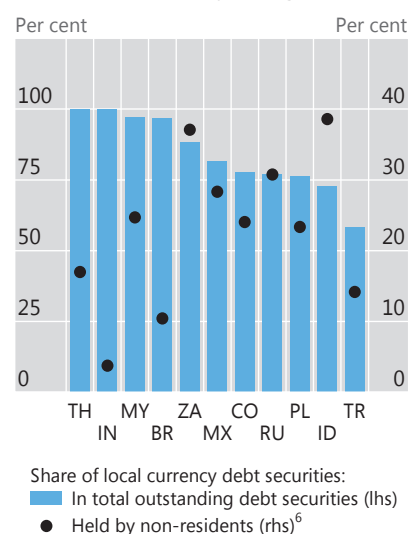
There is no comprehensive information on how much of this debt is hedged. That said, less developed derivatives markets typically limit the scope for financial hedges. "Natural hedges" through export revenues are more common. However, these may falter if export prices drop, as happened recently in the oil sector. Since half of total EME hard currency corporate debt is owed by state-owned enterprises, often oil firms, this can feed directly into the sovereign's balance sheet.

Fickle market funding

The growing reliance on market financing by many firms may exacerbate vulnerabilities. The outstanding amount of corporate bonds reached \$16 trillion at end-2019, the bulk of which was issued by firms in non-investment grades and the lower buckets of investment grade. In addition, firms took on approximately \$1.5 trillion in leveraged loans (syndicated lending for low-rated and more indebted companies) during 2019.¹⁵ Such loans are often held by investors through different investment vehicles, including credit funds, and more complex structured instruments such as CLOs. Banks typically provide funding to these investors and hold the higher-rated tranches. Last but not least, private credit – loans offered by non-bank investors with limited bank involvement – has also grown rapidly in recent years and has been disproportionately directed at firms at the lower end of the credit risk spectrum.¹⁶

The sudden stop in market funding in February and March highlighted a number of vulnerabilities related to this funding structure.

First, before the outbreak, heightened risk-taking and fierce competition among lenders had compressed spreads and loosened covenants, despite an increase in leverage.¹⁷ Less restrictive covenants, in particular, can result in much higher credit losses when the thresholds are finally hit. As a result, weak covenants increase investors' incentives to head for the exit.

A wave of downgrades¹Investors withdraw⁴EME local currency government bonds often held by foreigners⁵

¹ S&P ratings, local currency long-term debt rating of non-financial firms (including subsidiaries and operating subsidiaries); foreign currency long-term debt rating if previous not available. ² Starting on 1 January 2020, excluding exits and new entries, firms rated by S&P as investment grade (BBB- or above) in 2020 and which have since dropped below BBB-. ³ Firms rated BBB- with negative outlooks and/or negative credit watch. ⁴ Based on weekly net flows to funds dedicated to equities and corporate bonds in developed markets and in emerging market economies, respectively, as defined by EPFR. ⁵ Based on outstanding amounts at end-2019. For IN and TR, end-2018. ⁶ Central government debt.

Sources: IMF, *Sovereign Debt Investor Base for Emerging Markets*; Bloomberg; Dealogic; Euroclear; EPFR; S&P Capital IQ; Thomson Reuters; Xtrakter Ltd; national data; BIS calculations.

Second, the toxic combination of declining creditworthiness and investor retrenchment increased the pressure on fund managers to dump assets. By end-May, the number of downgrades and reductions in the rating outlook made by one of the major rating agencies had climbed to nearly 1,800, including 200 affecting firms in the energy sector (Graph I.12, left-hand panel). This represented well over one third of the rated non-financial corporate debt universe. Of particular concern are the so-called fallen angels – debt that drops out of investment grade and can no longer be held by most asset managers and institutional investors. In addition to US prime money market funds, mutual funds investing in corporate debt experienced sharp outflows (Graph I.12, centre panel), forcing them to sell. At the height of the sell-off, funds investing in AE and EME equities and corporate bonds lost approximately 15% of their net asset holdings in a single week.

Third, the repricing of risk by foreign investors in local currency bond markets once again resulted in a sharp tightening of domestic financial conditions in EMEs. EME domestic currency debt markets have grown substantially since the Asian crisis in the 1990s as a result of deliberate policies designed to reduce “original sin”, the inability of EMEs to issue debt in their own currency (Graph I.12, right-hand panel). But while mitigating currency mismatching for the borrower, the shift has transferred it to foreign lenders, which tend to invest on an unhedged basis – “original sin redux”. Since domestic yields tend to rise in tandem with currency depreciation, foreign investors lose on both positions, which amplifies their

retrenchment. As the same mechanism operates in reverse during appreciations and capital inflows, it tends to amplify the boom-bust pattern in capital flows commonly experienced by EMEs.¹⁸

Banks withstand pressure

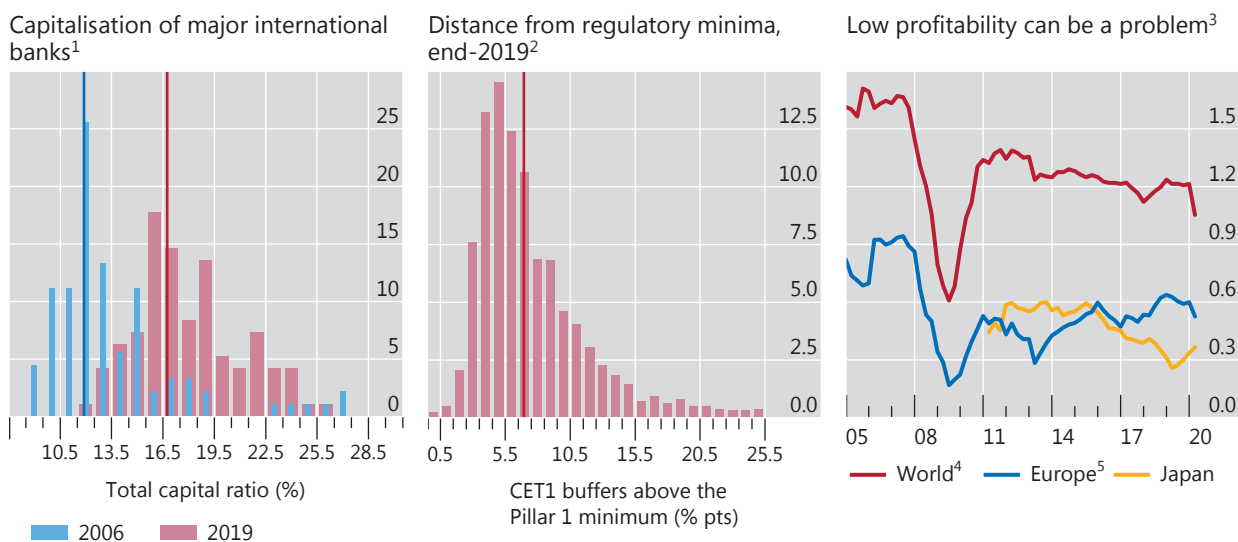
On the whole, banks were able to meet at least part of the increase in households' and firms' funding needs. This is particularly important because banks remain the main creditors of households and firms, notwithstanding the advance of capital markets. Bank loans account for the vast majority of household credit in almost all economies – the United States being a notable exception. Their share in corporate lending is lower, but still exceeds 60% in most AEs and EMEs. Thus, banks remain the first port of call for most firms seeking to bridge funding gaps.

The post-GFC increase in banks' capital buffers (ie in excess of minimum capital requirements) should give some comfort that banks will continue to meet funding demands (Graph I.13, left-hand and centre panels).¹⁹ At the same time, banks' chronically low profitability in some economies could crimp their ability to expand their balance sheets. Over the past decade, the return-on-assets of European banks has rarely exceeded 0.5%, compared with an average of 1.25% for the world as a whole (right-hand panel). The share of non-performing loans also remains high in some countries. In Japan, bank profits have been even lower than in Europe, with a return-on-assets of only 0.3% in 2019. This is reflected in very low price-to-book

Banks entered the Covid-19 crisis with significantly more capital than pre-GFC

In per cent

Graph I.13



The vertical lines in the left-hand and centre panels indicate the median for the respective year.

¹ Based on a balanced sample of 135 large banks. The increase in capital ratios is likely to be higher than portrayed due to more stringent rules on regulatory capital and risk-weighted assets introduced after the GFC. ² Difference between the CET1 ratio and the sum of the following regulatory requirements: minimum Basel III CET1 ratio (4.5%), capital conservation buffer (2.5%, assuming full implementation), the bank-specific capital surcharge on systemically important banks and the country-specific countercyclical capital buffer (up to 2%) at end-2019. Based on a global sample of 3,616 banks. ³ Four-quarter rolling average of returns on average assets for each bank; simple average across selected banks. ⁴ AR, AU, BR, CA, CN, ID, IN, JP, KR, MX, RU, SA, SG, TR, US, ZA and Europe as defined in footnote 5. ⁵ AT, BE, CH, DE, DK, ES, FI, FR, GB, IT, NL, NO and SE.

Sources: I Aldasoro, I Fender, B Hardy and N Tarashev, "Effects of Covid-19 on the banking sector: the market's assessment", *BIS Bulletin*, no 12, May 2020; U Lewrick, C Schmieder, J Sobrun and E Takáts, "Releasing bank buffers to cushion the crisis – a quantitative assessment", *BIS Bulletin*, no 11, May 2020; FitchConnect; BIS calculations.

ratios, in some cases languishing below one, which hinders banks from raising new equity capital.

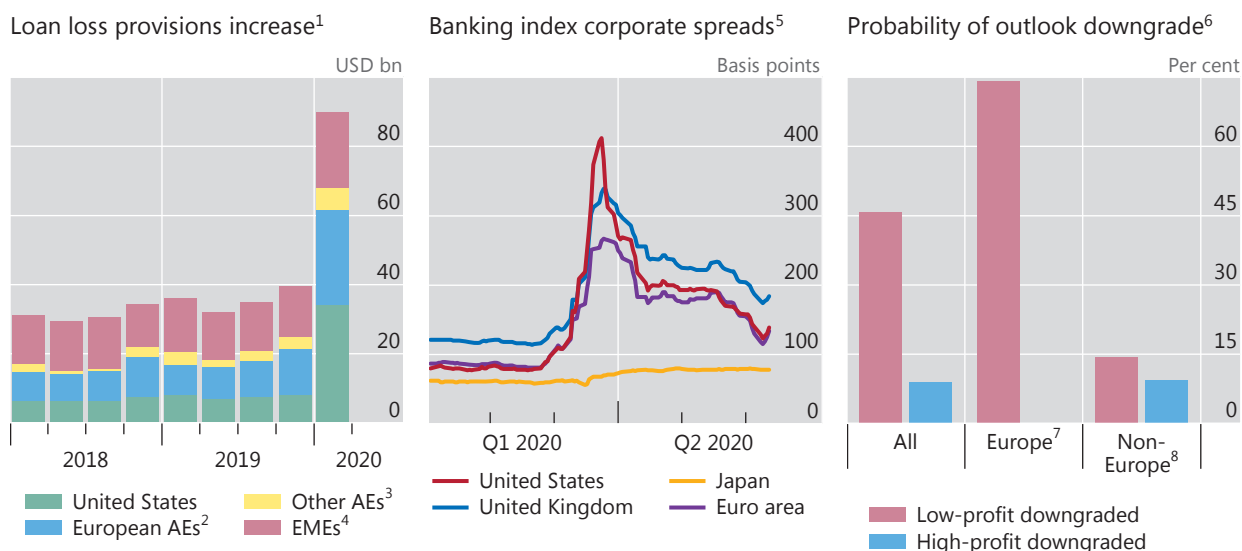
Another vulnerability is the reliance of many banks on dollar funding. At \$10 trillion, non-US banks' gross dollar liabilities at end-2019 are as high as before the GFC in late 2007. In 2008, European banks in particular found it exceedingly difficult to fund their dollar-denominated assets. The funding squeeze was ameliorated only after the Federal Reserve and other central banks put in place a system of swap lines: through these, non-US central banks could obtain US dollars and onlend to banks. While European banks have shrunk their dollar books and, consequently, dollar funding, Canadian, Japanese, Chinese and other EME banks have expanded theirs.²⁰

The Covid-19 shock has put banks under pressure on several fronts. The deterioration in credit quality has already forced them to significantly step up their loan loss provisions. Under the newly introduced expected loss provisioning standards, a rise in the mere probability of losses boosts provisions. In a sample of internationally active banks, US institutions increased provisions more than fourfold in the first quarter. European banks have been slower, with provisions doubling in the same period (Graph I.14, left-hand panel).²¹ Looking ahead, falling property prices could amplify losses. Market indicators suggest sizeable declines in many countries, especially in the prices of commercial properties for the sectors most affected by the lockdowns (Box I.C). On the other hand, banks' direct exposures to large firms in the heavily hit sectors such as airlines and oil firms appear limited.²²

Banks have felt pressure also on the funding side. Spreads on bank bonds and commercial paper widened significantly in late February and March as rating

Banks under pressure

Graph I.14



¹ Sum of quarterly loan loss provisions across sample of banks. Due to data unavailability, data for reclassified impairment of loans used for several banks. Due to newly introduced expected loss provisioning standards, a break in the series is expected which could show up in different periods across countries, starting in 2018. ² AT, BE, CH, DE, DK, ES, FI, FR, GB, IT, NL, NO and SE. ³ CA and JP. ⁴ BR, CN, HU, ID, IN, MX, RU, SG and TR. ⁵ Investment grade, local currency-denominated debt; option-adjusted spreads. ⁶ Based on a sample of 93 banks with credit rating outlooks given. The bars show the number of banks with downward outlook revisions between 1 March and 27 April 2020 divided by the total number of banks with rating outlooks in each group. ⁷ AT, BE, CH, DE, DK, ES, FI, FR, GB, IT and NL. ⁸ AU, BR, CA, CN, ID, IN, JP, KR, MX, RU, SA, SG, TR and US.

Sources: I Aldasoro, I Fender, B Hardy and N Tarashev, "Effects of Covid-19 on the banking sector: the market's assessment", *BIS Bulletin*, no 12, May 2020; FitchConnect; ICE BofAML Indices; SNL; BIS calculations.

Real estate markets in the wake of the Covid-19 shock

In contrast to the Great Financial Crisis (GFC) of 2007–09, real estate markets have not been at the epicentre of the recent financial earthquake. Even so, they matter for the eventual depth of the recession and the subsequent recovery. The construction industry is a major source of employment and demand for a broad network of suppliers. Real estate also constitutes a large fraction of household wealth, while mortgages and other commercial real estate-related lending represent a significant part of financial intermediaries' exposures. In summary, the health of the real estate market is important for the normal flow of credit through the economy and for financial stability. Real estate collapses have caused many past banking crises. Despite some increase in price co-movement across countries, real estate markets are still mainly driven by domestic factors.^① Yet the global reach of the Covid-19 shock may suggest greater co-movements than usual.

Actual real estate price adjustments are notoriously hard to measure and are observed with a lag. This is because assets are very heterogeneous and liquidity is low. And this makes it harder to gauge their response to the health emergency. The fact that real estate prices have increased at a brisk pace in recent years in many countries may represent a vulnerability. But since prices are also quite sluggish, very recent movements may be poor indicators of their future evolution.

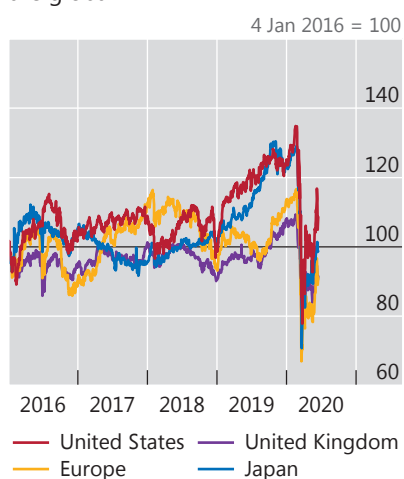
Partly because of this, the prices of commercial real estate (CRE) investment vehicles may provide a more timely guide. This is the case for the highly liquid real estate investment trusts (REITs). A drawback is that they exhibit strong equity-like dynamics.^②

Investors anticipate large CRE price declines. In all the jurisdictions considered, the Covid-19 shock wiped out REITs' cumulative valuation gains over the last five years or more (Graph I.C, left-hand panel). As a comparison, broad-market stock indices at the peak of the crisis in early March had lost only the gains of 2019. Even when benchmarked against the performance of more directly comparable stocks such as cyclicals and small corporates, the losses between February and March were large. REITs have also lagged behind overall stock markets in the recovery that followed from April.

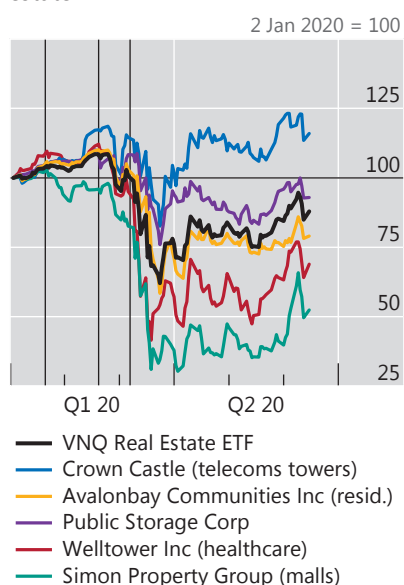
Investors anticipate large losses in real estate markets

Graph I.C

Real estate investment trust losses are global



Losses are sharper in commercial real estate



Distressed deals have been high in China for several months



The vertical lines in the centre panel indicate, respectively, 20 January 2020 (Chinese health officials acknowledge evidence of human-to-human contagion of Covid-19), 18 February 2020 (news of aggressive outbreak in Italy and other countries) and 6 March 2020 ("dash for cash").

Sources: Real Capital Analytics; Refinitiv; BIS calculations.

Valuation losses have varied widely across types of CRE. Segments such as shopping malls and retail space, which had been under pressure for some time and are more vulnerable to containment measures,

suffered a deeper plunge in prices and a shallower recovery than broader portfolios of real estate assets (Graph I.C, centre panel). By contrast, the prices of REITs specialised in telecommunications towers and warehousing experienced shallower losses. REITs specialised in residential properties moved in lockstep with broader portfolios such as the VNQ Real Estate ETF.

Other signs of stress in CRE gradually surfaced in the United States and Asian markets during Q1 2020. Deals were called off, and the ranks of buyers began to thin. Under normal business conditions, CRE deals are abandoned only rarely. In the United States, cancellations as a fraction of closed deals in a given month had averaged 0.4% over the last five years, on a declining trend. But in March, that fraction soared to almost 1.5%. Moreover, delinquencies reportedly increased in April on US commercial mortgage-backed securities (CMBS), though from a low level. Not surprisingly, the sharpest increase came from the hotel sector. Some credit rating agencies expect overall delinquency rates in CMBS to approach GFC levels later in the year, and those of hotels and retailers may approach 30% and 20%, respectively, much higher than the GFC peaks.^③ In China, property developers faced increasing difficulties in refinancing deals, in part because of regulatory tightening, and the fraction of troubled assets soared to 50% of the total market. In fact, in China, distressed deals – sales made by debtors or trustees that have taken control of the assets – have been high for some time, fluctuating around 35% from H2 2019 (Graph I.C, right-hand panel). Deal volumes in the Asia-Pacific region suffered a double-digit contraction in Q1 2020, mostly because of large deals being shelved. One has to go back to the GFC to find a similar contraction. Smaller deals were still going through, but market intelligence indicates that the situation has been growing increasingly brittle. Once again, volume drops were sharper in office and retail space, as well as senior housing and care. Industrial property fared relatively well, as manufacturing may lead the recovery this time around.

① See Committee on the Global Financial System, “Property price dynamics: domestic and international drivers”, *CGFS Papers*, no 64, February 2020. ② REITs are financial vehicles that pool resources from multiple investors with the purpose of acquiring a portfolio of real estate property, which the trust operates on behalf of its investors. REITs typically invest in apartment buildings, infrastructure, retail or office space, hotels, healthcare facilities, warehouses and other commercial property. Some REITs also specialise in providing mortgage credit. The investment vehicle has a global footprint. REITs are usually traded on regular exchanges, so they offer the liquidity of common stock. ③ See Fitch Ratings, “US CMBS delinquencies projected to approach Great Recession peak due to coronavirus”, 8 April 2020.

agencies revised the outlook for many banks and US prime money market funds saw outflows (Graph I.7, centre panel). In their decisions, rating agencies appeared to attach significant weight to profitability.²³ The agencies put almost half of the banks with profits below the median on negative watch, compared with fewer than 10% for those above (right-hand panel). The pressure was particularly acute for non-US banks relying on dollar funding.

Last but not least, banks have faced pressure on the operational side too. Bank staff members were even more likely to be working from home than those in other industries. Anecdotal evidence suggests that major banks operated with only 10–15% of their staff in the office. This may have helped accelerate the withdrawal from risk-taking as traders exited risky positions for precautionary reasons.

Despite these pressures, banks were able to expand their lending to the real economy. In the United States, the volume of commercial and industrial loans expanded by 10% in March and 14% in April.²⁴ In the euro area, loans to non-financial corporations rose by 2.7% in March and 1.6% in April, the fastest rate in over a decade.

Managing the fallout

Tackling the economic fallout of a pandemic requires a different policy prescription from dealing with a typical recession or financial crisis. During lockdowns, the priority is to ensure that households and (viable) firms survive the sudden stop in economic activity. In this phase, boosting private demand is not a priority, since

spending tends to be rather insensitive to policy stimulus. Instead, the objective is to mitigate the impact of the economic standstill on firms' and households' cash flows. This is akin to providing a lifeline to a patient in an induced coma, to keep vital organs functioning. Moreover, it is important to prevent an abrupt reaction in financial markets that could undermine financial intermediation, amplifying the contraction.

The life support measures during the first phase should lay the foundation for the recovery once lockdown measures are lifted. On the production side, firms that retain their skilled workers and see a resumption in demand will be better able to ramp up production while, on the demand side, workers who keep their jobs and income can resume consumption. But even so, high uncertainty may hold back aggregate demand and the pace of recovery. Monetary and fiscal policy may thus need to be expansionary for some time to sustain the recovery.

High uncertainty complicates the policy response. Policymakers need to take decisions despite substantial uncertainty about the length and severity of the outbreak and its impact on people's lives and livelihoods. As a result, it is exceedingly hard to put together a holistic and robust plan. Policy tends to follow a step by step approach in which specific problems are identified and solutions put in place as the situation evolves. Deploying insufficient funds could cause widespread bankruptcies and layoffs, with large and persistent output losses. It may also disappoint financial markets and amplify retrenchment. However, policy space is limited. And firing too many bullets too soon could leave the authorities exposed should the infection re-emerge and the crisis be more prolonged than expected. Against this backdrop, clear exit strategies are essential to gradually phase out the exceptional measures.

Uncertainty also extends to which firms and which jobs will survive, especially during the early stages of the pandemic. This would call for immediate and broad-based support that would gradually give way to a more focused approach as uncertainty recedes. Allowing bankruptcies too early in the process could kill the drivers of tomorrow's growth, but delaying them too long and keeping unviable firms alive could slow the necessary structural adjustment. A related issue is whether offering firms loans or loan guarantees could give rise to "moral hazard", where recipients may act with less financial prudence in the future. This may be less of a problem at this juncture. However, keeping afloat firms that had taken on excessive risk prior to the pandemic could hamper economic recovery further down the line. This puts a premium on due diligence and mechanisms such as imposing suitable conditionality on state support programmes to lessen moral hazard issues. Yet another trade-off concerns assistance to large enterprises, which could protect the livelihoods of the large number of workers they employ. But large firms are not necessarily those with a brighter future. And focusing on them at the expense of smaller ones could kill off competition from new entrants and thus slow innovation and reduce competitiveness.

High debt levels are a further complicating factor. While borrowing helps to bridge income gaps, the debt burden may become unsustainable for some firms and households. Insolvencies seem almost inevitable. Experience suggests that promptly cutting excess capacity and restructuring debts tends to produce faster recoveries than a more gradual approach.²⁵ But a surge in bankruptcy proceedings could overwhelm the system's restructuring capacity, not least if courts become congested.

Central banks as crisis managers

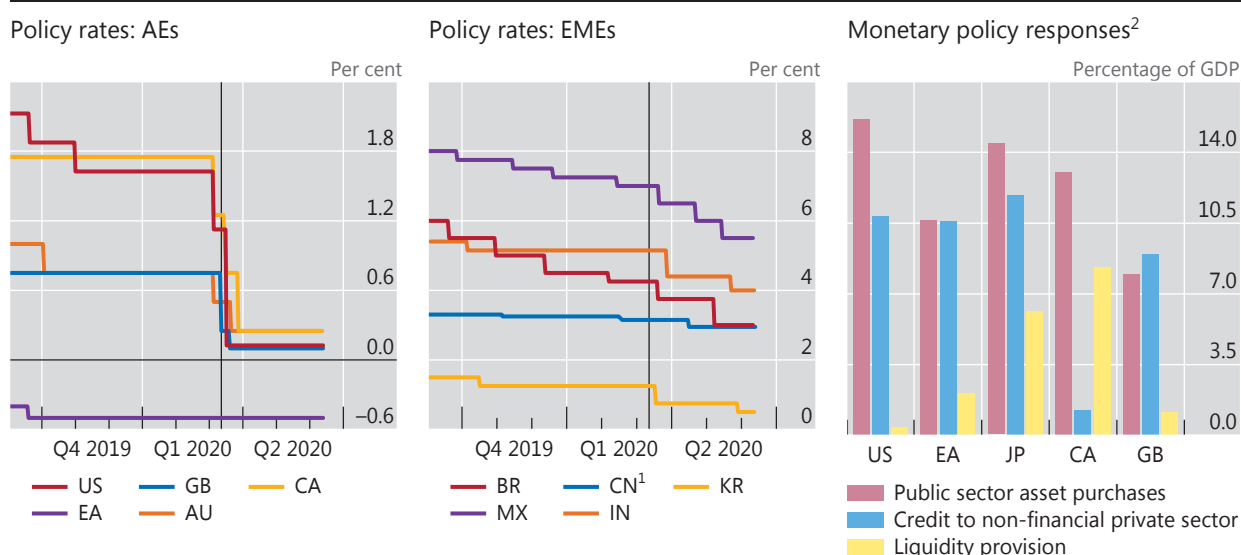
Monetary policymakers were the first to react. Central banks promptly cut their policy interest rates once a pandemic became a distinct possibility, to pre-emptively ease financial conditions and cushion the blow (Graph I.15, left-hand and centre panels). As the situation deteriorated and financial market turmoil ensued, central banks introduced a myriad of additional emergency measures to stabilise financial markets and restore confidence (Table I.1). They stepped up easing measures, in some cases taking policy rates to the effective lower bound, and introduced open-ended asset purchase programmes to unclog market-makers' balance sheets and restart issuance. And as dislocations in domestic and dollar funding markets became apparent, central banks injected liquidity via open market operations and standing facilities, and extended US dollar swap lines.

While most of those measures have by now become standard in crisis management, the current challenges forced central banks to expand their playbook. In particular, given the shock's unprecedented scale and nature, they offered lifelines to businesses in distress, by either purchasing debt outright (eg bonds and commercial paper) or providing backstops to banks (eg in the form of funding-for-lending schemes), especially in the case of SMEs (Graph I.15, right-hand panel). In the process, central banks went down the credit rating scale, sometimes below investment grade. In at least one case – the United States – the central bank extended support to local authorities. Taken together, these programmes are set to expand their balance sheets further.²⁶

Naturally, there were differences across countries. In particular, EMEs have had less room for manoeuvre, given their structural vulnerabilities and the multiple shocks hitting them. Even then, many could reduce interest rates and reserve

Swift and forceful response

Graph I.15



The vertical lines in the left-hand and centre panels indicate 11 March 2020 (coronavirus outbreak declared a pandemic by the World Health Organization).

¹ Medium-term lending facility, one-year rate. ² Projected maximum support during March–December 2020, based on official announcements. See Cavallino and De Fiore (2020).

Sources: P Cavallino and F De Fiore, "Central banks' response to Covid-19 in advanced economies", *BIS Bulletin*, no 21, June 2020; Datastream; national data; BIS calculations.

Selected central bank and prudential measures

Table I.1

		Advanced economies							Emerging market economies							
Type of tool	Measures	US	EA	JP	GB	CA	AU	CH	BR	CN	ID	IN	KR	MX	TH	ZA
Interest rate	Policy rate cut	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Lending/ liquidity	Gen. liquidity provision ¹	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	Specialised lending	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	
Asset purchases/ sales	Government bonds	✓	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓
	Commercial paper	✓	✓	✓	✓	✓							✓			
	Corporate bonds	✓	✓	✓	✓	✓							✓		✓	
	Other private securities ²		✓	✓		✓										
FX swap/ intervention	USD swap line		✓	✓	✓	✓	✓	✓	✓				✓	✓		
	FX intervention							✓	✓		✓	✓	✓	✓		
Prudential rules and regulations	Capital requirements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
	Liquidity requirements	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Payout restrictions		✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
	Market functioning ³	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

¹ For example, repo and reverse repo operations, standing facilities, modified discount window and lower reserve requirement ratio. ² For example, asset- and mortgage-backed securities, covered bonds and exchange-traded funds. ³ For example, short-selling bans and circuit breakers.

Source: National data.

requirements, and, for the first time, implement measures to support firms and mitigate stress in domestic currency bond markets. This is testimony to the much improved monetary frameworks in place, complemented by the active use of FX reserve management and macroprudential measures.²⁷

Prudential measures to enable banks to meet increased funding demand supported monetary policy actions. The overall strategy was to release the buffers that banks had been required to accumulate in good times and to ease or adopt more flexible interpretations of minimum requirements and loan classifications (Table I.1). In addition, a number of authorities imposed various restrictions on distributions, notably dividend payments.²⁸

Crucial as they have been, central bank responses have a fundamental limitation. They provide temporary financing, but cannot transfer real resources. As such, they all generate additional debt and can only help borrowers survive if the income loss is not too large. For much the same reason, some borrowers run the risk of shifting the problems to the banking sector should that income loss become too large.

Fiscal responses to the coronavirus crisis

This points to the dual importance of fiscal policy. First, it can act as backstop to the extraordinary measures central banks have taken. Governments can provide partial or complete indemnities to facilitate central banks' funding for less creditworthy firms. This can help to clarify the dividing line between monetary and fiscal policies as well as free central banks to concentrate on their mandate.²⁹ Second, and more importantly, fiscal policy can transfer real resources to firms and households, to

ease income shortfalls. This, of course, is in addition to the resources needed to directly tackle the health emergency in the first place.

As the coronavirus emergency intensified, governments around the world sprang into action and announced large-scale fiscal packages. The packages generally consisted of a mixture of outright transfers (eg through income support, expanded unemployment insurance schemes, wage subsidies and tax rebates/waivers), bridge financing (eg tax deferrals and loans) and contingent resource transfers (eg equity injections and loan guarantees). The measures complement each other in protecting household livelihoods and in helping companies survive cash flow problems (Table I.2).

Many fiscal measures involve the outright transfer of resources to households and firms. Reflecting the urgency of the situation, many authorities took a blanket approach, offering tax waivers or cash grants to all residents, while some targeted those most affected by the shutdowns. For example, several AEs increased and extended the coverage and duration of unemployment benefits. But even so, this left significant groups of the population in dire straits – for instance, young people about to enter the labour market or many self-employed workers. In many EMEs, where a large part of the population works in the informal sector and cannot be easily reached, governments expanded their social assistance programmes to shelter the most vulnerable (Box I.D). Some governments also provided subsidies to particular industries considered vital to the economy.³⁰

Governments also used a variety of tools to provide bridge financing. They deferred business income tax payments and, in some cases, personal ones too. In

Elements of fiscal packages								Table I.2							
	Advanced economies							Emerging market economies							
	US	JP	DE	FR	IT	ES	GB	BR	CN	ID	IN	KR	MX	RU	ZA
Measures supporting the health sector	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Measures supporting households															
Targeted transfers ¹	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Other labour income support ²	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Wage subsidies	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓
Tax cuts	✓	✓	✓	✓		✓			✓	✓	✓	✓		✓	✓
Tax deferral	✓	✓	✓		✓	✓	✓				✓	✓	✓		✓
Measures supporting firms															
Tax deferral	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Liquidity support ³	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tax cuts	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	
Targeted transfers		✓	✓	✓	✓		✓		✓	✓				✓	✓

This table summarises fiscal packages that have been announced at the national level in response to the Covid-19 pandemic.

¹ Include cash and in-kind transfers to affected households. ² Extended unemployment and sick leave benefits. ³ Non-budgetary measures such as equity injections, asset purchases, loans and debt assumptions or government guarantees and contingent liabilities.

Sources: IMF; OECD.

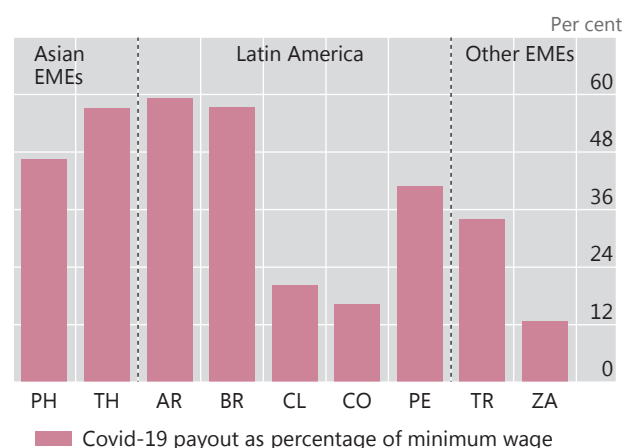
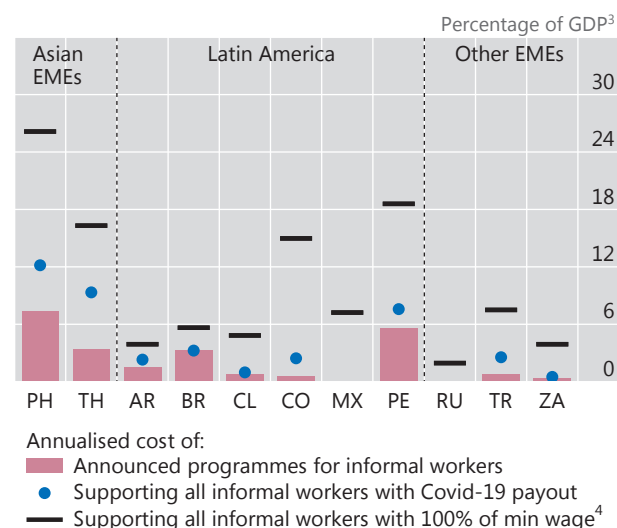
Cash transfers to support informal workers in emerging market economies

To support informal workers during the lockdowns, some EME governments have extended existing cash transfer schemes, increasing or front-loading disbursements.^① However, existing conditional cash transfer programmes are unlikely to be sufficient: a significant share of informal workers have incomes above national poverty lines and are therefore ineligible.^② For that reason, many governments have introduced new measures, including one-off unconditional cash transfers to informal workers in Argentina, Peru and Turkey; two-month transfers in Colombia and the Philippines; three-month transfers in Brazil, Chile and Thailand; and a six-month transfer in South Africa.

The payouts of the programmes range from 13 to 60% of the monthly minimum wage (Graph I.D, left-hand panel).^③ In many cases, this is less than the average monthly labour income earned by informal workers as reported in national income surveys (right-hand panel).^④ Countries with less fiscal space tend to offer less generous benefits (eg Chile, Colombia and South Africa). The estimated cost of these programmes (in annualised terms) ranges from 0.3% of GDP South Africa to 7.4% in the Philippines.^⑤

Cash transfers to informal workers

Graph I.D

Announced income support programmes for informal workers¹Annualised cost of income support programmes for informal workers²

¹ Announced programmes for BR, TH and ZA are for informal workers; for all other countries, they correspond to payouts per household. Payouts are for one month, regardless of the length of the announced programme. For CL, calculations are based on the payout in the first month. ² Simulations based on 2019 data on total number of workers in the informal sector. For BR and MX, data correspond to 2018. For PH, extrapolation based on the percentage of informal workers in the previous year. In all cases but MX and BR, informal employment is defined according to ILO standards and includes own-account workers and employers operating an informal enterprise, contributing family workers, and employees whose employment relationship is not subject to national labour legislation, income taxation, social protection or entitlement to employment benefits. For BR and MX, informal employment refers to workers not contributing to social security systems. ³ GDP forecast for 2020. ⁴ Average national minimum wage for the year 2020.

Sources: U Gentilini, M Almenfi, I Orton, P Dale, J Blomquist, R Palacios, V Desai and V Moreira, "Social protection and jobs responses to COVID-19: a real-time review of country measures", World Bank, May 2020; Inter-American Development Bank; International Labour Organization (ILO); IMF, *World Economic Outlook*; national data; BIS calculations.

The programmes' reach is extensive in some countries, but an important challenge is to identify those who are eligible.^⑥ To identify the targeted population, some countries are relying on national tax and ID databases, registries from other existing social assistance programmes, and online platforms for application by the public. Eligibility criteria vary: in some cases, they exclude workers who are currently benefiting from existing cash transfer schemes and other social assistance programmes; in other cases, they allow workers to receive more than one benefit. Caps on income are also part of eligibility criteria. To prevent fraud, some countries cross-check applications with social security, unemployment insurance and tax authority databases to verify that beneficiaries have no formal employment. Yet it is unclear to what extent these programmes are reaching the targeted informal workers.

It is an open question whether current disbursements provide enough relief. A key issue for policymakers is how large the payout should be and for how long it should be provided. Virus containment measures may last longer than expected or, even if they are relaxed, they may have to be reimposed. The recovery may also be shallower and slower than expected. Of course, any additional relief is limited by the available fiscal resources. A back-of-the-envelope calculation suggests that if income support were to be increased to cover all informal workers at the announced monthly payout, the expenditure would range (in annualised terms) from less than 0.5% of GDP in South Africa, where payouts are less generous, to 3.2% of GDP in Brazil and over 12% in the case of the Philippines, where the payout is relatively generous and the informal sector very large. Alternatively, if the cash transfers were to be raised to pay all informal workers the current minimum wage, the expenditure (in annualised terms) would range from 2% of GDP in Russia, a country with a lower informality rate, to 19% of GDP in Peru and over 25% of GDP in the Philippines, which both have large shares of informal workers.

① Conditional cash transfers in Latin American and Southeast Asian countries have a long history. The best known include Bolsa Família in Brazil, Familias en Acción in Colombia, Prospera in Mexico (formerly Progres-Oportunidades) and the Keluarga Harapan programme in Indonesia. Cash transfer programmes have not been used as often in emerging Europe. ② According to the International Labour Organization, informal employment includes all jobs in unregistered and/or small-scale private unincorporated enterprises that produce goods or services meant for sale or barter. ③ This computation only takes into account the specific payout to informal workers, and does not include other social assistance policies that are implemented concurrently and may also benefit the same household, such as increased disbursements from existent cash transfer programmes, health insurance, in-kind food and vouchers. For a detailed list of social assistance measures, see U Gentilini, M Almenfi, I Orton, P Dale, J Blomquist, R Palacios, V Desai and V Moreira, “Social protection and jobs responses to Covid-19: a real-time review of country measures,” World Bank, 15 May 2020. ④ For example, in Latin American countries the monthly labour income of informal workers ranges from 85% of the minimum wage in Colombia and Peru to 125% in Brazil and Chile. ⑤ Annualised figures are computed assuming that every scheme lasts 12 months. ⑥ Coverage and details about programmes are available from national sources and Gentilini et al (2020), op cit.

addition, several countries enacted standstills on various types of loan, although these are not necessarily fiscal measures in the strict sense. Some governments also provided funding directly or through their development banks.

To help restore business confidence and allow companies to raise funds, many governments also introduced credit guarantees. In particular, these were essential to induce banks to keep lending. Since the cost of the guarantees is recognised in the budget only if and when the loans default, such measures are also politically attractive.³¹ More importantly, governments could be compensated for the risks associated with the guarantees through fees and stock warrants.³²

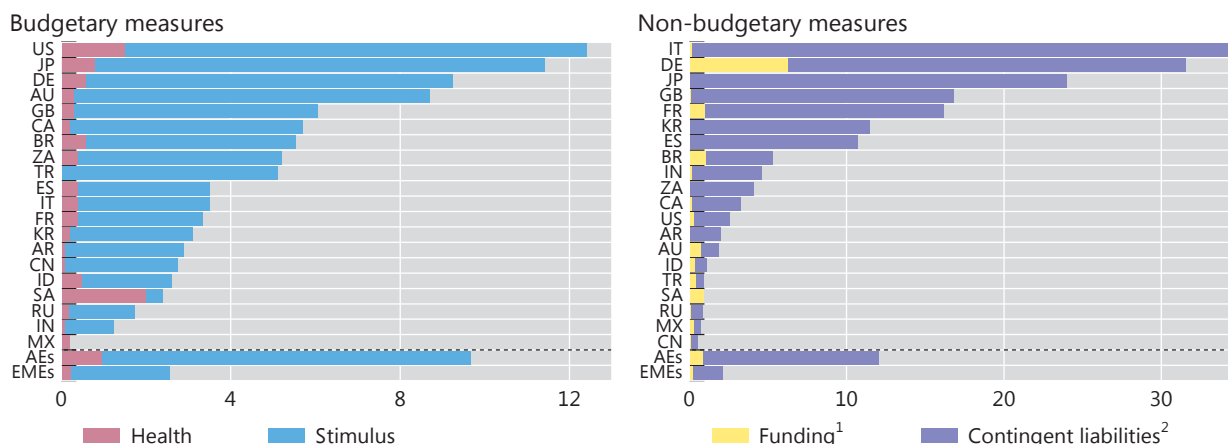
The size and scope of the packages announced thus far are unprecedented. The sum of crisis-related outright transfers, put in place up to early June, amounts to around 10% of GDP in AEs (Graph I.16, left-hand panel). And the total amount of bridge financing and contingent resource transfers, if fully utilised, could represent over 30% of GDP in Germany and Italy (right-hand panel). How much of this will actually be utilised depends on the duration of the shutdown, the conditions attached and the pace of recovery.³³

The composition of fiscal programmes varies greatly across countries. The size and shape of the welfare state had an important bearing on the design of fiscal packages.³⁴ For example, AEs with higher welfare spending and thus stronger automatic stabilisers relied less on discretionary transfers (Graph I.17, left-hand panel). Among EMEs, by contrast, countries with higher welfare spending also put in place larger packages involving immediate transfers. Similarly, countries with subsidised furlough schemes, eg France, Germany and Switzerland, tended to expand them rather than providing direct benefits to households, as done, for instance, in the United States. The structure and stability of the business sector also explains some of the features of the programmes. For example, countries in which firms faced larger liquidity shortages or had a larger stock of intra-firm credit put

Pledged fiscal packages

As a percentage of GDP

Graph I.16



Estimates focus on government discretionary measures that supplement existing automatic stabilisers, which differ across countries in their breadth and scope. AEs = AU, CA, DE, ES, FR, GB, IT, JP and US; EMEs = AR, BR, CN, ID, IN, KR, MX, RU, SA, TR and ZA. For regions, weighted averages based on GDP and PPP exchange rates.

¹ Equity injections, asset purchases, loans and debt assumptions, including through extra-budgetary funds. ² Guarantees on loans and other contingent liabilities such as loans channelled through public financial agencies.

Sources: IMF, *Fiscal Monitor*, April 2020 and update June 2020; IMF, *World Economic Outlook*; BIS calculations.

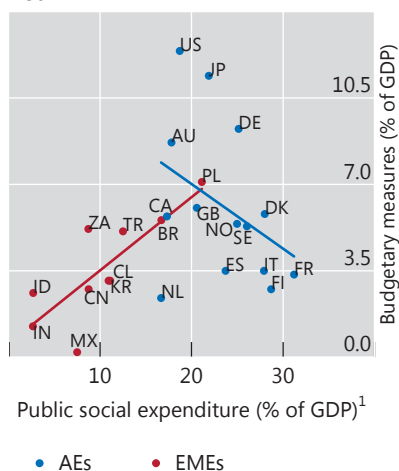
in place larger guarantee programmes and direct funding programmes (centre and right-hand panels).

The size of fiscal packages depended heavily on the fiscal space available. They were smaller in countries where sovereign credit default swap (CDS) premia rose

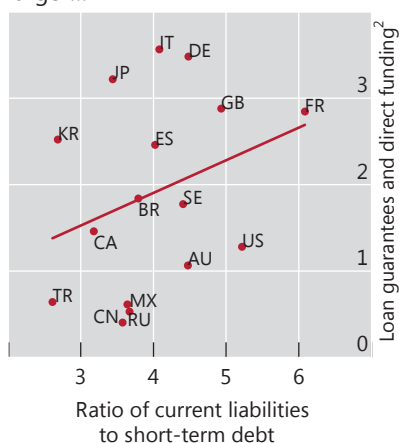
Institutional factors and corporate vulnerabilities drive the fiscal response

Graph I.17

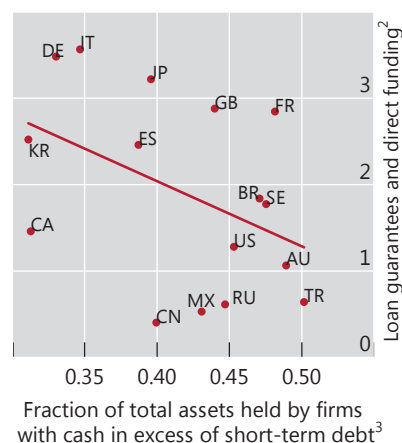
Larger transfers in advanced economies with smaller social safety net



Larger direct funding and loan guarantees where intra-firm credit is larger...



...and where firms have lower liquidity buffers



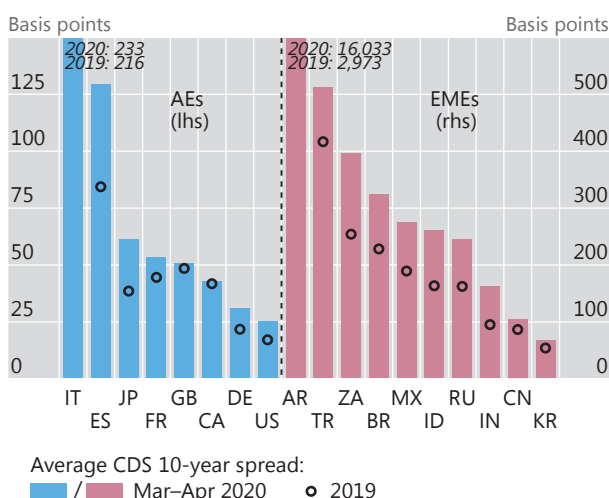
¹ Comprises cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. Benefits may be targeted at low-income households, the elderly, disabled, sick, unemployed, or young persons. ² $\log(1 + \text{loan guarantees per GDP} + \text{direct funding per GDP})$. ³ $\log(1 + \text{fraction})$.

Sources: IMF, *Fiscal Monitor*, April 2020 and update June 2020; OECD, *Society at a Glance 2019*; World Bank, *World Development Indicators*; S&P Capital IQ; BIS calculations.

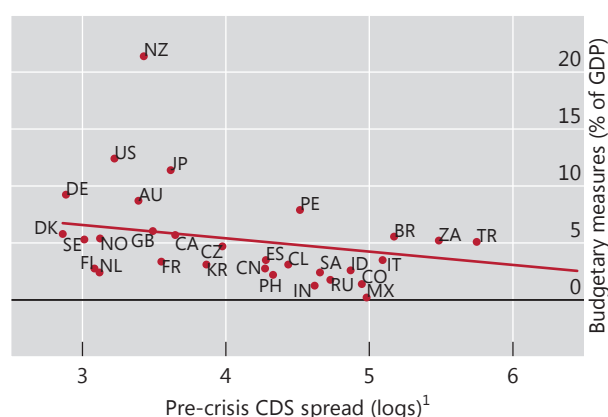
Fiscal space is tight in some places

Graph I.18

Sovereign CDS premia have increased...



...and are constraining the fiscal response



¹ Average of daily 10-year senior credit default swap (CDS) spreads in January 2020.

Sources: IMF, *Fiscal Monitor*, April 2020 and update June 2020; IHS Markit; BIS calculations.

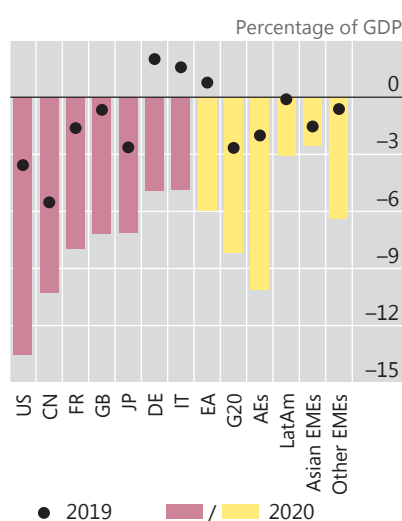
most, especially where they had previously been high (Graph I.18). Similarly, countries with lower pre-crisis credit ratings put in place leaner budgetary measures.

EMEs faced particularly tight constraints on their fiscal stimulus packages because of external constraints, as well as their weaker health infrastructure and inherently greater vulnerability. Accordingly, markets generally have a lower

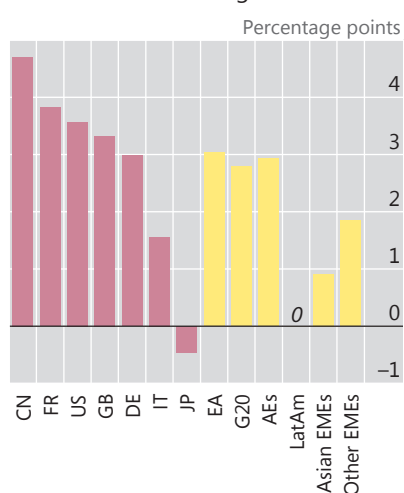
Fiscal deficits and debt ratios will soar

Graph I.19

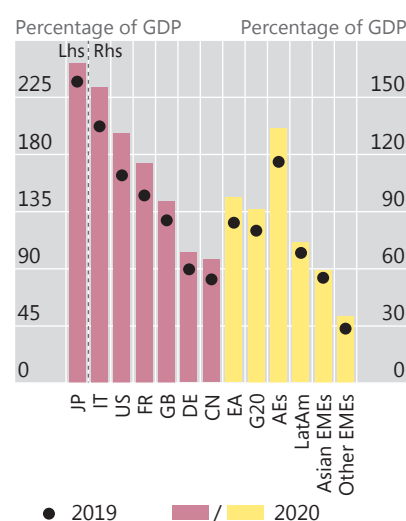
Massive widening fiscal deficits¹ expected for 2020



Primary deficits for 2021 projected to remain significantly above pre-Covid-19 shock average level²



Public debts likely to undergo steepest increase since GFC



For regions, weighted averages based on GDP and PPP exchange rates. AEs = AU, CA, DE, ES, FR, GB, IT, JP and US; LatAm = AR, BR, CL, CO, MX and PE; Asian EMEs = HK, ID, IN, KR, MY, PH and TH; Other EMEs = CZ, HU, PL, RU, SA, TR and ZA.

¹ Primary deficits. ² Difference between 2021 estimate and the average of 2016–19.

Sources: IMF, *World Economic Outlook*, April 2020; BIS calculations.

tolerance for their sovereign debt levels. As a result, the response of EMEs was much weaker, at 2.6% of GDP, compared with 10% for AEs (Graph I.16, left-hand panel).

Country differences aside, a legacy of the measures and the recession will be much higher public sector indebtedness. This will exacerbate a previous long-term trend that the GFC had already intensified. According to early IMF forecasts, the average primary fiscal deficits in AEs will increase by 8 percentage points of GDP between 2019 and 2020 (Graph I.19, left-hand panel). All AEs except Japan, Italy and some large EMEs, including China and Russia, are projected to have 2021 primary deficits of at least 2 percentage points of GDP above the 2016–19 average (centre panel). Thus, public debt will increase substantially in many AEs (right-hand panel), and is likely to grow further for all economies into the recovery.

U, V, W? The alphabet soup of the recovery

Besides saving lives, the ultimate test of the policy response to the Covid-19 crisis will be the strength and durability of the recovery. In the near term, the outlook hinges on how the pandemic unfolds, which is very hard to predict.

In an optimistic scenario, in which measures to contain the pandemic do not need to be reimposed, economic activity could gradually improve in the second half of 2020 and embark on a durable recovery. That said, most observers agree that a V-shaped recovery – as after the SARS episode – is out of the question. To be sure, production could probably resume fairly quickly, with pent-up demand for some consumer goods providing a boost. But restrictions on physical proximity and on international mobility would weigh on productivity for some time, lost demand for most services will not recover and, psychologically, risk aversion may linger. All this suggests a more gradual, U-shaped rebound.³⁵

While it is still early days, the recent Chinese experience seems to confirm this conjecture. China, where the virus was first reported, was relatively quick to enter and exit its first lockdown. There, large firms were able to return to approximately 90% of capacity within two months after the most restrictive measures were lifted, but smaller firms lagged behind and consumption remained subdued (Box I.E).

Yet even a U-shaped scenario may be out of reach. The lifting of containment measures could well result in a renewed outbreak and hence in their reimposition, possibly more than once. Rather than being U-shaped, the recovery would then be W- or wave-shaped, and of uncertain length. This would put further pressure on both monetary and fiscal policy.³⁶

The Covid-19 outbreak could also hold back economic activity in the medium-to-long run, if it damages the economic tissue and leaves long-lasting scars. Unless quickly restructured, higher debt levels could hold back growth, just as after the GFC. The restructuring process might not be able to effectively distinguish viable from non-viable firms, especially if bankruptcy courts or less formal mechanisms are overwhelmed: valuable capital would then be lost and worthless firms kept operating. Unemployment could result in a loss of skills or make it more difficult for young people to gain a foothold in the labour market.³⁷ More generally, unless policies are sufficiently supportive and well targeted, the reallocation of resources to meet the new pattern of demand post-crisis may take time or be undermined.

Questions also arise concerning global value chains and global integration. Firms may seek to shorten their value chains and rely on multiple suppliers for the same good to diversify their risks. Parts of the value chains may also be onshored. There may be more inward investment at the expense of FDI. Economies depending on trade or FDI may have to reinvent their growth model. The burden could fall

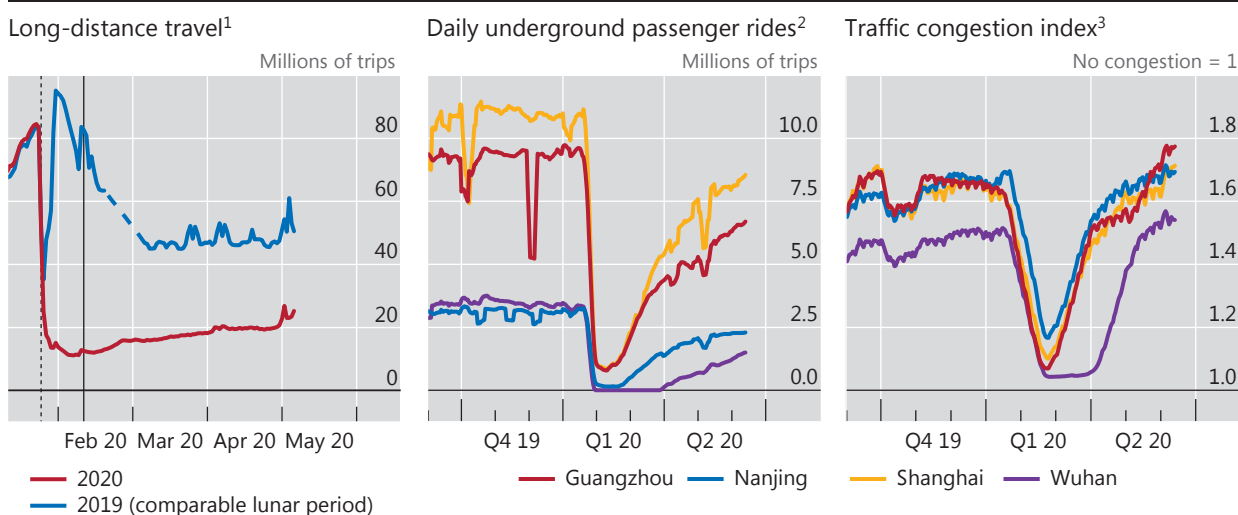
China returns to work

On 23 January, two days before the Chinese new year, the authorities put several major cities under strict lockdown in an attempt to contain the Covid-19 outbreak. Since then, the virus has gradually been brought under control and China recorded zero new reported coronavirus deaths for the first time on 7 April. How has the economy performed so far following the “exit” from containment measures? Data up to 20 May indicated that some economic activities took about six weeks to get back to near capacity, while others were still falling short of that benchmark.

The movement of people adjusted sluggishly after containment was eased. Traditionally, the lunar new year holiday ushers in the busiest travel period in China, with millions of migrant workers journeying between workplace and home. Data tracking this migration showed that daily average passenger traffic reached only 20 million trips in early May, compared with over 40 million a year earlier (Graph I.E.1, left-hand panel). Public transport rides in cities resumed faster, with the number of underground trips and traffic congestion rising quickly once the lockdowns were eased (centre and right-hand panels). Only the congestion index reached pre-pandemic levels by mid-May.

Passenger transport has yet to reach pre-virus levels

Graph I.E.1



The dashed vertical line in the left-hand panel indicates lunar new year's eve. The solid line indicates the date of return to work.

¹ Chinese new year holiday: 4–10 February in 2019 and 24–30 January in 2020. Includes all air, rail, road and water transport modes.

² Seven-day moving average. ³ Defined as the ratio of average actual travel time in the city to quickest possible journey time on a given day; 30-day moving average.

Sources: Chinese Ministry of Transport; Wind.

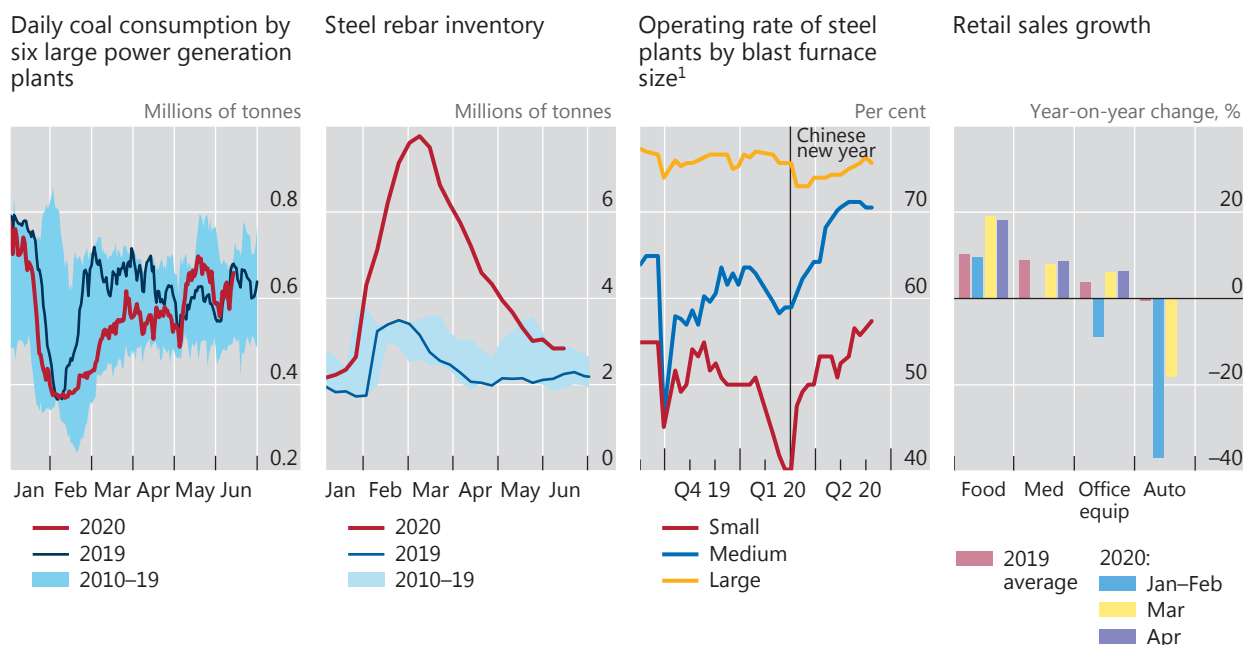
The sluggish restart of business operations could reflect the more stringent restrictions on long-distance travel and the two-week self-isolation required of workers returning from other provinces. In addition, many city dwellers might have worked from home and avoided unnecessary outings via mass transit, or may have been told to take unpaid leave as many businesses have struggled to pay salaries. A survey by an online job-matching agent has reported that, at the end of March, around 23% of some 8,200 enterprises stated they had stopped paying their workers.

Production resumed with significant differences across sectors. Electricity production recovered first, with daily total coal consumption by the large power generation plants reaching its pre-pandemic level in early April (Graph I.E.2, first panel). The recovery was slower for firms heavily involved in the production of intermediate goods. For example, the closures of many city construction sites in early February reduced the demand for steel rebar – reinforcement steel used in concrete structures – leading to a sharp rise in inventory levels (second panel). Despite the construction restart, inventories returned to the historical range only in early June. Meanwhile, large firms appeared to be quicker than small and medium-sized enterprises in resuming operations. At end-February, most provincial governments announced that large enterprises had returned to 90% capacity. One possible reason is that many large companies had the financial muscle to

charter private transport to help migrant workers return to work. However, as inferred from the operating rate of steel blast furnaces, even medium-sized and small plants have picked up rapidly in recent weeks (third panel).

Production and consumption data suggest recovery is on track

Graph I.E.2



Food = grain, oil and foodstuff; Med = Chinese and western medicines; Office equip = cultural and office equipment; Auto = automobile.

¹ The percentage of total production capacity of the blast furnace that is being used. Large = annual production of more than 6 million tonnes of crude steel; medium = annual production of between 2 million and 6 million tonnes; small = annual production of less than 2 million tonnes.

Sources: Wind; BIS calculations.

Consumer demand continued to improve, albeit at a slow pace. Retail sales were about 8% lower than in April the previous year, an improvement from the 16% drop recorded in March. Growth in sales of basic necessities such as food and medicine held up well throughout the lockdown and that of office equipment rebounded in March and April (Graph I.E.2, fourth panel). Sales of large-ticket items such as automobiles contracted further in March, before rebounding to the previous year's level in April.

In summary, the return to work in China has been slow. Three months after containment measures were eased, mass transit was below its pre-crisis level. Production fared better, but inventory in some sectors remained elevated. Personal consumption was the laggard, perhaps reflecting the fall in income resulting from layoffs and pay cuts.

disproportionately on poorer economies and EMEs, given their weaker competitive position and role in global value chains. In addition, lower labour mobility could reduce remittances, an important source of external income for many middle- and low-income economies. Positive global technological spillovers may suffer. If that affects the transfer of digital technology to EMEs, this may leave some segments of the population behind, worsening inequality and fuelling social discontent.

In a nutshell, the range of outcomes is quite wide. At one extreme, if the pandemic is short-lived, its imprint will be significant but, with hindsight, manageable. If the pandemic is prolonged, the post-crisis economic landscape could look very different from today's. Debt levels, especially for sovereigns, will be much higher. The need to reallocate resources will be greater, and the degree of

globalisation possibly smaller. On the other hand, lockdowns could accelerate the shift towards digitalisation and thus raise future productivity. In addition, investment in green technologies could boost economic activity.³⁸ The outlook for inflation is similarly uncertain. In the near term, high unemployment will push down inflation, but it is far from clear what will happen to inflation in the medium and long term.³⁹ In all likelihood, as a natural consequence of dealing with insolvency problems and of central banks' increased footprint in the economy, the role of the state in the economy will probably loom considerably larger. And so too might the policy challenges, as discussed in Chapter II.

Endnotes

- ¹ See H Cao, M Chui, M Drehmann, T Goel, I Mattei, A Mehrotra, J Schanz and A Villar, "Structural differences and the Covid-19 crisis: each EME is unhappy in its own way", *BIS Bulletin*, forthcoming, 2020.
- ² See International Labour Organization, *ILO Monitor: Covid-19 and the world of work*, third edition, April 2020.
- ³ See Centre for Monitoring Indian Economy, "The jobs bloodbath of April 2020", 5 May 2020.
- ⁴ Perhaps ironically, the drop in trade volumes occurred just when global trade was showing signs of recovering after a series of trade tensions abated.
- ⁵ United Nations World Tourism Organization, news release, 7 May 2020.
- ⁶ Oil-related revenues account for close to 70% of total government revenue in Saudi Arabia, 25% in Malaysia and Russia, and 10–15% in Colombia, Indonesia and Mexico, sometimes even more if state-run oil firms are consolidated. In Mexico, fiscal revenues from oil are hedged, so the impact of a lower oil price will be felt only after hedging contracts run out, which tends to be in a year's time.
- ⁷ Among major EMEs, the economy most dependent on remittances is the Philippines, where they reached around 10% of GDP in 2019. See World Bank, "Covid-19 crisis through a migration lens", *Migration and Development Brief*, no 32, April 2020.
- ⁸ Total international reserves of 11 major EMEs (excluding China and Turkey) fell by almost \$60 billion in March.
- ⁹ See Y Arslan, M Drehmann and B Hofmann, "Central bank bond purchases in emerging market economies", *BIS Bulletin*, no 20, 2 June 2020.
- ¹⁰ See A Zabai, "How are household finances holding up against the Covid-19 shock?", *BIS Bulletin*, no 22, 15 June 2020.
- ¹¹ See Association of Practising Accountants, "The impact of the coronavirus on UK owner managed business: an APA client survey", April 2020.
- ¹² See Bank of England, *Interim Financial Stability Report*, May 2020.
- ¹³ See S Avdjiev, P McGuire and G von Peter, "International dimensions of EME corporate debt", *BIS Quarterly Review*, June 2020, pp 1–13.
- ¹⁴ See D Beltran, K Garud and A Rosenblum, "Emerging market nonfinancial corporate debt: how concerned should we be?", Board of Governors of the Federal Reserve System, *IFDP Notes*, 2017.
- ¹⁵ Information on the amounts outstanding of leveraged loans is not available. Cumulating issuance, as is usually done for bonds, will result in a considerable overestimation of the actual amounts since many loans are repaid ahead of the scheduled maturity date.
- ¹⁶ Even though banks are not involved in the origination of private credit, they are still exposed to developments in this market through the provision of leverage to private credit funds. Slightly less than 50% of portfolio managers reported borrowing against fund assets. See S Aramonte, "Private credit: recent developments and long-term trends", *BIS Quarterly Review*, March 2020, pp 11–13.
- ¹⁷ See BIS, "Easing trade tensions lift sentiment", *BIS Quarterly Review*, December 2019, pp 1–14; and the 2019 financial stability reviews of the ECB and the Federal Reserve.
- ¹⁸ See A Carstens and H S Shin, "Emerging markets aren't out of the woods yet", *Foreign Affairs*, 15 March 2019, for a description of this mechanism.
- ¹⁹ See U Lewrick, C Schmieder, J Sobrun and E Takáts, "Releasing bank buffers to cushion the crisis – a quantitative assessment", *BIS Bulletin*, no 11, 5 May 2020.

- ²⁰ See I Aldasoro, T Ehlers, P McGuire and G von Peter, "Global banks' dollar funding needs and central bank swap lines", *BIS Bulletin*, forthcoming, 2020.
- ²¹ This difference could in part be related to the timing of the switch to expected loss provisioning. In the United States, the switch took place in Q1 2020, while countries using IFRS had already undertaken the switch in 2018. US banks also have to make provisions for expected losses during the *entire* life of a loan right from the time of its origination, while in Europe they have to provision only against 12-month expected losses. Only if there is a significant deterioration in credit quality do they have to report lifetime expected losses. In response to the profound uncertainty introduced by the Covid-19 crisis, the US CARES Act granted US banks temporary optional relief from compliance with the new standard. The ECB adopted a similar stance.
- ²² Euro area banks' exposures to mining and quarrying, which includes oil, amount to 0.5% of their total lending. In the United States, the median large bank lent around 3% of its loan book to the energy or oil sector, although a small number of banks had exposures of the order of 10% or more. See S&P Global Market Intelligence, "Banks disclose ratings exposures, efforts to shrink portfolio", *Data Dispatch*, 7 May 2020.
- ²³ See I Aldasoro, I Fender, B Hardy and N Tarashev, "Effects of Covid-19 on the banking sector: the market's assessment", *BIS Bulletin*, no 12, 7 May 2020.
- ²⁴ While the strong loan growth in March was driven primarily by the drawdown of credit lines by non-financial corporations (as evidenced in the expansion in large domestic bank balance sheet data), credit expansion in April was fuelled by Paycheck Protection Program loans.
- ²⁵ This may require a general reassessment of the financial health of firms after the initial aim of keeping them afloat for a short period was achieved, and the introduction of decisive fiscal actions, such as equity injections and debt guarantees, to restore market confidence. See C Borio, B Vale and G von Peter, "Resolving the financial crisis: are we heeding the lessons from the Nordics?", *BIS Working Papers*, no 311, June 2010.
- ²⁶ See also Chapter II of this Report; and P Cavallino and F De Fiore, "Central banks' response to Covid-19 in advanced economies", *BIS Bulletin*, no 21, 5 June 2020.
- ²⁷ See BIS, "Monetary policy frameworks in EMEs: inflation targeting, the exchange rate and financial stability", *Annual Economic Report 2019*, Chapter II, June.
- ²⁸ See J-P Svoronos and R Vrbaski, "Banks' dividends in Covid-19 times", *FSI Briefs*, no 6, May 2020.
- ²⁹ In the euro area, such a course of action requires the involvement of national fiscal authorities.
- ³⁰ It is debatable whether the state should provide financial assistance to a specific sector of particular economic importance. Proponents argue that their collapse could result in the loss of large investments and might worsen the recession, thereby imposing further costs on taxpayers, not least from unemployment benefits.
- ³¹ Since 1991, loan guarantees have received the same budgetary treatment as loans in the United States. See R Gnanarajah, "Cash versus accrual basis of accounting: an introduction", *Congressional Research Service Report*, R43811, December 2014.
- ³² Stein (2020) argues that contingent resource transfers through less senior claims (eg preferred plus warrants) would be preferable in the current circumstances, as debt overhang would slow recovery. See J Stein, "Webinar: an evaluation of the Fed-Treasury credit programs", Princeton University Bendheim Center for Finance, May 2020.
- ³³ Following the 9/11 terrorist attacks, only \$1.6 billion of the \$10 billion loan guarantees promised by the US government to the airline industry were used. Despite one recipient eventually filing for bankruptcy, the US Treasury wound up the state aid programme with a \$300 million profit. See M Blair, "The economics of post-September 11 financial aid to airlines", *Indiana Law Review*, vol 36, 2003, pp 367–95.
- ³⁴ See E Alberola, Y Arslan, G Cheng and R Moessner, "The fiscal response to the Covid-19 crisis in advanced and emerging market economies", *BIS Bulletin*, no 23, 17 June 2020.

- ³⁵ Stretching the Roman alphabet, one might speak of a tilted J-recovery, in which a sharp drop is followed by a gradual rebound. Some observers have even stepped outside the confines of the alphabet and referred to a “swoosh”-shaped recovery, similar to the logo of a famous sports shoe brand.
- ³⁶ On the shape of the recovery, see also E Kohlscheen, B Mojon and D Rees, “The macroeconomic spillover effects of the pandemic on the global economy”, *BIS Bulletin*, no 4, 6 April 2020.
- ³⁷ A large body of literature has established the “scarring” effect of youth unemployment, which can impose costs on individuals and society well into the future. See eg D Bell and D Blanchflower, “Young people and the Great Recession”, *Oxford Review of Economic Policy*, vol 27, no 2, 2011, pp 241–67.
- ³⁸ The reduction in carbon emissions during the lockdown phase could easily be offset by fewer efforts to green the economy down the road, given fewer available resources and competing priorities. See also the discussion in L A Pereira da Silva, “Green Swan 2 – climate change and Covid-19: reflections on efficiency versus resilience”, 14 May 2020.
- ³⁹ See Chapter II of this Report for a more detailed discussion.

II. A monetary lifeline: central banks' crisis response

Key takeaways

- *In the face of an unprecedented crisis caused by the Covid-19 pandemic, central banks were again at the forefront of the policy response. In concert with fiscal authorities, they took swift and forceful action, tailored to the specific nature of the stress.*
- *Central banks' role as lenders of last resort has seen another important evolution. There has been a marked shift towards providing funds to the non-bank private sector and, in emerging market economies, towards interventions in domestic currency asset markets.*
- *In the post-crisis period, much higher sovereign debt and heightened uncertainty about the overall economic environment – particularly the inflation process – could further complicate the trade-offs central banks face.*

Faced with an unprecedented global sudden stop, central banks were again at the forefront of the policy response. They moved swiftly and forcefully to prevent a potential financial collapse from exacerbating the damage to the economy. They stabilised the financial system, cushioned the adjustment for firms and households, and restored confidence to the extent possible.

In contrast to the Great Financial Crisis (GFC) of 2007–09, the Covid-19 turmoil was fundamentally a real shock generated by measures to address a public health emergency. Banks and the financial sector more generally were not the source of the initial disturbance. Rather, they became embroiled in the turmoil triggered by the precipitous economic contraction. Central banks found themselves facing the Herculean challenge of reconciling a real economy where the clock had stopped with a financial sector where it kept ticking. With firms and households bearing the brunt of the shock, much of the response sought to ease the financial strains they faced while being tailored to countries' specific circumstances.

This chapter examines central banks' responses against the backdrop of an evolving financial and economic landscape. It first outlines their salient features and underlying objectives. It then highlights some key considerations that guided the interventions, with specific reference to the historical role of central banks as lenders of last resort. Finally, it looks ahead to the medium-term challenges central banks may face in the post-pandemic world.

Central banks' crisis management: a shifting state of play

The Covid-19 crisis brought to the fore once again central banks' core role in crisis management. As global economic and financial conditions deteriorated rapidly, central banks formed a critical line of defence. The policy response was broad-based, tailored to the nature of the shock and to country-specific financial system features. Preventing market dysfunction was critical to preserving the effectiveness of the monetary transmission mechanism, maintaining financial stability and supporting the flow of credit to firms and households. In aiming to fulfil this

objective, central banks deployed their full array of tools and acted in their capacity as lenders of last resort – a function that has historically been at the core of their remit. Importantly, the interventions were consistent with their mandates which, notwithstanding cross-country differences in emphasis, are ultimately to pursue lasting price and financial stability – necessary conditions for sustainable growth.

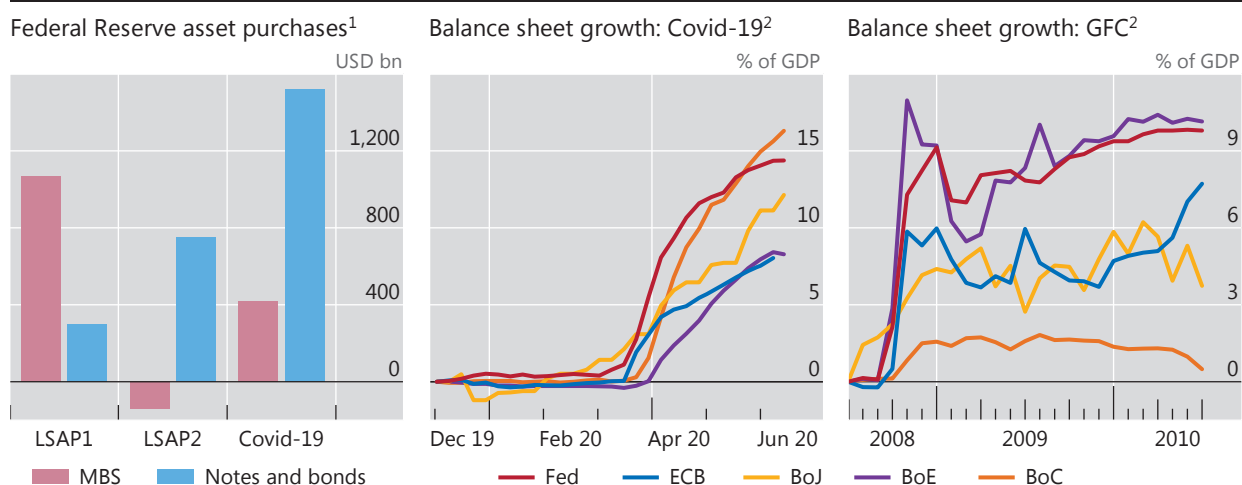
Apart from cutting interest rates swiftly and forcefully, down to the effective lower bound in a number of countries, central banks deployed their balance sheets extensively and on a very large scale. They injected vast amounts of liquidity into the financial system and committed even larger sums through various facilities. For instance, the Federal Reserve purchased over \$1 trillion of government bonds in the span of about four weeks. This was roughly equal to the total amount of government bonds purchased under the large-scale asset purchase (LSAP) programmes between November 2008 and June 2011 (Graph II.1, left-hand panel). Similarly, the ECB launched a facility to buy up to €1.35 trillion of securities, or around half of the total amount purchased under its Asset Purchase Programme between 2014 and 2018. In a matter of weeks, the balance sheets of the central banks of the major economies expanded substantially (centre panel), mostly exceeding their increase during the GFC (right-hand panel).

Other central banks, in both advanced and emerging market economies (EMEs), also implemented a broad range of measures targeting various market segments. These actions went hand in hand with large-scale fiscal packages designed to cushion the blow to the real economy (Chapter I). They were also complemented by supervisory measures aimed at supporting banks' ability and willingness to lend. In addition, as stress in the offshore dollar markets became particularly acute, the Federal Reserve extended its network of swap lines to as many as 14 central banks.

The various measures had different proximate objectives. Some of them, such as the initial interest rate cuts, had the more traditional aim of supporting demand and offsetting tighter financial conditions. At the time of the cuts, markets by and

Swift and forceful response

Graph II.1



¹ Difference in weekly holdings between the start and the end of the selected periods: LSAP1 = November 2008–March 2010; LSAP2 = November 2010–June 2011; Covid-19 = January 2020–latest available data. MBS = mortgage-backed securities. ² Cumulative changes in total balance sheet size since December 2019 (centre panel, weekly) and since June 2008 (right-hand panel, monthly). As a percentage of four-quarter moving sum of quarterly GDP; for April 2020 onwards, sum of Q2 2019–Q1 2020 GDP.

Sources: Bank of Canada; Bank of England; Board of Governors of the Federal Reserve System; Datastream; national data; BIS calculations.

large continued to function well. But as the crisis deepened, the evaporation of confidence caused major dislocations, forcing central banks to focus on stabilising the financial sector and supporting credit flows to the private sector.

What does this task involve more precisely? And how has it evolved in the light of changes in the structure of the financial system and the nature of the stress? Answering these questions requires examining more closely central banks' goals, tools, proximate objectives and strategies in crisis management.

Objectives and crisis toolkit

The overriding goal in crisis management is twofold. First, it seeks to prevent long-lasting damage to the economy by ensuring that the financial system continues to function and that credit to households and firms continues to flow. Second, it aims to restore confidence and shore up private expenditures. These goals require the central bank to draw on its three main functions: as the authority responsible for monetary policy, as lender of last resort and, where charged with such duties, as bank regulator and supervisor.

The relationship between the monetary policy and lender of last resort functions is complex and nuanced. The objectives of the two functions differ – the former is focused on steering aggregate demand, the latter on stabilising the financial system. At the same time, the instruments increasingly overlap. Pre-GFC, central banks relied largely on adjustments to short-term interest rates to steer aggregate demand, but since then they have relied much more on adjustments to their balance sheet – the typical lender of last resort tool. Operations that offer funding to banks at favourable rates conditional on their lending to firms and households, for example, supply central bank liquidity to influence aggregate demand. Moreover, the two objectives are intertwined. Central bank interventions to restore market functioning stabilise the financial system, thereby establishing the confidence needed to ensure the smooth transmission of monetary policy. Thus, it may be hard to draw a clear line between the two functions.

The tools at central banks' disposal can be divided into four main categories.

The broadest tool and typically the first line of defence is short-term interest rates. By influencing the cost of funds for the entire financial system, policy rates have a wide reach. They also send a powerful signal, which can help shore up confidence in times of stress. Notably, steering expectations of future interest rates through forward guidance has become an increasingly important part of monetary policy. While interest rate cuts in crises are common, they are far from universal, given that shocks and institutions vary. In EMEs, in particular, stabilising the exchange rate often requires raising interest rates to stem capital flight.

The second set of tools is lending to financial institutions. This includes repurchase operations, which are the bread and butter of liquidity management during normal times, as well as traditional standing facilities / discount windows, which can also act as liquidity backstops for institutions in need. Moreover, targeted lending operations can be tailored to support funding in specific market segments. They can also involve foreign currency – for example, through foreign exchange swaps – to alleviate currency-specific funding pressures.

The third set of tools is outright asset purchases (and sales). These operations alter relative asset supplies in markets and influence the liquidity of specific market segments. Thus, their impact on asset valuations can be more direct than that of other tools.¹ They also convey signals about the future course of policy and help manage expectations, thereby reducing uncertainty. The assets involved range from government bonds to private sector securities, such as commercial paper, corporate bonds, equity and foreign exchange.

Finally, as regulatory and supervisory agencies, central banks may adjust regulations that directly affect financial intermediaries and markets. These include what are typically regarded as monetary policy tools, such as reserve requirements. But, depending on central banks' powers, they may also involve other tools, such as capital and liquidity requirements and even capital flow management measures. Whenever the central bank does not have control over these tools, they need to be deployed in coordination with the relevant authorities.

Lender of last resort and the evolving financial landscape

Given the magnitude of the shock that triggered the current crisis, central banks deployed their full arsenal of tools, sometimes in unprecedented ways. The specific type of intervention varied with the nature of the stress and countries' characteristics, particularly the structure of the financial system and the conditions of its major players. Table I.1 in Chapter I illustrates examples of the key measures implemented in the major advanced economies (AEs) and a sample of EMEs.

The importance of the financial structure merits special attention. The lender of last resort function has historically evolved in line with financial market development. Traditionally, central bank emergency lending was synonymous with credit provision to banks. As capital markets developed and the importance of market-based finance increased, the reach of emergency lending broadened. In modern financial systems, markets, like banks, may be subject to "runs" driven by similar underlying forces. A sudden increase in market participants' uncertainty about asset valuations or counterparties' financial strength can cause them to disengage from markets. This can trigger a self-reinforcing spiral involving declines in market and funding liquidity and heightened counterparty credit risk that can lead to the breakdown of key financial markets.²

The GFC heralded a clear shift in the role of lender of last resort beyond banks. During the GFC, central banks broke new ground with the scale and breadth of their measures, particularly in terms of eligible counterparties and collateral. The current crisis has taken this evolution further. A striking feature this time has been the prevalence of interventions aimed at non-bank financial institutions, including entities such as mutual funds. This is in line with the growing role of market-based financing, particularly for the non-financial corporate sector (Graph II.2, left-hand panel). As a result, central banks, particularly in AEs, have increasingly been acting as market-makers or dealers of last resort.

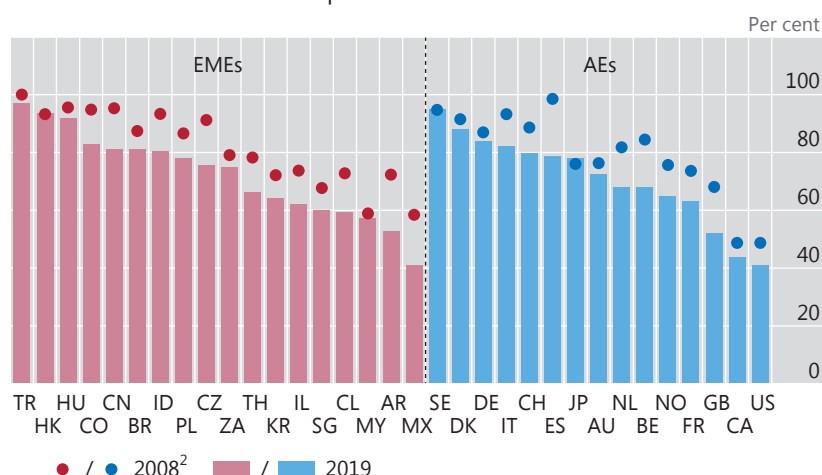
This was evident early in the Covid-19 crisis in response to acute strains on money market mutual funds. In a dynamic reminiscent of the GFC, a flight to safety resulted in large-scale redemptions from prime money market funds in the United States. Some \$160 billion or approximately 15% of assets under management were withdrawn in March alone (Graph II.2, right-hand panel). This had large knock-on effects on crucial funding markets, particularly on that for commercial paper, where prime money market funds are key investors. As a result, funding costs in these markets soared and issuance dropped. The disruptions reverberated globally, given that non-US firms and banks rely heavily on these markets, contributing to a global shortage of US dollar liquidity (see below). The Federal Reserve reacted swiftly, establishing a facility to backstop money market funds. This stemmed redemptions and averted a wider market breakdown. In response to similar strains, the Bank of Thailand and the Reserve Bank of India also introduced facilities to provide liquidity to money market mutual funds through banks. Such backstops have proven effective in shoring up confidence and easing tensions.

More broadly, central banks targeted a wide range of market segments through outright asset purchases. Most notably, they undertook large-scale purchases of

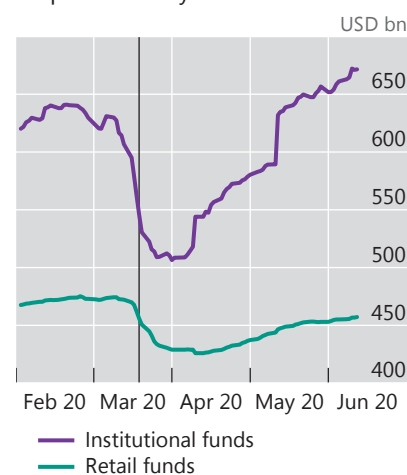
Post-Great Financial Crisis changes in financial structure and tensions in money market funds

Graph II.2

Share of bank loans to the corporate sector declines¹



US prime money market fund assets³



The vertical line in the right-hand panel indicates the Federal Reserve's announcement of the Money Market Mutual Fund Liquidity Facility (MMLF) on 18 March 2020.

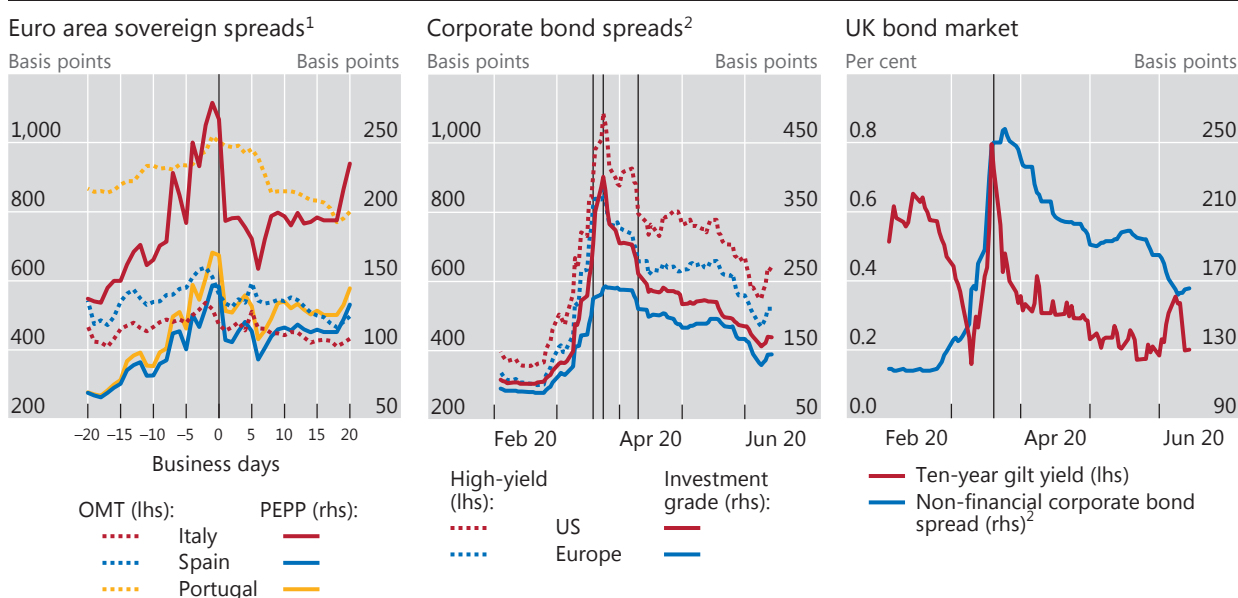
¹ Bank loans to non-financial corporations (NFCs) as a share of the sum of bank loans to NFCs and debt securities issued by NFCs. If bank loans are not available, bank credit to NFCs (BR, CO and MY) or bank claims on NFCs (CN) are used. Debt securities issued by NFCs measured as total debt securities; if not available, sum of domestic and international debt securities. ² For CH, Q1 2009. ³ Not all funds report their assets under management on a daily basis, which may lead to some jumps in the series.

Sources: Crane Data; Datastream; Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; national data; BIS calculations.

government bonds, either by ramping up existing programmes or by establishing new ones. The Federal Reserve was particularly forceful, committing to purchasing unlimited amounts of US Treasuries and agency mortgage-backed securities, and subsequently breaking new ground by buying municipal debt. The Bank of Japan also committed to unlimited government bond purchases. The central banks of several AEs and EMEs, including Australia, Canada, India and Korea, launched programmes for the first time. The purchases helped stabilise bond markets despite prospective sharp increases in issuance as governments fought the pandemic. In the euro area, the announcement of the Pandemic Emergency Purchase Programme (PEPP) helped narrow sovereign bond spreads, just as the announcement of Outright Monetary Transactions had back in 2012 (Graph II.3, left-hand panel).

Many central banks also bought private sector assets. All major AE central banks established or expanded facilities to fund purchases of a wide range of securities, including commercial paper, corporate bonds, asset-backed securities and equity. The purchases were aimed at preserving market functioning in the face of fire sales and at supporting the issuance of new securities. They thus channelled funds directly to the non-bank private sector.

Strains in corporate bond markets loomed large. Amid a global flight to safety, liquidity dried up and spreads spiked. Central bank interventions were a key stabilising force. Cases in point include the announcements of the ECB's PEPP, which included purchases of corporate bonds, on 18 March and the Federal Reserve's primary and secondary market bond purchase programmes on 23 March. Both immediately tightened spreads in the respective jurisdictions (Graph II.3, centre panel), including on high-yield bonds, which were initially excluded. High-yield spreads tightened further in the United States on 9 April, when some of those bonds became eligible. Similarly, the Bank of England's announcement that it had



The vertical lines in the centre panel indicate 18 March (ECB announced Pandemic Emergency Purchase Programme (PEPP)), 23 March (Fed announced Primary Market Corporate Credit Facility (PMCCF) and Secondary Market Corporate Credit Facility (SMCCF)) and 9 April (Fed announced extension of eligible securities under PMCCF and SMCCF to include recently downgraded bonds). The vertical line in the right-hand panel indicates 19 March (BoE announced a programme to buy £200 billion of gilts and corporate bonds).

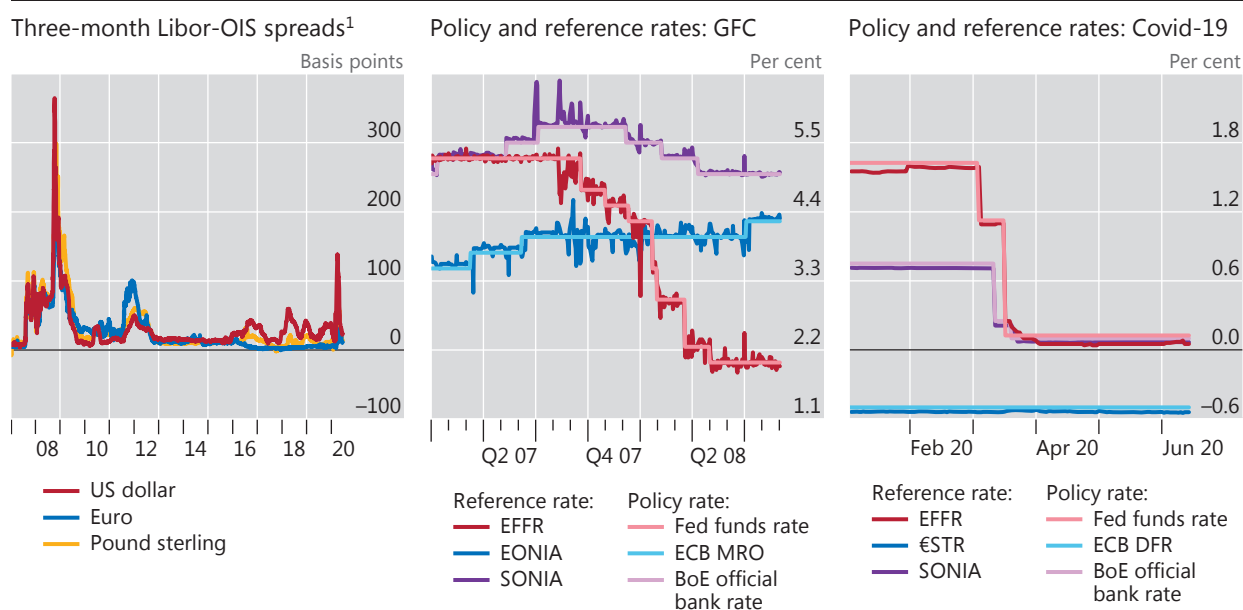
¹ Spread over 10-year German sovereign yields around announcements of OMT (Outright Monetary Transactions) and PEPP. Day 0 for OMT is 26 July 2012, the date of the speech by Mario Draghi at the Global Investment Conference in London ("whatever it takes" speech). Day 0 for PEPP is 18 March 2020, the date when the ECB announced the PEPP. ² Option-adjusted spreads.

Sources: Bloomberg; ICE BofAML indices; BIS calculations.

significantly stepped up its purchases of corporate and government bonds on 19 March was instrumental in alleviating market strains amidst signs of dysfunction (right-hand panel). Some EME central banks also stepped in to stabilise corporate bond markets, reflecting their greater importance in local financial systems (see below).

A striking example of how far a lender of last resort may need to go in more market-based systems is the dislocation in the US Treasury market in March (Box II.A). A confluence of two factors caused the turmoil: an abrupt de-risking by highly leveraged players, who needed to unwind their long Treasury positions in the face of large margin calls, and dealers' limited capacity to absorb the securities, given their already crowded inventories. As a result, the US Treasury market suffered one of its most severe bouts of volatility ever. Avoiding serious dislocations in this key market was paramount, given the critical role that government bonds play in the financial system. The Federal Reserve responded with massive purchases of Treasuries. The episode highlights how the financial condition of key market players – in this case dealers with limited balance sheet capacity and highly leveraged hedge funds – can influence the scope and focus of emergency operations.

This was also evident in the interbank market. One important difference between this episode and the GFC is banks' much stronger position, thanks to the large capital and liquidity buffers built since then (Chapter I, Graph I.13). As a result, counterparty credit risk among banks has not been a significant source of tension on this occasion (Graph II.4, left-hand panel). By contrast, during the GFC, doubts about banks' creditworthiness generated severe strains in the interbank market and the resulting interest rate volatility compromised central banks' ability to maintain



€STR = euro short-term rate; DFR = deposit facility rate; EFRR = effective federal funds rate; EONIA = euro overnight index average; MRO = main refinancing operations rate; SONIA = sterling overnight index average.

¹ For euro area, Euribor-OIS spread.

Sources: Bloomberg; BIS calculations.

policy rates close to their targets (centre panel). A major thrust of the interventions during the GFC was thus to alleviate problems related to the distribution of reserves among banks. Given banks' stronger positions, as well as the abundance of excess reserves, this was not an issue this time around (right-hand panel).

Reaching the last mile domestically ...

Given the unique nature of the Covid-19 crisis, firms and households directly bore the brunt of the fallout. Thus, an overarching objective of central banks' response was to channel funding to them for the length of the lockdowns, thereby covering the "last mile".³ Broadening the reach to encompass the non-financial private sector represents yet another step in the evolution of the lender of last resort function.

Beyond the purchases of commercial paper and corporate bonds mentioned above, central banks relied heavily on targeted lending operations to banks at low funding costs. The operations required that banks onlend the funds to firms. Almost all the countries surveyed in Table I.1 in Chapter I took this step. China, Brazil, Japan, Singapore, Sweden, Switzerland and the United Kingdom all set up new facilities, mostly targeted at small and medium-sized enterprises (SMEs). The ECB and the Bank of Korea cut interest rates on pre-existing facilities. In addition, the Federal Reserve established programmes to purchase loans originated by banks to a broad spectrum of firms. The extent of this funding support for the non-bank private sector was unprecedented.

Also prominent and unique to this episode were wide-ranging regulatory and supervisory measures to avoid bank deleveraging, many taken by central banks themselves. They took steps and made public statements that effectively eased capital and other regulatory constraints and/or implied a more flexible supervisory

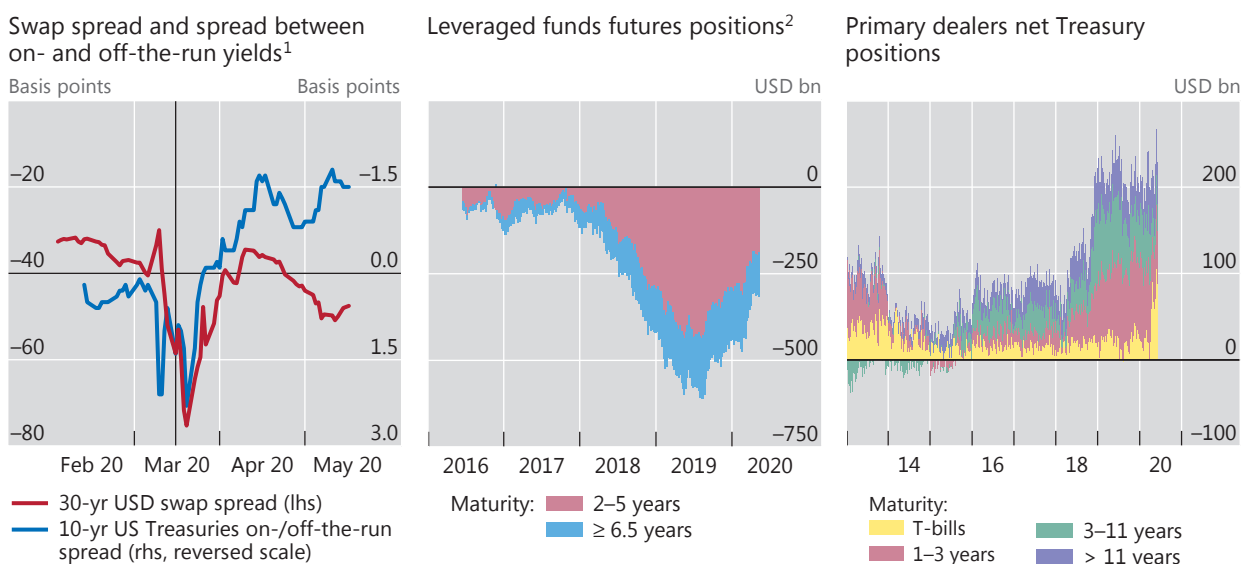
Dislocations in the US Treasury market

In March 2020, the US Treasury market suffered one of its most severe bouts of volatility. After an initial phase of investor de-risking that saw the 10-year yield fall to historical lows, the market experienced a snapback in yields and extreme turbulence.^① Long-dated Treasuries were hit especially hard, with the spread between 30-year yields and corresponding interest swap rates widening dramatically (Graph II.A, left-hand panel).^② The spread between bond yields and interest rate swap rates can be an indicator of financial intermediaries' balance sheet constraints, because holding bonds entails using up balance sheet space while swaps do not (off-balance sheet). Hence, the widening of the spread between 30-year yields and corresponding interest rate swap rates points to dealers' limited balance sheet capacity and/or unwillingness to take on additional positions in bonds. At the same time, large differences in yields between on-the-run and off-the-run bonds signal a breakdown in arbitrage.

The severe dislocation in one of the world's most liquid and important markets was startling. It reflected a confluence of factors. A key driver was the rapid unwinding of so-called relative value trades, which involve buying Treasury securities funded using leverage through repos while at the same time selling the corresponding futures contract. Investors, typically hedge funds, employ such strategies to profit from differences in the yield between cash Treasuries and the corresponding futures. Given that these price discrepancies are typically small, relative value funds amplify the return (and, by extension, losses) using leverage. One indication of the popularity of such trades was the growing short positions in futures held by leveraged funds (Graph II.A, centre panel). As volatility picked up and margin calls surged, liquidity in futures markets evaporated. Futures-implied yields dropped more rapidly than bond yields, causing mark-to-market losses for relative value investors who had sold futures and bought bonds. To meet the margin calls, positions were rapidly unwound, notably by selling bonds to cover their short positions in futures. This pushed the prices of Treasuries lower (their yields higher), resulting in a "margin spiral".^③ The market turbulence then spread more widely, including to the large class of hedge funds that follow rules-based investment strategies (so-called systematic funds).

Dealer balance sheet constraints exacerbate tensions in the US Treasury market

Graph II.A



The vertical line in the left-hand panel indicates 15 March 2020 (Federal Reserve announcement of Treasury and MBS purchases).

¹ On-/off-the-run spread calculated as the difference between the yield on the off-the-run 10-year government bond issued in November 2019 and the yield on the on-the-run 10-year government bond issued in February 2020. The latter ceased to be the on-the-run benchmark on 15 May 2020, when the US Treasury issued a new 10-year bond. ² Net positions (long minus short) in futures traded on the Chicago Board of Trade with deliverable maturities falling in one of the two buckets.

Sources: Federal Reserve Bank of New York; US Commodity Futures Trading Commission; Bloomberg; BIS calculations.

Under normal circumstances, dealers would be able to alleviate market stress by absorbing sales and building up an inventory of securities. But dealers' Treasuries inventories were already stretched, especially from 2018 onwards, as dealers had to absorb a large amount of issuance as well as accommodate rundowns of Treasuries holdings by the Federal Reserve as part of its balance sheet normalisation (Graph II.A, right-hand panel). In addition, banks' internal capital management practices – which tighten the leverage ratio constraint on balance sheet-intensive business units – may have also reduced dealers' demand for Treasuries.

Policy response

As a precursor to this episode, dislocations in the US repo market in September 2019 involved much the same players, with dealer balance sheet constraints again being a contributing factor.^④ Back then, repo demand from hedge funds to maintain arbitrage trades between bonds and derivatives contributed to a repo funding squeeze. With dealer banks holding already large US Treasury positions, reluctance to accommodate the higher demand for repo funding compounded the shortage and led to a sharp spike in the secured overnight financing rate (SOFR). The Federal Reserve had to step in to provide ample repo funding and absorb Treasury collateral from the market.

This time around, to alleviate the severe market impairment, the Fed rapidly scaled up purchases of US government bonds and agency mortgage-backed securities in mid-March. This was instrumental in freeing up dealers' balance sheets, helping to restore market functioning. The spread between Treasury yields and swap rates narrowed substantially, as did the gap between on-the-run and off-the-run bonds, indicating more willingness to arbitrage bond mispricing. Interestingly, the spread compression did not immediately follow the announcement of stepped-up purchases on 15 March (shown as the vertical line in left-hand panel of Graph II.A), but emerged progressively when Treasuries were actually purchased. This suggests that buying Treasuries directly from dealers' inventories was more effective in stabilising the market than seeking to induce other players to do so, such as by providing liquidity via repo operations, where take-up was relatively subdued.

Subsequent measures were aimed at further alleviating strains in the Treasury market. One was the temporary relaxation of the regulatory supplementary leverage ratio by excluding Treasuries and bank deposits at the central bank from calculation of the capital charge. The other was the establishment of a repo facility for foreign central banks (FIMA Repo Facility) by the Federal Reserve. The facility allows them to obtain US dollar liquidity by posting their holdings of US Treasuries as collateral. The former relaxes banks' balance sheet constraints, while the latter reduces sales of Treasuries in the market, especially by EME central banks, whose currencies were under pressure.

① See A Schrimpf, H S Shin and V Sushko, "Leverage and margin spirals in fixed income markets during the Covid-19 crisis", *BIS Bulletin*, no 2, April 2020. ② An interest rate swap is a derivative contract that can be used to hedge or speculate on the future interest rate path. In a fixed-for-floating swap, one party agrees to make payments based on the preagreed fixed interest rate, and to receive payments on floating rates, typically Libor, from the other. ③ See M Brunnermeier and L Pedersen, "Market liquidity and funding liquidity", *Review of Financial Studies*, vol 22, no 6, 2009. ④ See F Avalos, T Ehlers and E Eren, "September stress in dollar repo markets: passing or structural", *BIS Quarterly Review*, December 2019, pp 12–14.

stance and interpretation of accounting standards.⁴ Authorities softened capital and short-term liquidity regulations in most countries and encouraged banks to make full use of existing buffers above regulatory minima. For instance, where previously activated, they released the countercyclical capital buffers (Hong Kong SAR, Switzerland and the United Kingdom). In a major move, the Federal Reserve exempted bank holdings of Treasury securities and cash reserves from the supplementary leverage ratio capital charge. Reserve requirements were also cut or eliminated in many jurisdictions, particularly in EMEs.

A number of authorities complemented these measures with dividend restrictions so as to bolster further banks' capital resources. Banks have a natural incentive to continue paying dividends, especially when price-to-book ratios languish below one (Graph II.5, left-hand panel). This constellation signals that investors value dividends more than retained earnings. Indeed, the evidence indicates that lower price-to-book ratios go hand in hand with a higher probability of dividend payments (centre panel).

However, these measures were not sufficient to sustain lending effectively. They provided banks with the means to lend, but not with the corresponding incentive: the darkening economic prospects naturally acted as a deterrent. That is why a number of governments issued guarantees, sometimes covering up to 100% of the loan (such as in Germany, Hong Kong and Switzerland).

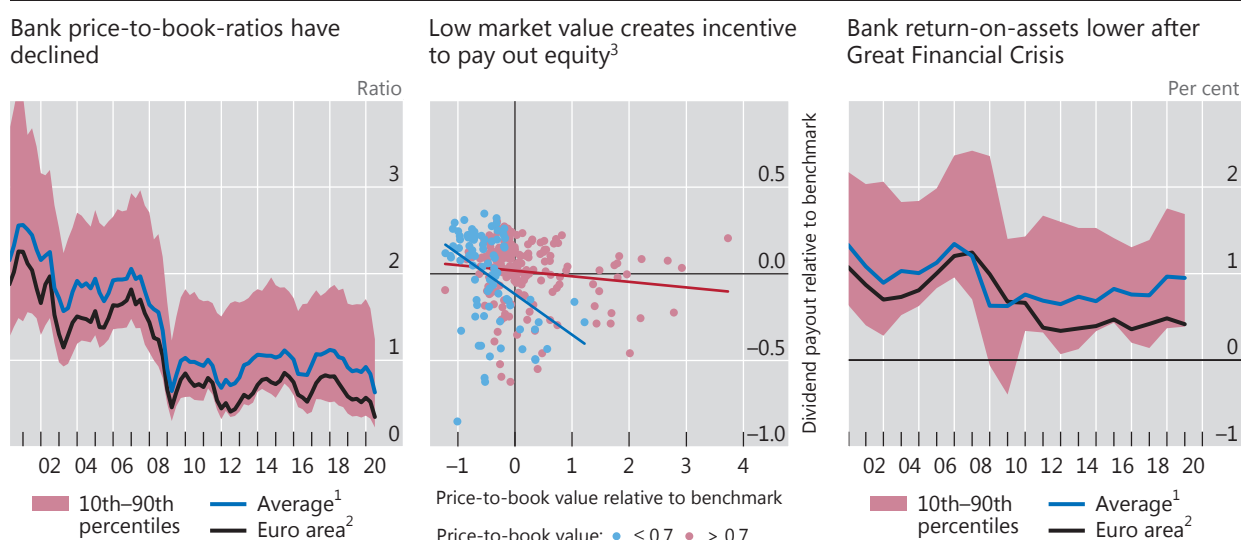
Even in such conditions, lending may be hampered by low profitability, which limits the ability to take risk and constrains capital accumulation. This is especially so for European banks (Graph II.5, right-hand panel). Indeed, banks in general have come under pressure on dimming prospects. They have had to raise loan loss provisions sharply, and their long-term rating outlooks have deteriorated (Chapter I, Graph I.14). Thus, in encouraging credit extension and the use of capital buffers, authorities had to strike a balance between supporting bank lending in the short term and ensuring that banks remained sufficiently well capitalised and liquid to underpin the eventual economic rebound.

The centrality of banks in this crisis, despite the larger role played by markets, reflects two financial system features. First, most financial systems are still bank-centric. In this sense, banks remain the main final node connecting finance to firms and households (Graph II.2, left-hand panel). And they play this key role even in more market-based financial systems, such as that of the United States, where small businesses still rely on bank loans rather than corporate bonds. Second (and often underappreciated), banks and capital markets are not simply different forms of finance; they are joined at the hip. Banks rely on markets for their funding and as an income source. Markets rely on banks in their capacity as market-makers and arrangers of transactions, for funding and, above all, for backup credit facilities. As such, banks and capital markets complement each other, especially in times of stress.⁵

Indeed, the current crisis has highlighted just how important recourse to bank credit lines is. While financing in the form of such lines varies across countries, they

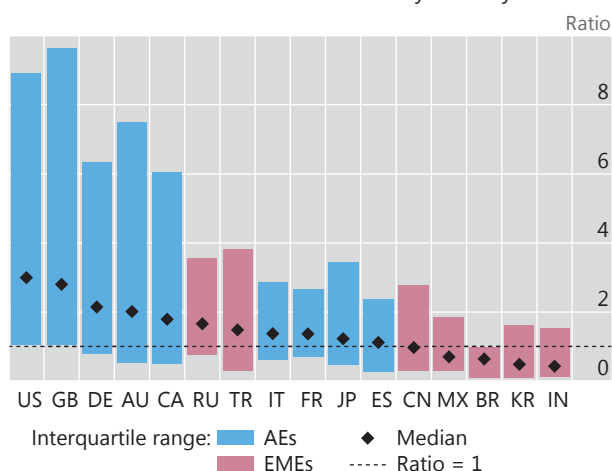
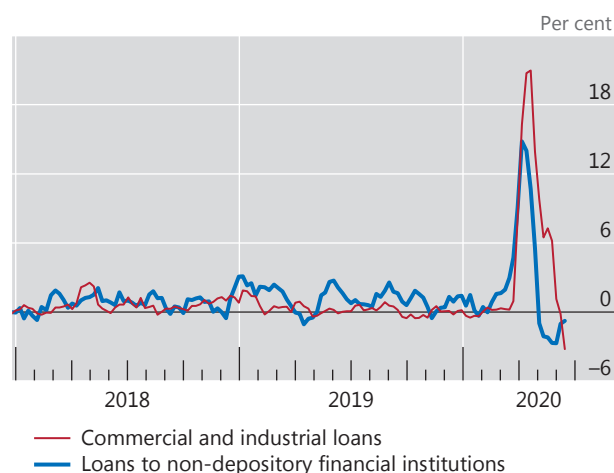
Low profitability and price-to-book ratios hinder banks' willingness to lend

Graph II.5



¹ Asset-weighted average of selected banks in AU, CA, CH, EA, GB, JP, SE and US. ² Euro area aggregate constructed using banks from AT, BE, DE, ES, FR, IT and NL. ³ Graph shows link between the probability of dividend distribution (vertical axis) and price-to-book ratio, controlling for other bank-specific characteristics (return-on-equity, size, asset growth) and macroeconomic conditions (horizontal axis). The blue dots are for banks with price-to-book values in the first tercile (below or equal to 0.7); see Gambacorta et al (2020).

Sources: L Gambacorta, T Oliviero and H S Shin, "Low price to book ratios and bank dividend payout policies", mimeo, June 2020; Datastream; Datastream Worldscope; BIS calculations.

Undrawn credit lines to debt service: by country¹US commercial bank loans²

¹ Ratio of undrawn credit (excluding commercial paper programmes) to debt service (the sum of short-term debt, current portion of long-term debt and interest expenses) for a sample of 36,470 firms that reported data for at least one quarter in 2019 (data last updated on 4 June 2020). ² Growth over the past four weeks.

Sources: R Banerjee, A Illes, E Kharroubi and J M Serena Garralda, "Covid-19 and corporate sector liquidity", *BIS Bulletin*, no 10, April 2020; Board of Governors of the Federal Reserve System; Datastream; S&P Capital IQ; BIS calculations.

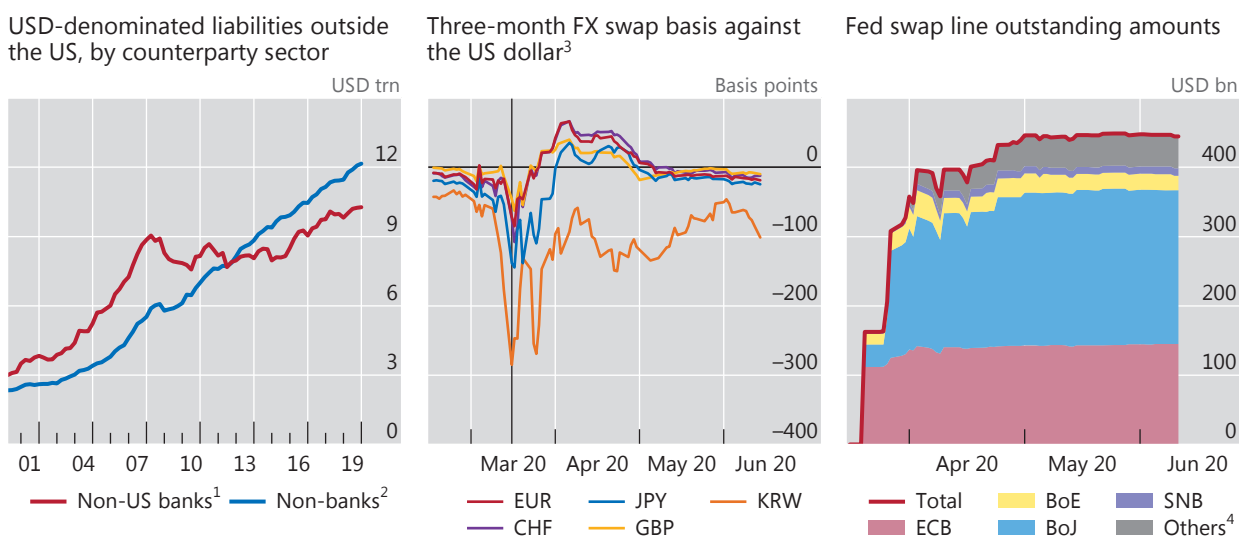
are ubiquitous. Based on a sample of 36,000 listed and large unlisted firms across 16 advanced and emerging market economies, undrawn credit lines amounted to around 140% of debt service for the median firm at the end of 2019, with firms in AEs generally having higher credit lines relative to EMEs (Graph II.6, left-hand panel). As the commercial paper market froze, firms drew heavily on them, as evidenced by the spike in commercial and industrial loans on US commercial banks' balance sheets. These increased by nearly \$700 billion or 30% during March through May (right-hand panel). It is fair to say that banks are both the first and the last mile. And in this crisis, it was banks, not capital markets, that played the role of "spare tyre" in the financial system.⁶

...and extending the reach globally

For central banks with an international currency, the role of crisis manager cannot stop at its country's borders. The clearest illustration is the Federal Reserve, given that the US dollar is the world's dominant currency.

Over the past two decades, the use of the US dollar in global financial transactions has ballooned. US dollar liabilities of non-US banks outside the United States grew from about \$3.5 trillion in 2000 to around \$10.3 trillion by the end of 2019. For non-banks located outside the United States, they have grown even more rapidly and now stand at roughly \$12 trillion, almost double what they were a mere decade ago (Graph II.7 left-hand panel). There is also a significant amount of off-balance sheet dollar borrowing via FX derivatives, primarily through FX swaps. Funding pressures therefore tend to show up in these markets.

Against this backdrop, it is not uncommon for offshore US dollar markets to come under stress in times of market turbulence. Many non-US financial institutions and firms cannot draw on a US dollar deposit base or raise funds directly in US money markets, and so are reliant on FX swaps. During the Covid-19 crisis, just as during the GFC, global investors' rapid de-risking led to a scramble for dollars,



The vertical line in the centre panel indicates 15 March 2020 (the announcement of the enhancement of swap lines between the Federal Reserve and five central banks).

¹ Non-US banks' US dollar-denominated liabilities excluding those booked by offices located in the United States. Excludes inter-office positions but includes liabilities to other (unaffiliated) banks. Positions reported by banks located in China and Russia start to be included as of Q4 2015. ² Sum across US dollar-denominated international debt securities, cross-border bank loans and local bank loans to non-banks located outside the US; this residency-based classification may include US non-banks outside the US. For details, see BIS, *BIS global liquidity indicators: methodology*, April 2019, Section 3.1. ³ Defined as the spread between three-month US dollar Libor and three-month FX swap-implied US dollar rates. ⁴ Please refer to the table in Box II.B for a list of central banks with swap lines at the Fed.

Sources: Federal Reserve Bank of New York; Bloomberg; BIS global liquidity indicators; BIS locational banking statistics (by nationality); BIS calculations.

which appreciated substantially. With bank funding under heavy pressure, possibly compounded by tighter risk constraints from the dollar appreciation, the supply of dollar funding dried up in many parts of the world. As a result, cross-currency basis swaps – a barometer of the imbalance between demand and supply of dollar funding – widened significantly (Graph II.7, centre panel).

In response, the Federal Reserve acted swiftly (Box II.B). To ease dollar funding shortages in various jurisdictions, it utilised standing swap lines established during the GFC with five major AE central banks and reopened them for another nine. The amounts and maturities were also increased, and the pricing made more favourable. On announcement, the swap lines had an immediate impact on the cross-currency basis (Graph II.7, centre panel). The gap narrowed further as the swap lines were utilised, particularly by the Bank of Japan and the ECB (right-hand panel). Subsequently, in order to help a broader set of countries liquefy their FX reserves and relieve selling pressure on US Treasuries, the Fed opened a repo facility. This allowed central banks to borrow US dollars directly from the Federal Reserve using their holdings of US Treasuries as collateral rather than having to do so in the market, possibly in unfavourable market conditions, or to sell them. With the GFC as precursor, the role of the Federal Reserve as a global lender of last resort has been further cemented.

Emerging market economies weather a perfect storm

For many EMEs, the pandemic crisis was akin to a perfect storm. On top of the steep drop in domestic activity from containment measures, many EMEs had to contend

Market stress in US dollar funding markets and central bank swap lines

A significant portion of the international use of major reserve currencies, such as the US dollar, takes place offshore. Dollar liabilities (ie loans and debt securities) on the balance sheets of banks and non-banks outside the United States amounted to over \$22 trillion at end-2019 (Graph II.7, left-hand panel). On top of this, off-balance sheet US dollar obligations incurred via derivatives such as FX swaps were even larger, with estimates ranging up to \$40 trillion.^① An FX swap allows an agent to obtain US dollars on a hedged basis, which is functionally equivalent to collateralised borrowing.

A key barometer of US dollar funding conditions is the FX swap basis – the difference between the dollar interest rate in the money market and the implied rate from the FX swap market. With frictionless arbitrage, covered interest parity holds and the basis should be close to zero – otherwise almost riskless profits can be reaped from borrowing in one market and lending in the other. A negative basis means that borrowing dollars through FX swaps is more expensive than borrowing in the cash money market.

Since the Great Financial Crisis (GFC) of 2007–09, the basis for key currencies has widened, driven by both demand and supply factors.^② On the demand side, institutional investors (eg portfolio managers, insurance companies and pension funds) outside the United States hold large dollar asset portfolios and use FX swaps to partially hedge the currency risk. Their portfolios have grown substantially over the past decade, boosting the demand for dollar borrowing via FX swaps. At the same time, the supply of hedging services from global banks has fluctuated with the risk capacity of these intermediaries. Tighter risk management and the associated balance sheet constraints have reduced banks' ability to arbitrage the basis away. As a result, the basis has become more variable and sensitive to fluctuations in demand for US dollar funding and banks' risk-taking capacity. The tensions escalate in times of stress, when demand for US dollars via FX swaps typically increases and banks' risk-taking capacity declines. As a result, obtaining US dollars through the FX swap market becomes more expensive and the basis becomes negative.

Federal Reserve swap lines

In billions of US dollars

Table II.B

Central bank	Size of swap lines in 2008	Maximum outstanding amount in 2008–09	Current status ¹	Size of swap lines as of 11 June 2020	Maximum outstanding amount as of 11 June 2020 ²
1 ECB	No limit	314	Standing	No limit	145
2 Bank of Japan	No limit	128	Standing	No limit	226
3 Bank of England	No limit	95	Standing	No limit	38
4 Swiss National Bank	No limit	31	Standing	No limit	11
5 Bank of Canada	30	Unused	Standing	No limit	Unused
6 Reserve Bank of Australia	30	27	Reopened	60	1
7 Central Bank of Brazil	30	Unused	Reopened	60	Unused
8 Danmarks Nationalbank	15	15	Reopened	30	5
9 Bank of Korea	30	16	Reopened	60	19
10 Bank of Mexico	30	3	Reopened	60	7
11 Reserve Bank of New Zealand	15	Unused	Reopened	30	Unused
12 Central Bank of Norway	15	9	Reopened	30	5
13 Monetary Authority of Singapore	30	Unused	Reopened	60	10
14 Sveriges Riksbank	30	25	Reopened	60	Unused

¹ As of 11 June 2020. ² Figure indicates maximum outstanding amounts drawn at any point in time between 19 March and 11 June 2020.

Sources: Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York; BIS calculations.

Market dislocation and the policy response

As the Covid-19 pandemic intensified in March 2020, US dollar funding costs rose sharply, approaching levels last seen during the GFC.^① In response, the Federal Reserve activated the standing swap lines established during the GFC with five major central banks (Table II.B). Besides having no prespecified amount limits, the interest rate charged was reduced to just 25 basis points over the US dollar overnight index swap (OIS) rate and the duration extended to 84 days. On 19 March, the Federal Reserve re-established temporary bilateral swap lines with nine additional central banks. These swap lines, also set up during the GFC, had expired. The amount available varied across jurisdictions. In addition, on 31 March the Federal Reserve put in place a temporary repo facility that allowed central banks, including those without established swap lines, to obtain dollar liquidity by pledging US Treasury and agency securities as collateral.

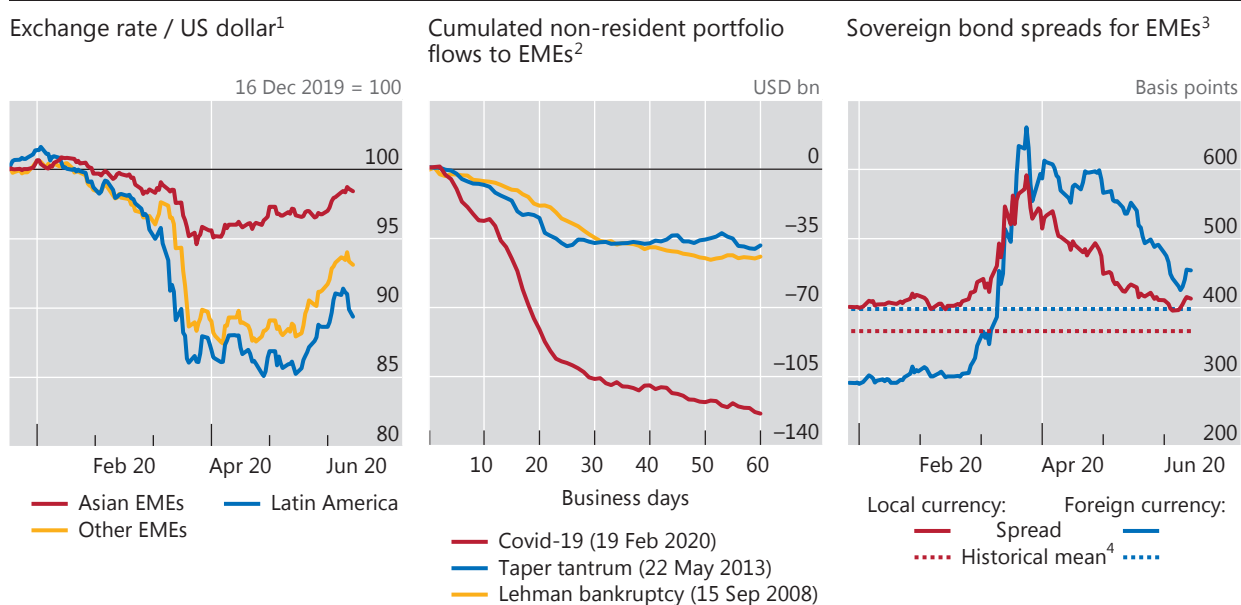
These policy measures assuaged market fears, and the basis for most currencies narrowed. Utilisation of the swap lines was larger for the yen, the euro and sterling, though generally not smaller than during the GFC (Table II.B). Correspondingly, the basis for these currencies narrowed significantly. This suggests that, in addition to the announcements, the actual drawdowns helped ease market tensions. Indeed, countries that did not utilise the swap lines heavily, such as Korea, still saw significant basis spreads.

① While FX swaps and forwards create debt-like obligations, they do not show up on the balance sheet, and are thus not counted as debt. For an estimate of this “hidden dollar debt”, see C Borio, R McCauley and P McGuire, “Foreign exchange swaps: hidden debt, lurking vulnerability”, *VoxEU*, February 2020. ② See C Borio, R McCauley, P McGuire and V Sushko, “Covered interest parity lost: understanding the cross-currency basis”, *BIS Quarterly Review*, September 2016, pp 45–64; and B Erik, M Lombardi, D Mihaljek and H S Shin, “The dollar, bank leverage and real economic activity: an evolving relationship”, *BIS Working Papers*, no 847, March 2020. ③ See S Avdjiev, E Eren and P McGuire, “Dollar funding costs during the Covid-19 crisis through the lens of the FX swap market”, *BIS Bulletin*, no 1, April 2020.

with disruptions to global value chains and a collapse in export receipts, exacerbated by plummeting commodity prices. The retrenchment in capital inflows, which triggered large exchange rate depreciations and a sharp tightening of financial conditions, further strengthened the raging winds (Graph II.8, left-hand panel). Particularly affected were countries with high foreign currency debt, with substantial participation of foreign institutional investors in local government bond markets (see below) and exposed to large carry trades. Indeed, capital outflows dwarfed those during previous stress episodes (centre panel). Spreads on local currency bonds spiked alongside those on foreign currency bonds (right-hand panel). For some countries, declines in remittances, reductions in foreign direct investment inflows and reversals of carry trades compounded the problem (Chapter I).

A number of factors further constrained the policy response in EMEs. The sharp fall in oil prices hit oil exporters especially hard and substantially reduced fiscal revenues. Where oil production is concentrated in state-owned enterprises, such as in Brazil, Colombia and Mexico, the firms’ weaker financial condition increased contingent government liabilities and raised the risk premium on government debt. This led to a major contraction in fiscal space, precisely at a time when more fiscal resources were needed to offset the pandemic’s damage. More generally, high population density, under-funded public health systems and a sizeable informal sector, mainly in the worst-hit parts of the economy such as small retail businesses, restaurants and tourism, strained many EMEs’ capacity to cope and exacerbated the economic hardship.

In this context, the prerogative was to cushion the fallout for the economy. Central banks responded forcefully by promptly easing policy and taking a number of extraordinary measures. In many cases, the response went far beyond that in previous crises. This in part reflected the underlying nature of the shock, which required alleviating strains on firms and households directly. But it also reflected fundamental changes in economic and financial structures as well as in broader policy frameworks over the past decades.

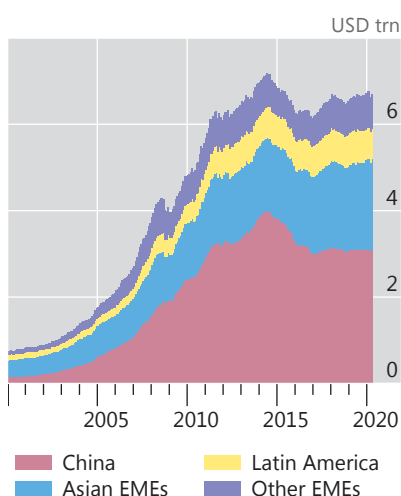
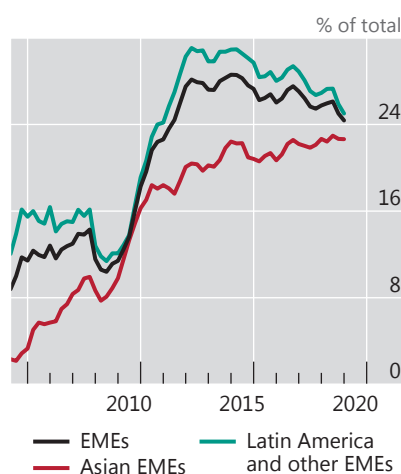


¹ Simple average of the individual local currencies vis-à-vis the US dollar. A decrease indicates an appreciation of the US dollar. Asian EMEs = CN, HK, ID, IN, KR, MY, PH, SG, TH and TW; Latin America = AR, BR, CL, CO, MX and PE; other EMEs = CZ, HU, PL, RU, SA, TR and ZA. ² Cumulated non-resident portfolio flows (debt and equity, when available) over days since the indicated date. Sum across BR, CN, HU, ID, IN, KR, MX, MY, PH, PL, SA, TH, TR, TW and ZA. ³ Spread of JPMorgan GBI-EM (local currency) and EMBI Global (foreign currency) yields over 10-year US Treasury yield. ⁴ Since December 2001 (local currency) and January 2000 (foreign currency).

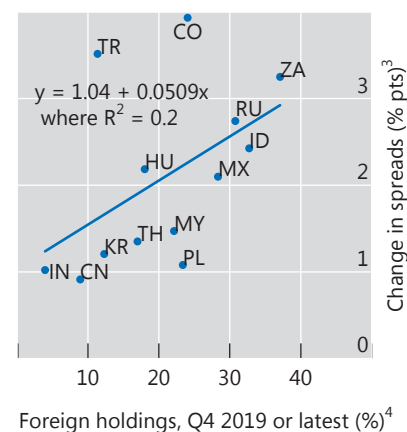
Sources: Bloomberg; Institute of International Finance; JPMorgan Chase; national data; BIS calculations.

EME central banks' room for policy manoeuvre during crises has typically been narrower than that of AEs, due in large part to exchange rate effects. Cutting interest rates tends to compound the exchange rate depreciation, which can magnify currency mismatches, thereby reinforcing financial headwinds. Moreover, for those countries with less anchored inflation expectations, the depreciation risks raising inflation. Over the years, however, EMEs have implemented policies that have earned them greater degrees of freedom. They have adopted flexible policy frameworks combining inflation targeting with judicious exchange rate intervention, and hence larger FX reserve buffers (Graph II.9, left-hand panel), as well as active use of macroprudential tools.⁷ And they have developed local currency bond markets. This has better anchored inflation expectations and broadened the range of policy options. It has also bolstered policymakers' ability to address threats to financial stability and made it more feasible to cut interest rates swiftly in a crisis.

And yet, new pressure points have also emerged. The development of local currency bond markets, in particular, went hand in hand with, and in some cases relied on, higher participation of foreign investors (Graph II.9, centre panel). Partly as a result, currency mismatches have shifted from the balance sheets of borrowers to those of investors, who often invest on an unhedged basis. As currencies depreciate, these investors typically incur exchange rate losses alongside those caused by rising domestic currency yields, which tend to move in tandem. Given the size of the exposures relative to domestic markets, stock adjustments in foreign investors' portfolios greatly intensify the interplay between yields and exchange rates. This pattern was again visible during the latest turbulence.⁸ Countries with higher shares of foreign ownership in local currency bond markets experienced significantly larger increases in local currency bond spreads following the outbreak of Covid-19 (right-hand panel).

FX reserves¹

Foreign ownership in local currency sovereign bond markets²


Changes in local currency yield spreads versus the level of foreign holdings



¹ Asian EMEs = HK, ID, IN, KR, MY, PH, SG and TH; Latin America = AR, BR, CL, CO, MX and PE; other EMEs = CZ, HU, PL, RU, TR and ZA. Data up to February 2020 for AR, PE and PH. ² Simple averages of regional economies. Asian EMEs = ID, KR and TH; Latin America and other EMEs = BR, CO, HU, MX, PE, PL, TR and ZA; EMEs = Asian EMEs, Latin America and other EMEs. ³ Change in five-year generic local currency sovereign yield spread over the US Treasury of the same tenor. Maximum change relative to 3 January 2020 in the period up to 12 June 2020. ⁴ Foreign holdings relative to total market size. For ID and MY, as of Q1 2020.

Sources: IMF, *International Financial Statistics* and *Sovereign Debt Investor Base for Emerging Markets*; AsianBondsOnline; Bloomberg; Datastream; Institute of International Finance; national data; BIS calculations.

Against this backdrop, EME central banks broke new ground in terms of interventions in domestic currency bond markets in order to ensure their smooth functioning. Many, including the central banks of India, Korea, the Philippines, Poland, Turkey and South Africa, implemented government bond purchase programmes for the first time. Others, such as those of Mexico and Brazil, undertook Operation Twist-type transactions, absorbing duration from the market by buying long-term securities and selling short-term ones. Preliminary evidence suggests that the interventions were helpful: bond yields declined and exchange rates stabilised (Box II.C). Some central banks also introduced measures to support corporate bond markets. In Korea and Mexico, for example, they introduced facilities to lend to financial institutions against corporate bond collateral. Similarly, the Bank of Thailand established a corporate bond stabilisation fund to help firms roll over short-term debt.

While this could herald a shift towards greater market-type interventions akin to those of advanced economies, important limitations exist. Shallower markets may constrain the scale of interventions. And weaker institutional settings and less well anchored inflation may give rise to greater concerns about fiscal dominance. This is all the more so given investors' more limited tolerance for these economies' underperformance. At the same time, the need for liquidity support in foreign currency is still as important as ever, given that foreign currency debt – mostly in US dollars – has continued to increase, and that the high participation of foreign investors in domestic securities markets may destabilise exchange rates.

This again highlights the importance of an effective global safety net. There is a general consensus that self-insurance through the accumulation of foreign exchange reserves is sub-optimal. Similarly, there is only so much that individual

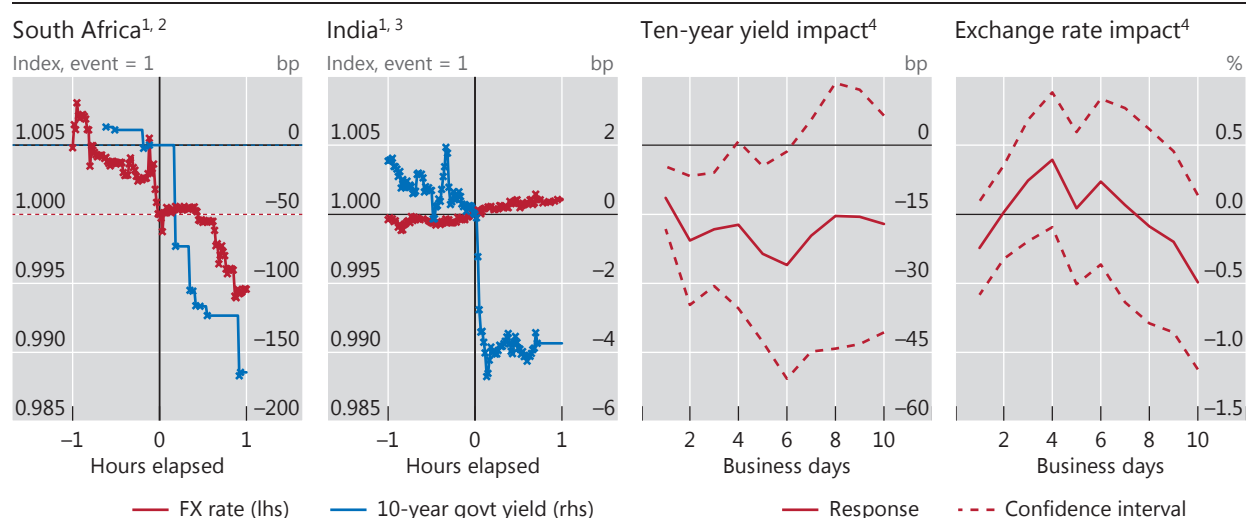
Central bank bond purchases in emerging market economies

Financial markets in EMEs were hit hard by the Covid-19 turmoil, with large currency depreciation and sharp increases in local currency yields. In response, several EME central banks launched bond purchase programmes, signalling their willingness to act as a buyer of last resort. The overriding objective was to maintain market functioning and support liquidity in local currency bond markets. The design and size of the programmes differ across countries. Most central banks focused on local currency sovereign bond markets. The central banks of Hungary and Colombia also purchased mortgage bonds and bank bonds, respectively, while the Central Bank of Chile bought only bank bonds. Few central banks have explicitly announced the size of their programmes. Where they have done so, the scale is relatively modest, ranging from below 0.2% of GDP to 2.8%.^①

Initial market reactions suggest that the measures have been successful in improving bond market conditions, pushing down yields and shoring up confidence, as reflected in stronger exchange rates. This is evident in South Africa and India, where high-frequency data are available and the announcements did not coincide with interest rate decisions (Graph II.C, first two panels). In South Africa, in the hour after the announcement, 10-year yields fell by more than 150 basis points and exchange rates appreciated 1%. In India, announcement effects on yields were smaller and exchange rates were largely unchanged. The differences in market reactions between countries seem to reflect differences in initial conditions as well as the scope, scale and communication of the bond purchase programmes.

Responses to announcements of bond purchases

Graph II.C



¹ Exchange rates versus the US dollar are standardised to one, and 10-year government bond yields are standardised to zero at the time of the announcement. Crosses indicate active quotes. A falling exchange rate denotes an appreciation of the local currency vis-à-vis the US dollar. ² Announced on 25 March 2020. ³ Announced on 20 March 2020. ⁴ Estimated impact of bond purchase announcement based on panel local linear projection regressions. The regressions control for country and time fixed effects as well as for changes in domestic policy rates. Based on a sample of 13 EMEs over the period 1 January–29 April 2020. Confidence intervals are 90%. For details, see the online appendix of Arslan, Drehmann and Hofmann (2020).

Sources: Y Arslan, M Drehmann and B Hofmann, "Central bank bond purchases in emerging market economies", *BIS Bulletin*, no 20, June 2020; Refinitiv; BIS calculations.

The positive initial market reactions are confirmed by regression analysis using the full sample of announcements across 13 EMEs (Graph II.C, last two panels). Controlling for domestic central bank interest rate decisions and time period-specific effects (such as Federal Reserve and ECB policy actions), the analysis suggests that on the day of the announcement 10-year yields fell by 10 basis points. The effect persists and further builds in subsequent trading days, reaching a maximum of –25 basis points after six trading days. Bilateral exchange rates against the US dollar appreciated on impact by 0.3% on average, but the effects are not statistically significant at conventional levels and dissipate quickly.

These positive initial market reactions suggest that the programmes were successful in restoring investor confidence and did not lead to higher inflation expectations. This was probably also due to the clearly defined

scope of the programmes, which explicitly aimed at restoring confidence in markets rather than at providing monetary stimulus. And by serving to contain the rise in bond yields, the measures also provided useful support to EME economies during the pandemic shock.

① See Y Arslan, M Drehmann and B Hofmann, “Central bank bond purchases in emerging market economies”, *BIS Bulletin*, no 20, June 2020.

countries can do to limit exposures through capital flow management safeguards without forgoing the benefits of participation in the global financial system.

A more complete and lasting solution calls for some form of international coordination. One way is to pool reserves – for example, through regional or bilateral swap lines. Many countries in Asia have progressively implemented such schemes through the Chiang Mai Initiative. Regional pooling, however, is less effective in the face of a global shock, when all countries are hit simultaneously. Another, much discussed, avenue revolves around liquidity provision by supranational institutions such as the IMF. But apart from the fact that access is restricted to countries in good standing and potential problems of stigma, the resources readily available are limited. In this crisis, the IMF has offered \$100 billion in emergency financing to a number of mostly developing countries, and could potentially mobilise up to \$1 trillion in total lending.⁹ By comparison, IMF estimates suggest that financing needs of emerging market and developing countries could reach \$2.5 trillion.

Absent such comprehensive arrangements, liquidity backstops under the aegis of the central bank issuing the international currency will continue to be the prime safeguard. The Federal Reserve’s FX swap lines are not only critical but also consistent with domestic interests. As issuer of the global currency, the United States benefits from lower financing costs. And extending US dollar liquidity helps forestall spillbacks from distress in foreign markets. That said, the swap lines are limited in coverage. Until a lasting political and practical solution is found, EMEs will have to continue to draw on a fragmented combination of mechanisms to meet their liquidity needs.

The evolving crisis playbook

Central banks’ current crisis management response represents a further stage in the evolution of a function that was born with the institution itself. The GFC considerably advanced central banks’ ability to deal with systemic events both domestically and globally.¹⁰ The present crisis has required central banks to go even further. This has been due in large part to the nature of the shock, which has put the focus squarely on alleviating strains for firms and households. The extension of the crisis playbook points to a number of considerations regarding the interventions’ forcefulness, boundaries and relationship with fiscal policy.

Vigorous, prompt and mandate-consistent interventions

The sheer scale and ferocity of the Covid-19 crisis meant that central banks were fire-fighting on multiple fronts simultaneously. Experience has shown that in a systemic crisis one cannot afford to fall behind the curve. Building on the long-standing principle laid down by Walter Bagehot of advancing liquidity “freely and vigorously”, central banks did so especially forcefully.¹¹

As this episode has amply confirmed, there is a premium on being prompt. Early recognition of the nature and size of the problems combined with swift intervention are critical to short-circuit adverse feedback dynamics and forestall economic damage. In a highly interconnected financial system, strains in one market segment can spill over into others, rapidly escalating into system-wide stress. Moreover, the scale and forcefulness of the measures have an important bearing on confidence. Gradualism cannot succeed. Central banks have learned from the GFC that uncertainty about how central banks will respond to market stress can increase volatility. For example, ambiguity about access to facilities or the associated problem of stigma can hinder the take-up of liquidity and exacerbate tensions. Both words and actions need to speak loudly.

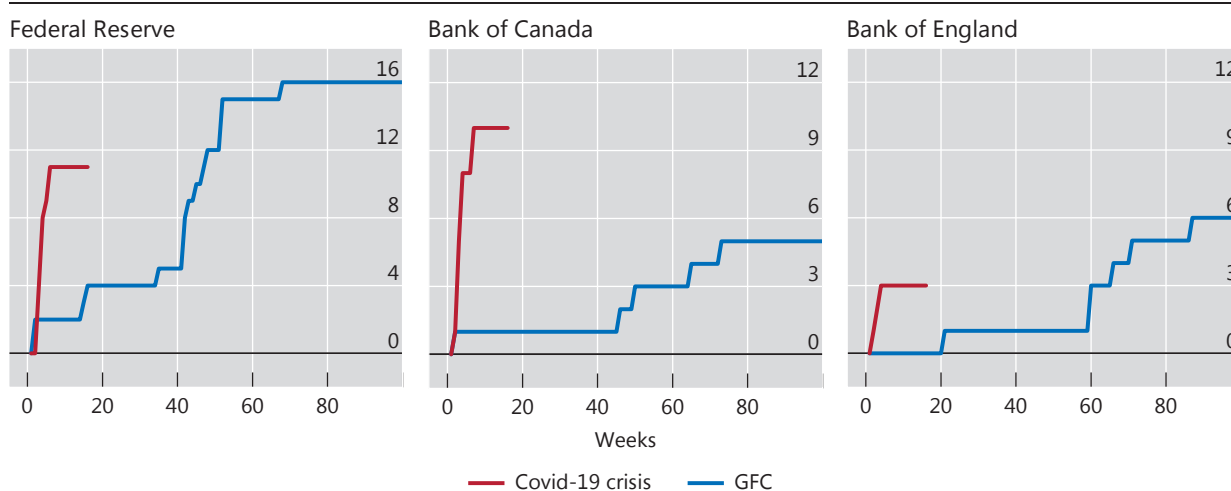
A striking feature of this episode was indeed how quickly central banks sprang into action. Many cut policy rates in emergency meetings and launched numerous facilities in the space of days (Graph II.10). This was partly due to experience. In many AEs, facilities set up during the GFC were still operational, so that central banks could ramp them up quickly. In some cases, previously closed facilities were reactivated. The premium on speed means that central banks will always be at the core of crisis management in financial markets.

At the same time, given the financial system's evolution, the forms of intervention have evolved. As the system has become more complex, the pipes through which the needed liquidity has to flow to reach all key market segments have proliferated. Central banks must stand ready to adjust their operational frameworks, extending liquidity to non-banks as well as banks, depending on circumstances. Moreover, beyond acting as lender of last resort, central banks are increasingly called upon to perform the role of dealer of last resort. They can do so directly, by standing ready to buy securities to support market liquidity; and they can do it indirectly, by freeing up financial institutions' balance sheet capacity through outright securities purchases, which facilitate re-engagement in the market. In addition, they may have to supply foreign currency liquidity.

Central banks' rapid crisis response

Number of new measures introduced since the start of the crisis¹

Graph II.10



Start of the crises defined as December 2007 for the Great Financial Crisis and March 2020 for the Covid-19 crisis.

¹ Number of new measures as announced by central banks. These cover liquidity, lending, foreign exchange operations and asset purchases but exclude changes in policy interest rates. Only new programmes or measures are included; extension of existing programmes is not.

Source: National data.

Importantly, maintaining longer-term credibility and legitimacy requires that central banks take actions that are consistent with their mandates. All the interventions need to be justifiable under the broad monetary policy or lender of last resort remit. Staying within the remit also means limiting as far as possible decisions that may appear to have unjustified distributional consequences, such as when choosing to grant credit to specific firms or sectors. This was evident in the broad-based nature of programmes with simple and objective eligibility criteria based primarily on financial soundness.

Extending boundaries

Confronted with a crisis of unprecedented magnitude, central banks had to reassess where to draw the boundaries of their assistance and what safeguards to adopt. Central banks found themselves pushing hard against traditional demarcations of their remit. In doing so, an important conditioning factor was the political economy context shaped by the crisis.

The nature of the shock is key. In contrast to the GFC, in the Covid-19 episode the financial sector was not the source of the problem as the shock was completely exogenous and generalised. The former meant less recrimination about supporting financial markets and institutions; the latter created political backing for direct assistance to a broad range of participants. Backing was important, particularly in encouraging the fiscal support that enabled central banks to take the necessary actions. In the process, some previous red lines were crossed.

For many central banks, for example, a key boundary had been direct interventions in corporate bond markets, which could be perceived as engaging in credit allocation. Yet many did so in this crisis as part of a concerted policy effort to cushion the blow to firms which, through no fault of their own, had experienced a sudden liquidity squeeze. The rationale extended also to SMEs, where credit risk is higher, as these were hit especially hard. More generally, supporting businesses, and SMEs in particular, rather than large banks was politically less controversial, if not positively encouraged. The Federal Reserve's aptly named Main Street Lending Program illustrates the importance of placing the interventions in the proper context.

That said, extending reach entails reputational risks. To mitigate potential criticisms of overreach and ensure accountability, the interventions went hand in hand with a high degree of oversight and transparency. The amounts, terms and governance of the operations were published promptly, and the link between actions and goals was clearly articulated. Fees and haircuts on higher-risk securities helped provide a degree of protection against potential losses. And through simple eligibility criteria, judgmental selection of potential beneficiaries was minimised, though at the expense of less targeted assistance.¹²

Once the immediate crisis passes and the dust settles, the balance of considerations will shift. At that point, exit strategies and reconsideration of potential moral hazard issues will become more prominent.

A key element of exit is to decouple the unwinding of emergency measures from the monetary policy stance. This can be challenging given that the tools for both functions overlap. Clear communication is required. The timeliness of exit is also important. Liquidity support to markets, in particular, should aim to pass the baton of system functioning back to market participants as soon as possible. Thus, central banks have articulated exit strategies to the extent possible and emphasised the temporary nature of the assistance. Some of the facilities involving short-term lending or purchases of commercial paper will expire quickly. Many of the liquidity facilities were also priced in such a way that they would no longer be attractive

once normal market functioning resumed. Nevertheless, exiting from the large-scale asset purchases will be harder. Indeed, historically, reductions through sales are rare.¹³ Economic, rather than purely technical, design considerations are key.

Although moral hazard has been less of an issue in this crisis given its exogenous character, the current experience will inevitably shape expectations of how policy will respond to future financial stress. The broad and forceful provision of liquidity has stemmed market dysfunction, but it has also shored up asset prices across a wide risk spectrum. This could affect the future market pricing of risk – hence a premium on complementary policies. A key initiative would be an effective extension of the regulatory perimeter to the non-bank, capital market segment, such as asset management.¹⁴ Strains in this sector, notably runs on money market funds, have played a first-order role in this crisis, as they already had during the GFC.

Well coordinated with fiscal authorities

The greater credit risk central banks took as they reached further in this crisis put the spotlight on the quasi-fiscal nature of emergency liquidity assistance. At the heart of the matter is the elusive distinction between illiquidity and insolvency when judged in real time. The quality of the underlying collateral that central banks acquire in their extension of liquidity can vary significantly and be hard to evaluate. And sometimes it is precisely the acceptance of lower-quality collateral that enables central banks to liquefy specific market segments and stem a panic. As collateral transformation has become an integral part of the lender of last resort function, exposure to credit risk has increased. Indeed, this is by construction if central banks directly purchase private securities. Moreover, the longer the duration of the liquidity support, the greater the risk, not least as illiquidity tends to morph into insolvency as the crisis persists.

Mitigating credit risk for the central bank helps retain a demarcation between monetary and fiscal measures. This is so even when the monetary measures are taken in consultation with, and possibly with the direct support of, the fiscal authorities.

In this crisis, fiscal backing took two forms. The first was through full or partial indemnities, which provide central banks with an equity cushion to absorb losses. For example, the Bank of England's purchases of commercial paper through its Covid Corporate Financing Facility benefit from full indemnity. The second mechanism was through loan guarantees to borrowers. On that basis, for instance, the Swiss National Bank was able to promptly supply funds to banks that pledged the corresponding loans.

Insulating central banks from credit risk in a transparent and effective way supports their operational independence. For one, it mitigates the risk to their financial independence. In addition, it helps avoid the perception that central banks are overstepping their mandate while also limiting political influence. In particular, the arrangements typically specify the eligible assets, the parameters over which consultation with the government is necessary, and reporting requirements. Even so, given the enormous scale of the support, central banks are inevitably drawn closer to credit and fiscal policy. A case in point is the \$4 trillion or more in direct lending to firms that may potentially be channelled through the Federal Reserve should all the indemnity in the US stimulus package be utilised.¹⁵

Just as fiscal backing supports the lender of last resort function, so central bank interventions can support fiscal policy during crises. In particular, measures to restore orderly market functioning also facilitate government debt issuance. Importantly, these measures are also consistent with the overarching monetary policy objective of maintaining accommodative financial conditions.

Finally, once the acute illiquidity phase of the crisis passes, if more overt solvency problems emerge, the onus of crisis management necessarily shifts from central banks to fiscal authorities. Only the fiscal authorities can transfer real resources outright, as opposed to just providing funding. And only they can, ultimately, support or implement efficient debt restructuring programmes. This crisis has already generated huge income losses for firms, while prospective losses may mount. A surge in corporate defaults is on the cards. This would call for prompt and orderly debt restructuring. Balance sheet clean-ups are critical in re-establishing the conditions for a sustainable recovery. Indeed, history indicates that the way financial crises are managed and resolved can deeply influence the length of the slump as well as the speed and strength of the subsequent recovery.¹⁶

Looking ahead

The Covid-19 pandemic is a generation-defining event. Much like the GFC over a decade ago, the legacy of this crisis will linger for a long time to come. It is difficult to look ahead in the midst of a storm, but once the winds subside the task will be to navigate in waters that are familiar in some respects, but potentially more treacherous in others. For central banks, as the economy transits from the illiquidity phase, possibly through the insolvency phase and finally to the recovery phase, the overarching challenge will be to once again help re-establish the basis for sustainable growth in the context of price and financial stability. This will be particularly challenging given the pervasive uncertainty surrounding the path of economic adjustment to the post-Covid world.

With the containment measures lifted in some locations, economic activity has gradually resumed. But the climb back from the depths of the recession could be protracted. Even if contagion waves do not re-emerge, lingering uncertainty may well hold back expenditures and companies may continue to operate at less than full capacity under social distancing rules. For many firms, the losses will never be recouped and pre-existing business models will no longer be viable. To the extent that liquidity problems morph into solvency ones, debt restructuring will absorb precious fiscal space. Banks will incur losses. Depending on how large these turn out to be, banks' ability to support the recovery could be badly affected (Box II.D). At some point, the supervisory stance would need to switch from encouraging the use of buffers to replenishing them.

Against this backdrop, near-term inflation risks are skewed to the downside. In the short run, deflationary pressures due to the sharp contraction in aggregate demand will most likely prevail. This is already visible in inflation readings (Graph II.11, left-hand panel). Given that containment and precautionary measures have affected sectors unevenly, the dispersion of sectoral inflation has increased (centre panel). Prices of sectors most severely hit by the lockdown – such as the automotive, clothing and transportation sectors – have dropped, while those for goods whose demand has risen – above all, food and beverages – have increased. At the same time, the near-term inflation outlook has become markedly more uncertain, as reflected in the much wider dispersion of inflation forecasts for 2021 (right-hand panel). This probably largely reflects lingering uncertainty regarding the severity and persistence of the economic contraction, including the risk of further infection waves.

Looking further out, uncertainty over the inflation process is likely to persist due to both demand and supply factors. On the demand side, higher precautionary saving to build buffers and repay debt could continue to dampen expenditures. On the supply side, adjustments to production and work practices under social distancing rules would push up costs. The impact could be particularly pronounced

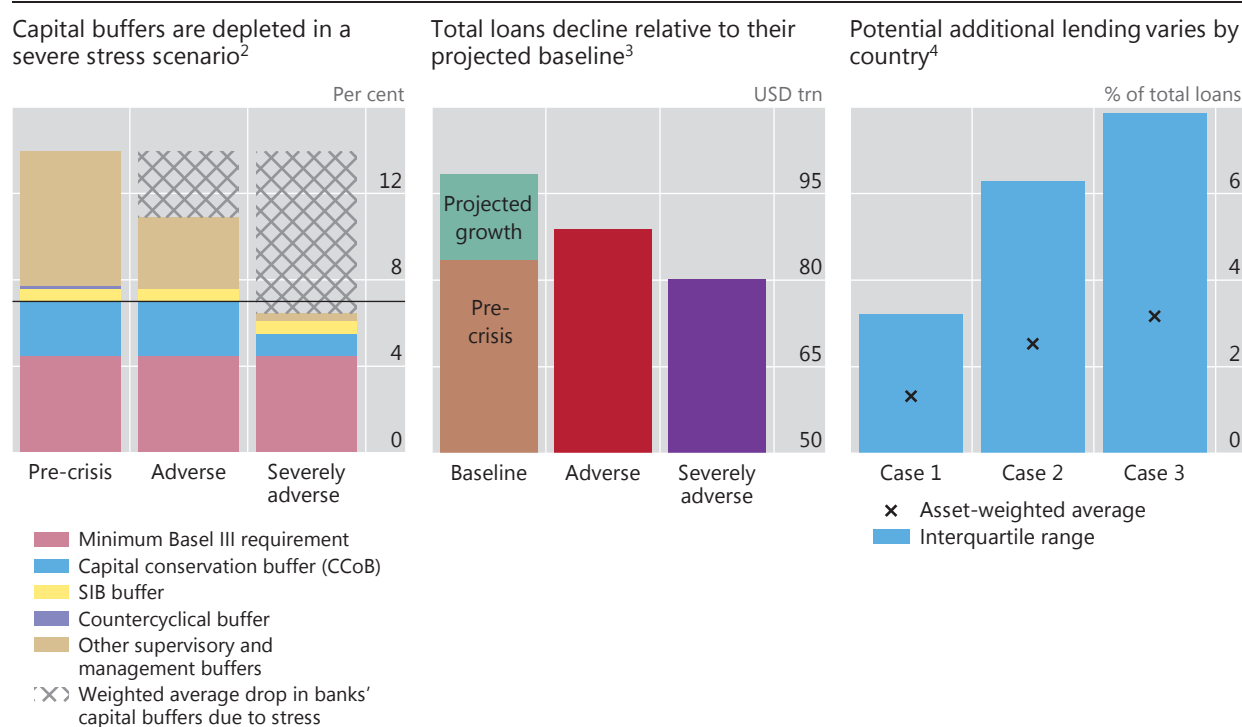
How much additional lending could the release of bank capital buffers support?

Banks' ability and willingness to lend to the real economy has taken centre stage during the Covid-19 crisis. Whether banks can meet the demand for credit prudently hinges upon the size and usability of their capital buffers. Before Covid-19, banks globally had around \$5 trillion above their Pillar 1 requirements (about 45% of their total capital).^① How much of this capital will be available to support new lending depends on the extent to which banks' capital is depleted by the crisis, as well as banks' willingness to use the buffers. Both are influenced by the degree of policy support.

To estimate the amount of remaining usable buffers, two scenarios are constructed based on historical episodes of stress: one based on the savings and loan crisis in the United States ("adverse scenario") and a graver one similar to the GFC ("severely adverse scenario"). Banks' average regulatory capital ratio (Common Equity Tier 1 to risk-weighted assets) would fall from the current 14% to 10.9% and 6.5% in the adverse and severely adverse scenario, respectively, over three years (Graph II.D, left-hand panel).

Macroeconomic scenarios and additional lending supported by usable buffers¹

Graph II.D



¹ Based on a sample of 5,600 banks at end-2019. ² The horizontal line represents a CET1 capital ratio of 7% (Basel III minimum requirement and CCoB). ³ The panel depicts the amount of total loans for three scenarios: the starting point (left-hand bar) is equal to the pre-crisis level of loans (ie at end-2019) to which the projected increase in loans over three years is added (the stress horizon). This projection is based on the pre-crisis trend growth in loans. The centre and right-hand bars represent the level of total loans that result from the adverse and severely adverse stress scenario, respectively. In each scenario, credit grows more slowly than in the baseline scenario and banks write off loans based on the trajectories in Hardy and Schmieder (2013). ⁴ The graph shows the amount of additional loans under the severely adverse scenario that banks could issue as a percentage of total loans; results are aggregated at the country level. The graph compares three cases: banks run down their CET1 ratios to 10% + SIB buffers (case 1); banks use all the capital released under case 1 for lending (case 2); banks, in addition, receive a public guarantee on 20% of all additional loans (case 3).

Sources: D Hardy and C Schmieder, "Rules of thumb for bank solvency stress testing", *IMF Working Papers*, no WP/13/232, 2013; U Lewrick, C Schmieder, J Sobrun and E Takáts, "Releasing bank buffers to cushion the crisis – a quantitative assessment", *BIS Bulletin*, no 11, May 2020.

Bank loans would fall commensurately (Graph II.D, centre panel). The starting point is loans outstanding at end-2019 (brown bar) and projected loan growth over three years (green bar) based on pre-crisis trend growth in loans. Compared with this starting point, the amount of total loans would be \$9.6 trillion (equivalent to 11% of total loans at end-2019) lower for the adverse scenario (red bar) and \$18.3 trillion (22%) lower for the severely adverse scenario (purple bar).

To what extent could a release of remaining usable bank buffers counterbalance the decline in loans? Three cases are considered for the severely adverse scenario, which appears more similar to the Covid-19 impact (Graph II.D, right-hand panel). Case 1 assumes that banks employ any remaining usable buffers to expand their balance sheet until their capital ratio declines to 10%.^① It also assumes that systemically important banks (SIBs), on top of that, maintain their SIB buffers. This case also assumes that each bank keeps the ratio of customer loans to total assets constant, preserving the general structure of its balance sheet. Due to the lack of usable buffers, additional lending amounts to a mere \$1.1 trillion (1.3% of total outstanding loans at end-2019).

Case 2 considers the same drawdown of usable buffers, but features a more targeted use of funds. Specifically, all remaining usable buffers are deployed to fund loans rather than to expand other assets. This case thus implies a stronger expansion in lending than case 1, with additional loans of roughly \$2.1 trillion (2.5% of total outstanding loans at end-2019).

Case 3 assesses the potential for additional lending that public support could initiate. The analysis assumes that 20% of all additional loans benefit from a public guarantee (a conservative assumption given that guarantees implemented so far have tended to be much higher), reducing the risk weight on this share of the loan portfolio to zero. This increases the amount of lending that a given amount of capital can support. Additional loans rise to \$2.6 trillion (3.1% of total outstanding loans at end-2019).

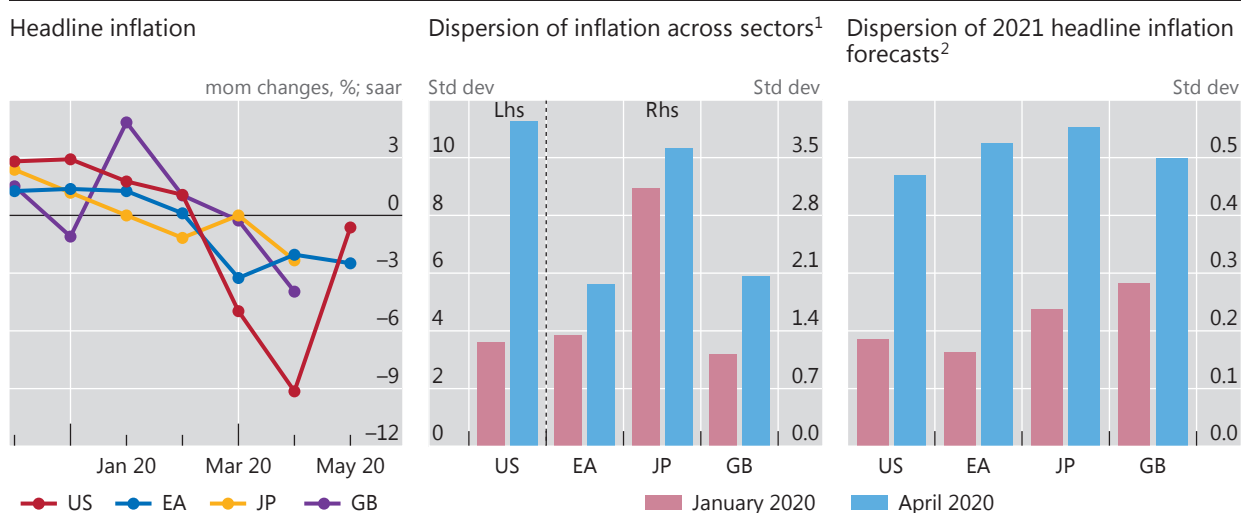
Overall, the analysis suggests that – despite the build-up of capital over the past few years – usable buffers alone might not be enough to sufficiently support lending in a crisis similar to the GFC; additional policy support would be needed. In providing support, policy needs to strike a balance: on the one hand, it needs to maintain the banking sector's lending capacity; on the other, it needs to preserve the sector's long-term strength, which often implies accelerating consolidation and balance sheet repair.^③

① For more details, see U Lewrick, C Schmieder, J Sobrun and E Takáts, "Releasing bank buffers to cushion the crisis – a quantitative assessment", *BIS Bulletin*, no 11, May 2020. ② Note that even though the weighted average of banks' capital ratio is 6.5% in the severely adverse scenario, for many banks the ratio is still above 10%. For those banks, there is room to use capital buffers further. ③ See M Drehmann, M Farag, N Tarashev and K Tsatsaronis, "Buffering Covid-19 losses – the role of prudential policy", *BIS Bulletin*, no 9, April 2020; and C Borio and F Restoy, "Reflections on regulatory responses to the Covid-19 pandemic", *FSI Briefs*, no 1, April 2020.

in service sectors characterised by dense gatherings of customers, such as air travel, restaurants and recreation activities. More fundamentally, the pandemic's legacy may partially reverse the structural influences that have acted to keep inflation low over the last few decades. Prominent among these were globalisation and technology, whose end result was to weaken the bargaining power of labour and the pricing power of firms. A trend towards deglobalisation and reshoring of supply chains, possibly reinforced by political developments, would boost prices by increasing costs and lowering productivity. Above all, it would help restore bargaining and pricing power, thereby facilitating inflation.

With downward pressures on inflation in all likelihood prevailing in the near term, monetary policy will need to remain accommodative. And with fiscal space more limited, pressure may grow for central banks to do more. Echoing the post-GFC experience, some of the crisis measures enacted may be hard to reverse even when the immediate emergency has passed. Central bank balance sheets, already set to reach record levels in many countries, may expand further (Graph II.12, left-hand panel). For EME central banks, their foray into bond market interventions has already given rise to discussions of possible implementation of quantitative easing programmes.

A distinct feature of the new economic landscape will be much higher debt, especially public sector debt (Chapter I). Apart from the large spike incurred to fight the pandemic, debt may also rise further during the recovery, extending its long-term trend. At the same time, central bank holdings of government debt, already very large in major economies, would quite probably increase and remain on central bank balance sheets for a long time (Graph II.12, right-hand panel).



¹ Standard deviation of year-on-year inflation across 19 (US), 12 (EA and GB) and 10 (JP) sectors. ² Standard deviation of 2021 consumer price inflation forecasts based on monthly surveys across professional forecasters.

Sources: Consensus Economics; Datastream; Eurostat; national data; BIS calculations.

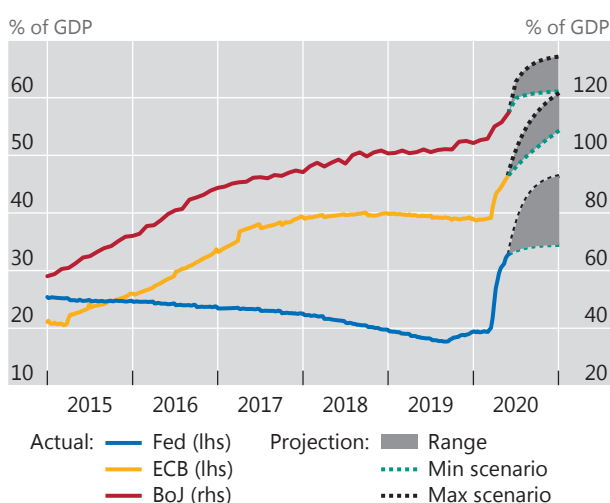
In such an environment, central banks would be under pressure and face difficult trade-offs. They would do well to adhere to the key principles that have guided them through this crisis so far. Policies need to remain credibly focused on maintaining macroeconomic stability. Actions should remain in line with policy mandates. The goals and reasons for policy actions should be clearly articulated, linking all decisions to the pursuit of the mandates within a coherent framework. Policy flexibility should be retained, including through clear exit strategies consistent with the economic environment. Finally, direct and overt deficit financing should be avoided.

Dealing with high public debt, in particular, requires a two-pronged approach. First and foremost, governments need to safeguard fiscal sustainability. Even as low interest rates relative to growth presently imply favourable debt dynamics, this cannot be taken for granted, not least given that market perception of debt sustainability can change abruptly. Governments must stand ready to take corrective actions to ensure a path of primary fiscal balances consistent with fiscal sustainability. Second, lifting and sustaining higher economic growth is paramount. This puts the onus on growth-friendly fiscal policies as well as structural reforms. Well chosen and implemented expenditures to facilitate the shift to renewable energies would be particularly timely. And just as important, the growth-enhancing effects of globalisation should be preserved.

Absent effective fiscal consolidation and growth-oriented structural reforms, high debt burdens may generate pressure on monetary policy to keep interest rates low. After all, higher inflation combined with financial repression has historically served to reduce debt burdens.¹⁷ If so, normalising monetary policy would become harder even if inflation rose.

A key risk is fiscal dominance. This pertains to situations where the stance of monetary policy is subordinated to the government's financing needs. The underlying tension arises because monetary policy has fiscal consequences. Monetary policy works by controlling the cost of borrowing in the economy, invariably also affecting government financing costs. And that impact has grown as central banks have deployed their balance sheets more extensively and moved

Central bank balance sheets expand further¹



Central bank holdings of government bonds as a share of total outstanding amounts²



¹ Projections are until end-2020. Scenarios are based on all announcements up to 4 June 2020. Balance sheet projections are expressed in percentage of annualised and seasonally adjusted Q4 2019 GDP. For assumption details, see Cavallino and De Fiore (2020). ² Latest available data: for EA, April 2020; for GB, Q3 2019; for JP and US, May 2020. For the euro area, securities held under the Public Sector Purchase Programme and the Securities Market Programme.

Sources: P Cavallino and F De Fiore, "Central banks' response to Covid-19 in advanced economies", *BIS Bulletin*, no 21, June 2020; ECB; Bank of Japan; Board of Governors of the Federal Reserve System; United Kingdom Debt Management Office; Datastream; BIS; BIS calculations.

further out the maturity spectrum to control interest rates. As a result, the fine line between monetary policy and government debt management has become blurred. Discussions of monetary financing further erode the distinction between monetary and fiscal policy (Box II.E).

One safeguard against fiscal dominance is strong governance. Over the years, institutional frameworks have been geared towards keeping fiscal and monetary policy separate, with central bank operational independence as a key pillar. This has underpinned central banks' credibility, allowing them to ease aggressively and de facto lowering government financing costs without de-anchoring inflation expectations. To be sure, in most jurisdictions, operational independence does not imply goal independence. The government or legislature's preferred balance between price stability and other macroeconomic objectives may shift over time: tolerance or even preference for higher inflation cannot be ruled out. But central bank independence does provide an important safeguard within existing arrangements, by raising the bar for any given change.

In this context, it will be important to recognise once again the limitations of central banks' actions. Monetary policy alone cannot be the engine of sustainable growth.¹⁸ Pushing too hard and too long on the monetary pedal can generate financial vulnerabilities and imbalances that eventually bite back. Likewise, large-scale intervention in government debt markets can be sustained only if it promotes central banks' macroeconomic stabilisation objectives and if complemented by a clear exit strategy. There are limits to how far the boundaries between fiscal and monetary policies can be pushed without running the risk of undermining the central bank's credibility. Trust and confidence in central banks are arguably their most important assets. It is precisely because of this hard-won trust and confidence that central banks have been able to cross a number of previous red lines to restore stability during this crisis. Preserving that confidence is essential.

Monetary financing: What is it (not)? And is it a step too far?

As central banks have undertaken extraordinary steps in response to the pandemic, and greatly expanded their balance sheets as a result, discussions of monetary financing (MF) have regained prominence. Despite the vivid imagery sometimes used to depict it – “helicopter money” – MF is an ambiguous concept. Its typical characterisation involves a fiscal stimulus financed with central bank money. But what would this entail in practice?

Powerful imagery aside, one can think of helicopter money or MF as consisting of two simple steps. The first is crediting individual accounts with funds, just like the government does when paying out unemployment benefits or tax rebates. The second, less well understood, step is allowing the additional money to swell banks’ deposits with the central bank (technically, boost “excess reserves”), which is where the money ends up.

The two steps are, in fact, quite familiar. Transfers are one of the largest components of government spending. And many major central banks have operated with excess reserves for quite some time now. The counterpart of the increase in excess reserves is typically the purchase of government debt, ie a quantitative easing (QE) operation. Thus, MF can be thought of as the combination of a government transfer (the deficit) and a QE operation of the same size.^① Correspondingly, the impact on government yields and economic activity is similar to it. With respect to the QE component, it is well accepted that such operations can have a significant impact on yields and financial conditions more generally through a number of channels, including portfolio balance effects and signalling.

What, then, is special about MF? Relative to the way many central banks have been operating at least since the Great Financial Crisis, the distinguishing element of MF is the explicit link to fiscal deficits and governance.^② In other words, it regards communication, control (ie who decides the size, time and duration of the operation) and, related to that, the objectives pursued.

On this basis, central banks have certainly not engaged in MF.^③ In this crisis, central banks have undertaken very large QE-type operations in the context of a huge and rapid ramping-up of government borrowing needs. These actions have helped to keep sovereign bond markets liquid and functional, and have supported the smooth financing of emergency fiscal spending. But importantly, the operations have been fully in line with central banks’ primary objectives of safeguarding economic and financial stability, and have not been taken with the purpose of financing fiscal deficits as such. It is just that, given the extreme circumstances, the actions are naturally complementary to those of fiscal authorities. Moreover, central banks retain full control, so that they can unwind the operations as economic circumstances require.

Through these aggressive measures, central banks have eased financial conditions and contained the financial turmoil. That said, the measures do blur the traditional boundaries between monetary and fiscal policies. As such, they need to be supported by strong institutional frameworks and are more feasible for central banks in advanced economies with their high credibility stemming from a long track record of stability-oriented policies. MF would push the boundaries between monetary and fiscal policies further, with greater risks. While some proposals include safeguards in the form of strict activation clauses, clear specification of operational control and well defined exit points, it is an open question whether these mechanisms, however carefully designed, would survive the test of time. The underlying risk is that the monetary policy function could become subordinated to short-term fiscal needs – so-called fiscal dominance. If so, the hard-won credibility of monetary institutions would be undermined and, with it, central banks’ ability to deliver on their macroeconomic stabilisation objectives.

① Some MF proposals envision that the financing of government spending takes place through a direct transfer of central bank capital to the government – for example, by crediting the government’s account with money in return for nothing, or by purchasing government bonds and immediately writing them off. In this case, the corresponding QE operation shows up on central banks’ balance sheets as a reduction in capital rather than an increase in holdings of government bonds. ② From a legal perspective, MF is often associated with the manner in which the financing is done. For example, in many jurisdictions central banks are prohibited from purchasing government bonds on the primary (as opposed to secondary) market or from direct lending to the government. The reason is that such forms of financing potentially subordinate central banks to fiscal authorities in specifying the terms and conditions of lending. Academic discussions of MF have also emphasised the permanence of money creation, although this is unrealistic in practice; see C Borio, P Disyatat and A Zabai, “Helicopter money: the illusion of a free lunch”, *VoxEU*, 24 May 2016. ③ See eg A Bailey, “Bank of England is not doing ‘monetary financing’”, *Financial Times*, 5 April 2020; G Vlieghe, “Monetary policy and the Bank of England’s balance sheet”, Bank of England, 23 April 2020; and C Wilkins, “Bridge to recovery: the Bank’s COVID-19 pandemic response”, C D Howe Institute, Toronto, 4 May 2020, in relation to the Bank of Canada.

Endnotes

- ¹ See the literature on the “preferred habitat” of bond investors: J Andrés, D López-Salido and E Nelson, “Tobin’s imperfect asset substitution in optimizing general equilibrium”, *Journal of Money, Credit and Banking*, vol 36, no 4, 2004; and D Vayanos and J Vila, “A preferred-habitat model of the term structure of interest rates”, *NBER Working Papers*, no 15487, November 2009. For a broad assessment of unconventional policy tools, including asset purchases, see Committee on the Global Financial System, “Unconventional monetary policy tools: a cross-country analysis”, *CGFS Papers*, no 63, October 2019.
- ² See eg M Brunnermeier and L Pedersen, “Market liquidity and funding liquidity”, *The Review of Financial Studies*, vol 22, 2009. For a discussion of the implications for central bank emergency liquidity provision, see S Cecchetti and P Disyatat, “Central bank tools and liquidity shortages”, Federal Reserve Bank of New York, *Economic Policy Review*, vol 16, 2010.
- ³ See A Carstens, “Bold steps to pump coronavirus rescue funds down the last mile”, *Financial Times*, 29 March 2020.
- ⁴ The Basel Committee on Banking Supervision also announced a series of measures to alleviate the impact of the crisis on the banking system. Some measures are aimed at ensuring that banks can continue to lend to households and businesses, while others free up operational capacity for banks and supervisors. These include encouragement of the use of buffers, clarification of the treatment of credits subject to support measures, postponement of the implementation of Basel III, and flexible implementation of expected credit loss accounting.
- ⁵ See T Adrian, P Colla and H S Shin, “Which financial frictions? Parsing the evidence from the financial crisis of 2007–9”, *NBER Macroeconomic Annuals*, vol 27, no 1, 2013; and F De Fiore and H Uhlig, “Corporate debt structure and the financial crisis”, *Journal of Money, Credit and Banking*, vol 47, no 8, 2015, for a discussion of the complementary roles of bank and bond financing during the GFC. Another example of the complementarity is that even when firms finance themselves through commercial paper, they generally need to back this up with credit lines in order to receive a rating. See J Alworth and C Borio, “Commercial paper markets: a survey”, *BIS Economic Papers*, no 37, April 1993.
- ⁶ See A Greenspan, “Do efficient financial markets mitigate financial crises?”, speech at the Financial Markets Conference of the Federal Reserve Bank of Atlanta, Sea Island, Georgia, October 1999.
- ⁷ See BIS, “Monetary policy frameworks in EMEs: inflation targeting, the exchange rate and financial stability”, *Annual Economic Report 2019*, Chapter II, June.
- ⁸ See B Hofmann, I Shim and H S Shin, “Emerging market economy exchange rates and local currency bond markets amid the Covid-19 pandemic”, *BIS Bulletin*, no 5, April 2020. More broadly, see the discussion of “original sin redux” in A Carstens and H S Shin, “Emerging markets aren’t out of the woods yet”, *Foreign Affairs*, 15 March 2019; and C Cantú, T Goel and J Schanz, “EME government debt: cause for concern?”, *BIS Quarterly Review*, June 2020, pp 15–16.
- ⁹ See IMF, “Enhancing the emergency financing toolkit – responding to the Covid-19 pandemic”, *IMF Policy Papers*, April 2020.
- ¹⁰ See B Bernanke, T Geithner and H Paulson, *Firefighting: the financial crisis and its lessons*, Penguin Books, United States, 2019.
- ¹¹ The classic principles of a lender of last resort were set out by Bagehot when he wrote that, to stay a banking panic: (i) the bank supplying reserves “must advance freely and vigorously to the public”; (ii) “these loans should only be made at a very high rate of interest”; and (iii) “at this rate these advances should be made on all good banking securities, and as largely as the public ask for them”; see W Bagehot, *Lombard Street: a description of the money market*, Henry S King, London, 1873, pp 74–5.

- ¹² For example, a criterion based on a single debt-to-earnings ratio (as applied to the Federal Reserve's Main Street Lending Program) may not sufficiently distinguish between firms with low and those with high exposure since what constitutes reasonable leverage differs across types of businesses. At the same time, the compensation, stock repurchase and capital distribution restrictions that come with the assistance may discourage firms that are in relatively good shape from taking up assistance, leaving the potential pool of borrowers skewed towards riskier businesses.
- ¹³ See N Ferguson, A Schaab and M Schularick, "Central bank balance sheets: expansion and reduction since 1900", *CESifo Working Paper Series*, no 5379, 2015.
- ¹⁴ See C Borio, M Farag and N Tarashev, "Post-crisis international financial regulatory reforms: a primer", *BIS Working Papers*, no 859, April 2020.
- ¹⁵ The CARES Act of 2020 earmarked \$454 billion for the US Treasury to use for investments in programmes or facilities established by the Federal Reserve. With equity backing from the Treasury, the Fed could potentially extend loans up to 10 times the amount of loss absorption granted. For example, the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF) together received Treasury backing of \$75 billion, allowing purchases of up to \$750 billion. The Main Street Lending Program, on the other hand, utilises a slightly lower leverage ratio, with \$75 billion of Treasury backing for a total size of \$600 billion.
- ¹⁶ See S Claessens, A Kose, L Laeven and F Valencia (eds), *Financial crises: causes, consequences, and policy responses*, IMF, 2014; and C Borio, B Vale and G von Peter, "Resolving the financial crisis: are we heeding the lessons from the Nordics?", *BIS Working Papers*, no 311, June 2010.
- ¹⁷ See C Reinhart and M Belen Sbrancia, "The liquidation of government debt", *BIS Working Papers*, no 363, November 2011; and C Reinhart, "The return of financial repression", *CEPR Discussion Papers*, no DP8947, 2012.
- ¹⁸ See BIS, "No clear skies yet", *Annual Economic Report 2019*, Chapter I, June.

III. Central banks and payments in the digital era

Key takeaways

- *Central banks play a pivotal role in maintaining the safety and integrity of the payment system. They provide the solid foundation by acting as guardians of the stability of money and payments. The pandemic and resulting strain on economic activity around the world have confirmed the importance of central banks in payments.*
- *Digital innovation is radically reshaping the provision of payment services. Central banks are embracing this innovation. They promote interoperability, support competition and innovation, and operate public infrastructures – all essential for easily accessible, low-cost and high-quality payment services.*
- *Central banks, as critical as ever in the digital era, can themselves innovate. In particular, central bank digital currencies (CBDCs) can foster competition among private sector intermediaries, set high standards for safety and risk management, and serve as a basis for sound innovation in payments.*

Introduction

A vital function of the financial sector is to provide efficient ways for households and businesses to make and receive payments. A sound and well functioning payment system facilitates economic activity and supports long-run economic growth.¹

Payment systems today build upon a two-tier structure provided by the central bank together with commercial banks. The central bank plays a pivotal role by ensuring trust in money, a core public good for the economy at large, while the private sector leads on innovation in serving the public. The central bank supplies the ultimate safe medium to settle both wholesale and retail transactions, while commercial banks supply the bulk of retail payment instruments.

Over the past few decades, payment systems have undergone a radical transformation. New payment methods and interfaces have taken shape, and many more innovations are under way.² While these developments raise new challenges, the core role of the central bank in payment systems remains. The private sector can provide the innovation, ingenuity and creativity to serve customers better, but history illustrates that private sector services thrive on a solid central bank foundation. Whether promoting interoperability, setting standards or levelling the competitive playing field, there are strong arguments for the public sector to play a role. In fact, today the central banks' role is as important as ever, if not more so.

Central banks are actively pursuing a range of policies to tackle existing shortcomings. The objective is to ensure that households and businesses have access to safe and efficient payment options. Central banks can choose to stand at the cutting edge of innovation themselves, not least in their direct provision of services to the public at large. One option at the frontier of policy opportunities is the issuance of CBDCs, which could amount to a sea change. CBDCs could offer a new, safe, trusted and widely accessible digital means of payment. But the impact could go much further, as they could foster competition among private sector

intermediaries, set high standards for safety, and act as a catalyst for continued innovation in payments, finance and commerce at large.

This chapter discusses the foundations of money and payment systems, payment trends and policies. It concludes with a short discussion of the future of payments.

Money and payment systems: the foundation

While we use money every day, its theoretical definition can be elusive.³ Still, we all recognise it when we see it. Money has taken different forms through the ages, but one of its defining features has been serving as a medium of exchange, accepted as payment for goods and services (Box III.A).⁴ In addition, money serves as a store of value and a unit of account. This chapter focuses primarily on the medium of exchange function, also called means of payment, and on the supporting system.⁵

A payment system is a set of instruments, procedures and rules for the transfer of funds among participants.⁶ Payment systems are generally classified as either retail or wholesale. A retail payment system handles a large volume of relatively low-value payments, in such forms as credit transfers, direct debits, cheques, card payments and e-money transactions. A wholesale payment system executes transactions between financial institutions. These payments are typically large-value and need to settle on a particular day and sometimes by a particular time.

As money has evolved through the centuries, so have the means of payment. The pace of change is especially rapid today. Indeed, payments continue to be the financial service most affected by shifts in demand, technology and new entrants.⁷ Despite improvements, households and businesses demand safer and ever faster payments. They increasingly expect payments to be mobile-first, fully digital and near instant, whether online or at the point of sale. Moreover, the current pandemic could accelerate the shift to digital payments.

At the same time, some new entrants have tried to capitalise on the existing shortcomings. Three such attempts stand out: the rise (and fall) of Bitcoin and its cryptocurrency cousins;⁸ Facebook's proposal to develop Libra – a private global stablecoin arrangement;⁹ and the foray of big tech and fintech firms into financial services.¹⁰ Some of these have failed to gain much traction; others are perceived as a threat to jurisdictions' monetary sovereignty; while many have yet to address a host of regulatory and competition issues. Nevertheless, all have propelled payment issues to the top of the policy agenda.

The foundation of a safe and efficient payment system is trust in money.¹¹ In a fiat money system, where money is not backed by a physical asset, such as gold, trust ultimately depends on the general acceptance of pieces of paper that cannot be redeemed in anything but themselves. General acceptance is what ultimately makes them valuable, alongside confidence that payments made with them can irrevocably extinguish obligations ("finality"). In countries around the world, central banks have become the designated institution to pursue this public interest.¹²

In pursuit of this objective, the central bank issues two types of liabilities. One is physical cash (banknotes and coins) for use by the general public, the most common form of money over the centuries and across countries. Physical cash is accepted (ie exchanged for goods and services) by virtue of a combination of its legal tender status (which makes payments with physical cash final) and central banks upholding their commitment to safeguard its value. The other type of liability – commercial banks' deposits with the central bank (ie reserves) – is for use in wholesale transactions. Like cash, central bank money is safe and, with legal support, underpins payment finality. Payments are further supported by central bank credit – essential to oil the payments machine. What makes both forms of

money special is not just that they have no (or very low) credit risk but also that they represent, by construction, the most liquid asset in the system.

History indicates that the most effective and efficient payment system is a two-tier one. In it, banks compete with each other at the interface with ultimate users while the central bank provides the foundation. Commercial banks offer accounts to households and businesses which, in turn, have accounts with the central bank to settle payments among themselves.¹³ In a two-tier system, maintaining confidence in commercial bank money is essential. To do so, several institutional mechanisms have been put in place, with the central bank playing pivotal roles. Ultimately, commercial bank money derives its value from the promise of being convertible into central bank money at par and on demand. In order to buttress that promise, the central bank also acts as the ultimate source of liquidity (ie as lender of last resort). Prudential regulation and supervision – often performed by the central bank – limit the risk of banks' failure while deposit insurance schemes can help prevent runs and ensure that holders of transaction deposits are reimbursed should a failure occur.

Payment systems are complex markets with multiple participant types. They involve not only banks but also non-bank payment service providers (PSPs) offering payment services to end users. Generally, banks and other PSPs offer consumer-facing or retail services at the "front end". This can include providing so-called "digital wallets" and mobile interfaces that give users access to their bank account or store credit card details. Some banks and other PSPs play key roles in clearing, settlement and processing at the "back end" (Box III.B).

This complexity has some similarity to a town market that brings together different types of buyers and sellers. It may appear complex, but it can be an efficient form of exchange once strong institutional backing is in place. Central banks help organise the payments marketplace by playing the three key roles of operator, catalyst and overseer (Box III.A).¹⁴ They can provide the critical institutional infrastructure, set and oversee implementation of standards, and encourage the provision of a high-quality range of services, thereby promoting innovation and competition.

Central banks can also improve the services they supply directly to ultimate users by staying at the technological frontier. To that end, a number of central banks are considering issuance of CBDCs. CBDCs can serve both as a complementary means of payment that addresses specific use cases and as a catalyst for continued innovation in payments, finance and commerce.

Supporting the payments marketplace also requires preserving its safety and integrity. Just as a sound and smooth functioning payment system underpins economic growth, so can disruptions to a payment system cause major economic damage. Economic activity can grind to a halt if payments do not function. And compromised integrity can lead to a loss of confidence. Localised distress can spread across domestic and international financial markets, extending the damage.

To maintain the safety and integrity of payment systems, the central bank must mitigate various threats. A first threat is systemic risk, which can arise in an interconnected payment system when the inability of a system participant to perform as expected causes other participants to be unable to meet their obligations when due; this can propagate credit or liquidity risks throughout the system. Central banks have expended considerable effort in recent decades to mitigate such risks.¹⁵ A second threat is fraud; wholesale payments, given that they are large-value and complex, are a primary target. A third and related threat is counterfeiting, which applies to cash, and possibly also to CBDCs. A fourth threat is illicit financing and money laundering – the process of disguising the illegal origin of criminal proceeds. In this general context, cyber threats have grown in

importance. More than ever, there is a broad range of entry points through which to compromise a payment system. The international community has been actively engaged in mitigating these and other threats, including through work conducted in international organisations and standard-setting bodies.

Box III.A

The payment system, trust and central banks

Why do we pay? We pay because we are not trustworthy in the eyes of most. To quote John Moore and Nobu Kiyotaki: evil is the root of all money.^① In this world, the payment system can be a force for good.

The payment system started with debt as people traded only with those they knew and trusted. Trade with strangers required a method to substitute for a public record of reputation. Societies coordinated on using physical objects, such as shells, gems or precious metals. It was agreed that the transfer of these objects by one individual to another would forever extinguish the debt claim of that individual held by the other. In technical terms, the payment was considered final. **Finality** is defined as the irrevocable and unconditional transfer of an asset in accordance with the terms of the underlying contract. The exchange occurs at a legally defined moment and cannot be reversed.^② Legal rules characterise the circumstances under which a payment is final. Without it, one cannot trust that a transfer of (bank) funds necessarily constitutes a payment.

Once societies adopted a monetary convention, rulers quickly realised they could gain from controlling the supply of money. Merchants trading coins knew the issuer, as rulers minted their profile on a side of each coin. The value of this money was backed by the degree of trustworthiness of its issuer. However, absent sound governance, rulers could not be trusted, and debasement was not uncommon.

Demands for sound governance and a more efficient payment system were often reasons to establish a central bank. In many countries the public authority gave special issuing rights to an existing private bank. The institution then acted as a banker to commercial banks. This two-tier system is the epitome of the current account-based monetary system.

The central bank underpins the two-tier system in at least three key ways.

First, the central bank provides a medium of exchange (or means of payment) that also serves as the **unit of account**. A common unit of account greatly simplifies the measurement of relative prices. As a result, exchange of goods and services can be done more efficiently.

Second, the central bank provides the infrastructure that, together with a sound legal framework, facilitates swift and **final settlement of debt in central bank money**. Central bank money plays a key role in the final settlement of claims: in the case of cash, for many of the smallest transactions by consumers and businesses; and in the case of bank reserves, for the settlement of large and time-critical interbank transactions, which ultimately support all payments in the economy. Central bank money provides “ultimate settlement” because claims on the central bank are typically free of the credit and liquidity risks associated with other settlement assets. This is particularly relevant, as the finality of payments made with some digital assets relying on decentralised validation protocols has been questioned.

Third, the central bank is the ultimate source of trust in the system. It provides trust through its role as an **operator** of core infrastructures such as wholesale systems. Moreover, the central bank acts as a **catalyst** for change and as an **overseer**, promoting safe and efficient payment arrangements.

^① N Kiyotaki and J Moore, “Evil is the root of all money”, *American Economic Review*, 92, no 2, pp 62–6, 2002. ^② See Committee on Payment and Settlement Systems, *The role of central bank money in payment systems*, August 2003; and C Kahn and W Roberds “The economics of payment finality,” Federal Reserve Bank of Atlanta, *Economic Review*, Second Quarter 2002.

Today's payment systems: key facts

Access, costs and quality

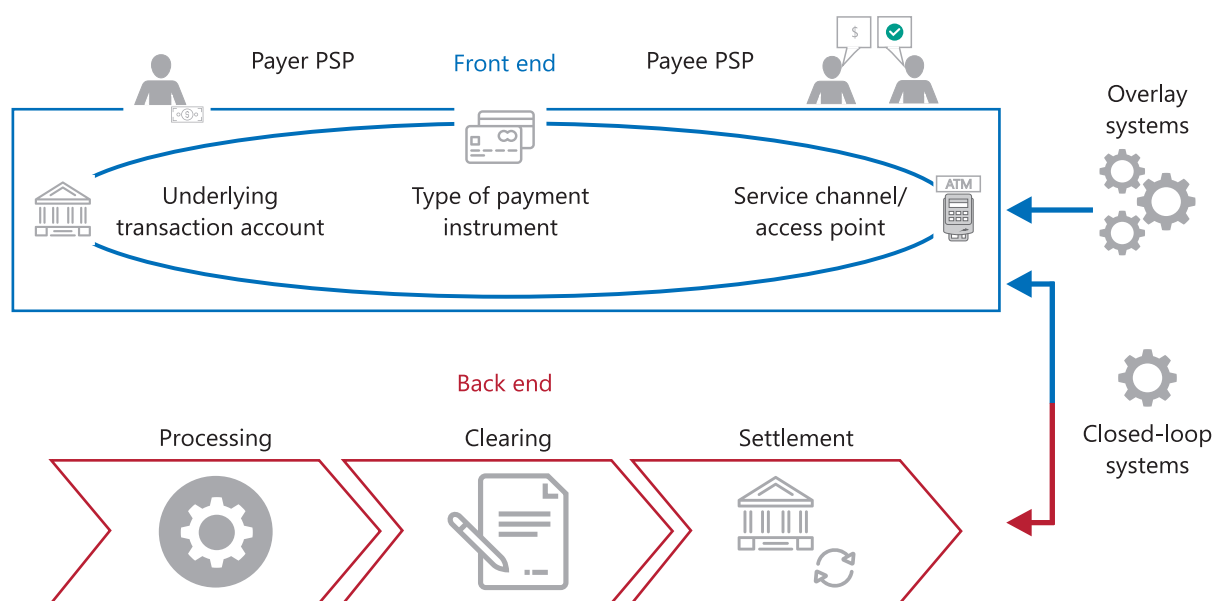
Today's payment systems, like other large (digital) marketplaces, are diverse, complex and the result of a long evolution. To start with, the difference between retail and wholesale payment systems is substantial. Retail payments make up

The payment system deconstructed

A **payment system** is a set of instruments, procedures and rules among participating institutions, including the operator of the system, used for the purposes of clearing and settling payment transactions. Its infrastructure usually involves payments flowing through a “front end” that interacts with end users and a number of “back end” arrangements that process, clear and settle payments (Graph III.B).

Payment infrastructure elements and arrangements

Graph III.B



PSP = payment service provider (ie banks and non-banks).

Source: Adapted from Committee on Payments and Market Infrastructures, "Cross-border retail payments", February 2018.

The **front-end** arrangements initiate the payment. They encompass the following elements:

- *Underlying transaction account* (eg deposit transaction) represents the source of the funds.
- *Payment instrument* (eg cash, cheque, card), which can vary across PSPs and use cases.
- *Service channel* (eg bank branch, automated teller machine (ATM), point-of-sale (POS) terminal, payment application) connects the payer/payee and PSP.

The **back-end** arrangements generally focus on specific stages of the payment chain:

- *Processing* encompasses authentication, authorisation, fraud and compliance monitoring, fee calculation, etc.
- *Clearing* is the process of transmitting, reconciling and, in some cases, confirming transactions prior to settlement.
- *Settlement* is the process of transferring funds to discharge monetary obligations between parties.

Overlay systems provide front-end services by using existing infrastructure to process and settle payments (eg ApplePay, Google Pay, PayPal). These systems link the front-end application to a user's credit card or bank account. **Closed-loop systems** (eg Alipay, M-Pesa, WeChat Pay) provide front-end to back-end services, have back-end arrangements largely proprietary to their respective firms, and do not interact with or depend much on the existing payment infrastructure.

nearly 90% of the total volume of payments (ie number of transactions), yet less than 1% of the total value.¹⁶ Wholesale payment systems have seen frequent but discrete updates (Box III.C). In retail payments, since 1950, many countries have adopted electronic payments and seen the rapid growth of credit and debit cards,¹⁷ the introduction of automated teller machines (ATMs), the advent of web- and mobile phone-based payments and, more recently, the entry of large non-bank providers offering e-payment services.¹⁸ Among retail payments, global values of card and e-money payments have risen, while those of cash withdrawals and cheques have declined. On aggregate, roughly 90–95% of cash withdrawals and retail electronic payments are domestic.¹⁹ While all of these developments have enhanced payment services, certain shortcomings are apparent.

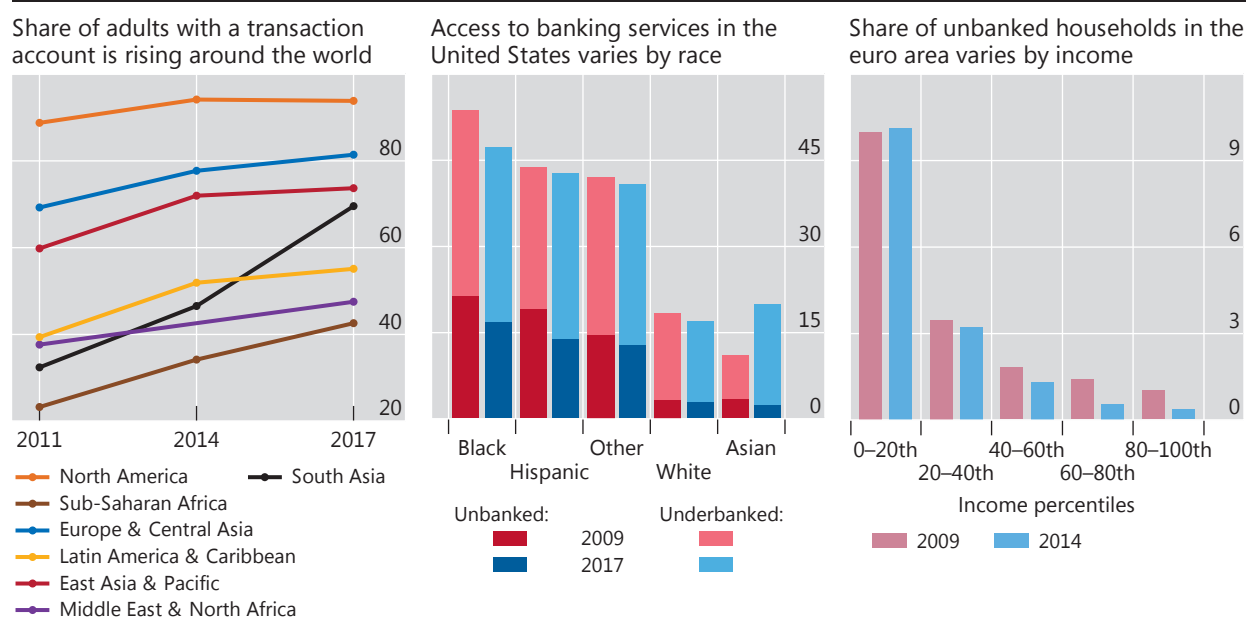
Access to payment services has increased over time, yet is still far from universal. Access to basic accounts has been rising, particularly in South Asia (eg India), East Asia (eg China) and sub-Saharan Africa (Graph III.1, left-hand panel). Yet more remains to be done to provide transaction services to all. Lacking a transaction account, 1.7 billion adults globally, and hundreds of millions of firms, are tied to cash as their only means of payment. Low-income individuals, women and small businesses are still much more likely to lack access to formal payment services.²⁰ Even in advanced economies, some groups lack access to bank accounts and the associated payment options; nearly half of Black and Hispanic US households are unbanked or underbanked (centre panel). In the euro area, 10% of low-income households are unbanked (right-hand panel). In some emerging market and developing economies, fewer than half of firms have an account;²¹ lack of access to formal payment services, eg to pay suppliers and employees and to accept funds from customers, hinders firms' access to other services such as credit.

Costs are relatively high in the retail segment and are influenced by the form of payments and the degree of competition. Retail payments tend to be more

Financial inclusion and access are improving, but gaps remain

Shares, in per cent

Graph III.1



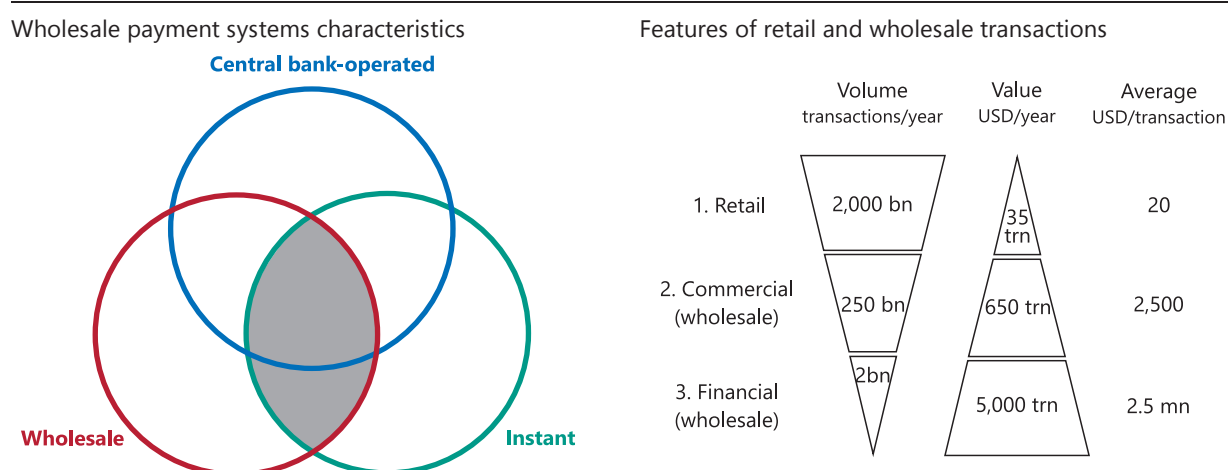
Sources: J Coffinet and C Jadeau, "Household financial exclusion in the Eurozone: the contribution of the Household Finance and Consumption survey", IFC-National Bank of Belgium Workshop, May 2017; World Bank, Findex; FDIC, *National Survey of Unbanked and Underbanked Households*.

The evolution of wholesale payment systems

Most countries have multiple payment systems, each catering to distinct market segments. These systems can be categorised along three key dimensions (Graph III.C, left-hand panel): payment type (wholesale or retail); operator (central bank or private sector); and settlement mode (instant or deferred). Wholesale payment systems (WPS) process large-value and time-critical payments. These payments are typically interbank, and also involve other financial entities. Most WPS are operated by the central bank and settle payments on an instant (“real-time”) basis.^① Given their importance, WPS are subject to global standards for financial market infrastructures.^② WPS participants generally have accounts at the central bank and are subject to supervision and oversight. In addition, whether privately or publicly owned/operated, WPS are overseen by central banks and other agencies. This scrutiny underpins the safety, efficiency and finality of payments in all segments, thus providing a public good. Compared with retail systems, WPS tend to settle fewer transactions, but much larger values (Graph III.C, right-hand panel).^③

Wholesale payment systems are large-value and instant

Graph III.C



The grey shaded area in the left-hand panel represents instant wholesale payment systems.

Sources: Committee on Payments and Market Infrastructures, Red Book statistics, 2018, with input from Gottfried Leibbrandt; BIS elaboration.

WPS have evolved markedly since the start of the millennium.^④ In addition to the move to real-time settlement, the range of entities allowed to participate has expanded beyond banks to include financial market infrastructures, payment service providers and, more recently, non-bank PSPs, fintechs and even big techs.^⑤ WPS have also lengthened their operating hours in response to user demand and the inception of fast retail payment systems. In fact, some WPS already operate on (or near) a 24/7/365 basis (eg SPEI in Mexico) and others are considering moving towards this benchmark.

WPS are likely to continue evolving. Technology will be a big part of both the drivers for change and the solutions for WPS. For instance, the increased popularity of retail fast payments among consumers may force WPS to further extend operating hours. Moving to new and more efficient technological solutions can help WPS reduce their “downtime” for maintenance. The increased prominence of fintechs and big techs in payments may change participants’ needs and expectations. Application programming interfaces (APIs, or sets of definitions and protocols that allow different applications to communicate with each other) and cloud computing services (which allow on-demand scalability) may help address these changing demands.

① Exceptions exist: eg in Canada and Hong Kong SAR, the WPS is not owned/operated by the central bank; and in the United States, there are two WPS, Fedwire Funds and CHIPS, the latter being privately owned and operated. ② See CPMI-IOSCO (2012), which applies to systemically important WPS (in practice, a very wide group). ③ This refers to “direct” participants of the WPS (CPMI Glossary). Direct participants can act as a gateway for other financial and non-financial entities to access the services of the WPS. ④ See eg BIS, “Payment and settlement systems: trend and risk management”, 64th Annual Report, Chapter VIII, June 1994; and Committee on Payment and Settlement Systems, “New developments in large-value payment systems”, May 2005. ⑤ See A Carstens (2019b).

expensive for users, in aggregate, where credit cards dominate.²² Moreover, card payments are a lucrative source of revenue for financial institutions and card networks. Both features reflect the fact that these institutions use payments as a competitive moat. Overall, the ratio of domestic payment revenues to GDP (a rough proxy for costs) is higher where banks' net interest margins are higher (Graph III.2, left-hand panel), pointing to lack of competition. In Latin America, for example, credit card fees amount to over 1% of GDP.²³ This indicates the potential for reducing costs without weighing on economic activity.

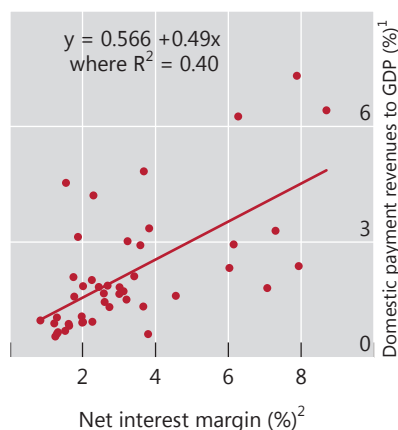
Processing costs differ across payment instruments. Cash, debit and credit cards each involve different front-end costs, ie the costs incurred in processing payment transactions at the counter.²⁴ Cash also requires back office processing. For debit and credit cards, nearly all of the processing costs are "merchant service costs" – fees that the merchant pays to the bank issuing the cards, the bank acquiring the card payment and the card network operators (Graph III.2, centre panel).

Indeed, card networks typically involve three or four parties to process transactions, with various and sometimes opaque fees. These include interchange fees among banks and licence fees to card networks.²⁵ Even across cards, fees vary considerably; premium cards come with additional perks for users – particularly higher-income ones – paid for with an annual fee, but also with higher costs for merchants (nearly double the costs of non-premium cards). Those costs are not always transparent to end users; and even if they are, misaligned incentives mean that the choices of payment method do not consider overall system efficiency. Authorities have taken a range of actions to lower card fees.²⁶

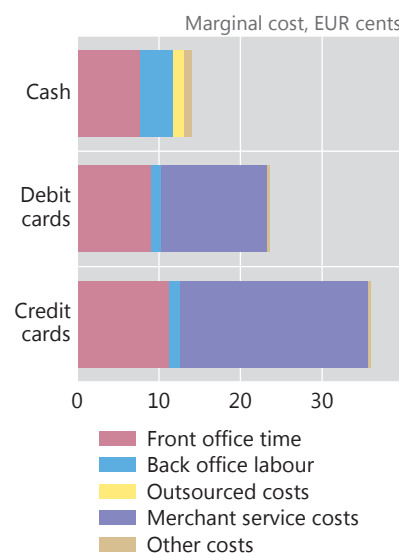
Costs of payments are higher for some economies, users and instruments

Graph III.2

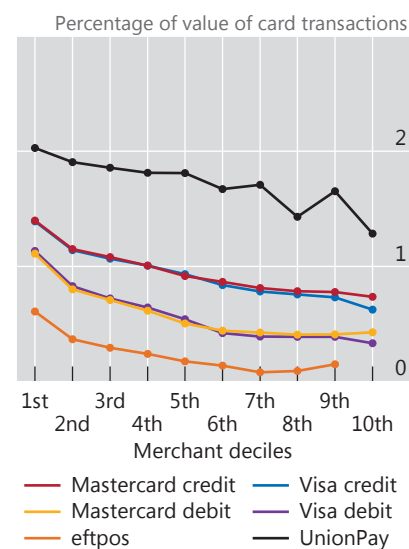
Payments are costlier where banks' net interest margins are high



Merchant service costs are important for card payments³



Card payments: smaller merchants pay more⁴



¹ Data for 2019. The numerator is the sum of account-related liquidity, domestic transactions and credit cards (fees and lending net interest income) for consumer and commercial payments. ² Data for the latest year available. Defined as the accounting value of a bank's net interest revenue as a share of its average interest-bearing (total earning) assets. The sample comprises 45 countries. ³ Data for Europe (AT, BE, DE, ES, FR, GB, IT, NL, PL and SE), 2015. The graph reflects a scenario in which merchants were asked to assess fixed or variable costs for accepting cash, debit card and credit card payments for a €25 transaction over a three- to four-year time horizon. ⁴ Average cost of card acceptance by merchants in Australia, 2018/19. Ranked in value deciles.

Sources: McKinsey & Company, *Global Payments Report 2019: amid sustained growth, accelerating challenges demand bold actions*, September 2019; K Occhiuto, "The cost of card payments for merchants", Reserve Bank of Australia, *Bulletin*, March 2020; European Commission, *Survey on merchants' costs of processing cash and card payments*, March 2015; IMF, *World Economic Outlook*; World Bank; BIS calculations.

Still, costs tend to be higher for smaller firms (Graph III.2, right-hand panel) and for lower-income users.

Payments across borders are not only typically slow and opaque, but also especially costly.²⁷ Lower-value payments, such as remittances, are the prime example. Cash transfers are the most expensive, reflecting both handling costs and lack of competition wherever cash is the only option. Costs vary also with the number and type of firms involved. Most cross-border payments flow through a network of correspondent banks. Remittances transferred this way are the most expensive, at 10% of value, while those sent through money transfer operators (MTOs)²⁸ are nearly half of the cost, at 6% of value. Regions with fewer channels through which to send remittances, such as Africa, face higher than average costs, making the poorest regions the hardest hit.²⁹

Finally, there is scope to improve the quality of payment services in terms of convenience, transparency and speed. Despite greater demand for payments in real time (or very close to it), methods such as cross-border bank transfers often take days to clear and settle.³⁰ Granted, domestically, many countries are implementing new retail systems that offer nearly instant execution and continuous availability, some even around the clock, but they are not universally available.³¹ Overall, the quality of payment services still falls short of evolving customer expectations.

The Covid-19 pandemic has highlighted both the progress achieved and the remaining shortcomings in payments. The ability to use contactless payments in physical stores and for online purchases has supported economic activity. Yet digital payments are still not sufficiently convenient or accessible to all. Current efforts to improve their adoption, including in order to allow government-to-person payments to vulnerable groups, could enhance financial inclusion (Box III.D).

Industrial organisation: network effects in payments

The key to identifying the most promising policies to address the above shortcomings and improve payments is to understand their industrial organisation. Payments are conducted in complex markets that give rise to network effects and interactions among system participants. These network effects and interactions can influence the design of policies to encourage competition and innovation and help shed light on the important role central banks can play.

Network effects arise when the value of using a network increases with the participation of additional users.³² In the case of payment systems, these effects arise because the more people use a particular payment network, the more appealing it is for others to join. Digital platforms exhibit such a characteristic in a particularly strong way.

Network effects can be a mixed blessing, however. While they naturally give rise to a virtuous circle of economic gains, they can also heighten the risk of the emergence of dominant firms, which destroy competition and generate costs to society. The policy challenge is to secure the gains while avoiding the costs.

Payment systems are networks with participants that fall into two groups – PSPs and users.³³ The PSPs compete with each other, but this competition takes place in the presence of complex interactions that bring subtle trade-offs. In this context, the public provision of the core infrastructure can be important in reconciling competing policy objectives. It can allow network effects to thrive while promoting a competitive level playing field. The central bank performs such a function by supplying the accounts on which payments settle. In this sense, the central bank is instrumental in the provision of a key public good.

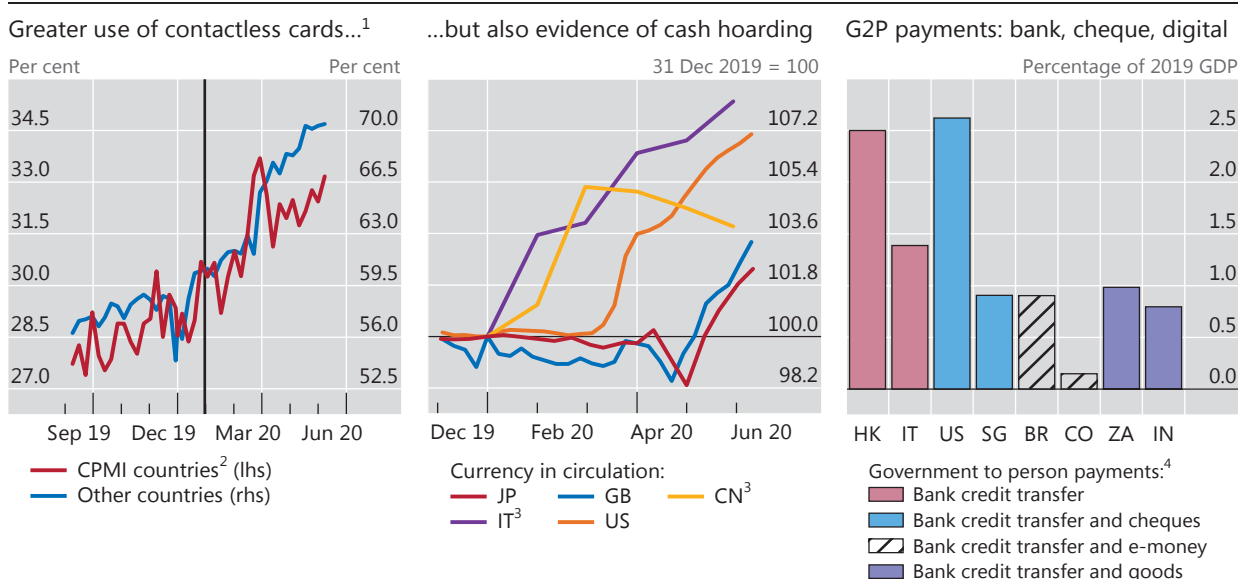
The underlying economics is best conveyed through the example of a town market, like those found in the public squares of many cities (Graph III.3). These

Payments amid the Covid-19 pandemic

The Covid-19 pandemic has led to marked changes in retail payments, for at least four reasons. First, public concerns about viral transmission from cash have risen.^① Scientific evidence suggests that risks are low compared with other frequently touched objects. Yet consumers in many countries have stepped up their use of contactless cards (Graph III.D, left-hand panel), and the pandemic could drive greater use of digital payments.^② Second, as in past periods of uncertainty (eg the expected Y2K glitch in 2000 and the Great Financial Crisis of 2007–09), precautionary holdings of cash have risen in some economies (centre panel) – even as its use in daily transactions has fallen. Third, as physical stores temporarily closed, e-commerce activity surged.^③ Fourth, cross-border transactions have collapsed. As mobility dropped, cross-border credit card transactions by Visa fell 19% in March 2020 relative to the same month in 2019, and remittances are projected to fall by about 20% in 2020 as migrants face job loss and uncertainty.^④

Payment behaviour is changing in the pandemic

Graph III.D



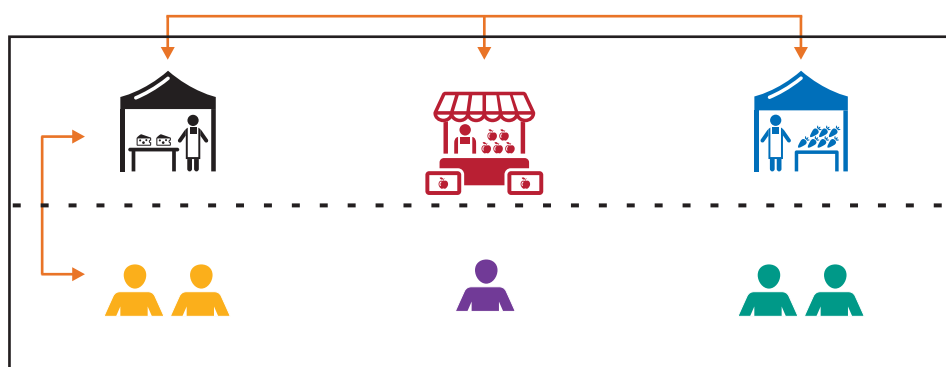
The black vertical line in the left-hand panel indicates 30 January 2020, when the World Health Organisation (WHO) declared the Covid-19 outbreak a “public health emergency of international concern”.

¹ Share of contactless in all card-present transactions by a global card network. In many countries, transaction limits for contactless payments were raised in Q2 2020. ² Excludes MX and TR due to data availability. ³ Monthly series. ⁴ For IN, IT and US, government-to-person (G2P) payments include expanded unemployment benefits. For IN, this includes distribution of grain and cooking gas.

Sources: Federal Reserve Bank of St Louis, FRED; IMF, *World Economic Outlook*; IMF; Datastream; KPMG; a global card network; BIS calculations.

The pandemic has highlighted both progress and shortcomings in payments. Digital payments have allowed many economic activities (eg purchase of groceries and other essential goods) to continue online during the pandemic. Yet due to unequal access, low-income and vulnerable groups face difficulties in paying or receiving funds. Some central banks have warned that refusal by merchants to accept cash could place an undue burden on those with limited payment options.^⑤ To reach the unbanked, some government-to-person (G2P) payments have relied on paper cheques, which take longer to process and may pose higher risks of fraud than bank transfers. Elsewhere, authorities have used new digital payment options (Graph III.D, right-hand panel). The crisis has amplified calls for greater access to digital payments by vulnerable groups and for more inclusive, lower-cost payment services going forward.

① See R Auer, G Cornelli and J Frost, “Covid-19, cash and the future of payments”, *BIS Bulletin*, no 3, 3 April 2020. ② See M Arnold, “Banknote virus fears won’t stop Germans hoarding cash”, 25 March 2020. ③ See L Leatherby and D Gelles, “How the virus transformed the way Americans spend their money”, 11 April 2020. ④ See Visa, “Form 8-K”, 30 March 2020; and World Bank, “World Bank predicts sharpest decline of remittances in recent history”, 22 April 2020. ⑤ See Bank of Canada, “Bank of Canada asks retailers to continue accepting cash”, 13 April 2020; and Reserve Bank of New Zealand, “Cash and other payment systems ready for COVID-19”, 19 March 2020.



The diagram illustrates an open marketplace with free entry and competition. The figures below the dashed line represent the buyers. The stalls above the dashed line represent the sellers. There are strategic complementarities between sellers and buyers, where one side attracts more of the other side (standard two-sided markets) and also between the sellers of different products and services.

Source: BIS elaboration.

markets offer sellers a public space in which to set up their stalls, and customers the opportunity to explore and sample the wares of a range of sellers. Such a marketplace is a network with positive externalities between sellers and buyers. The prospect of more buyers visiting the market makes it more attractive for sellers, and vice versa.

These markets can generate spillover benefits between participants while at the same time preserving competition. The stallholders who sell vegetables compete with each other on the price and quality of produce. However, when there are stallholders selling different goods, they will all directly benefit from the induced arrival of new buyers. For instance, cheese merchants will attract buyers of cheese, but these cheese buyers are also potential customers for the vegetable sellers. In this way, sellers may actually benefit from the presence of other sellers, ie there are so-called “strategic complementarities” *between* sellers. In this way, when sellers offer differentiated goods, the entry of a seller offering new products may generate benefits for the *other* sellers due to the new buyers attracted to the market as a whole.

Moreover, town markets can benefit from a public infrastructure that helps level the playing field. The town market in a public square can be seen as a publicly provided platform where service suppliers and users can interact freely to reap economic benefits. In order to achieve this, artificial barriers or other impediments to the interactions of buyers and sellers are eliminated. Nevertheless, sellers will be subject to minimum standards. Public authorities that operate the market also set rules for operating hours, organisation of stands, price transparency, and food quality and safety.

Payment systems are like town markets. The vegetable sellers and the cheese sellers correspond to the PSPs, while the buyers correspond to the users of payment services. These PSPs may offer differentiated products to customers by bundling other digital services, such as e-commerce, ride hailing or messaging and social media services, with basic payment functionality. In that case, since users value these services differently, their bundling with payment functionality is analogous to the contemporaneous presence of cheese and vegetable sellers in the town market.

The network effects between PSPs and users in the payment system is apparent from this analogy. A large potential user base attracts PSPs that wish to cater to the users, while a rich selection of PSPs will attract more users. Just like the sellers in the town market that sell the same good, PSPs that provide similar offerings will compete on price and quality.

And just like town markets, payment systems may benefit from public infrastructure. Here, central banks can provide the core foundation of payment systems in ways to promote economic gains for users. One example is the development in recent years of fast retail payments that settle on the central bank's balance sheet. As with the town market, such a system is a platform operated by the central bank or a public utility. Like sellers in town markets, PSPs in such systems offer a range of services to the public. Central banks set technical standards, operating hours and other rules. They can endorse or require the use of common addressing standards, open APIs for data sharing and other elements to ensure a competitive level playing field as well as interoperability between PSPs. This allows the users of one PSP to benefit from access to other users who are customers of another PSP.

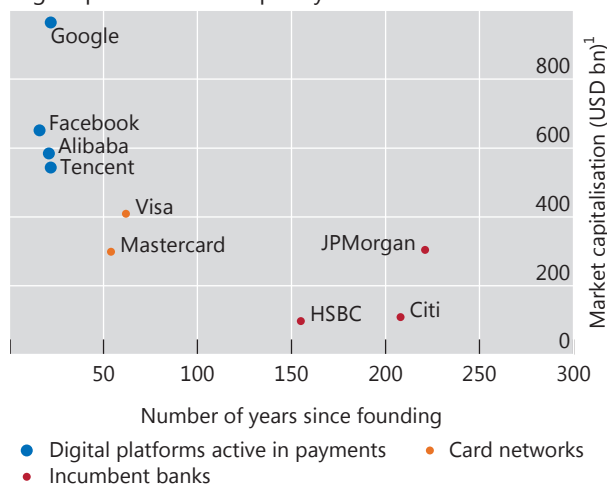
We may contrast the town market with a full-service department store that offers a similar range of products, but within the confines of the single store. Such a department store can be compared to PSPs that offer the full range of differentiated services, but exclude other PSPs' offerings. When visiting one particular department store, the buyer cannot purchase products from a rival one. Thus, even if the department store (the PSP) offers a full range of goods, there is no guaranteed interoperability with another PSP.

The analogy with full-service department stores in the payment context is firms that harness the data-network-activities (DNA) loop to exclude competitors.³⁴ In this case, the nature of competition becomes one *between* platforms – “platform competition” for short. Competition between firms with large, established digital platforms characterised by scalability and a broad user base can tip in favour of a dominant player or a small number of such dominant players who can achieve market power in payments very quickly (Graph III.4, left-hand panel). As the platform and its

Digital platforms differ from traditional networks

Graph III.4

Digital platforms scale quickly...



...due in part to their characteristics

Traditional network	Today's digital platform
Network externalities	✓
Economies of scale and scope	✓
High fixed cost	✗
Low marginal cost	✓ May be even lower
✗	Fully digital
✗	Aggregator of data
✗	Broad user base

¹ As of 12 June 2020.

Sources: Companies' websites; Refinitiv Eikon; BIS elaboration, building on M Brunnermeier, H James and J-P Landau, "The digitalization of money", *NBER Working Papers*, no 26300, August 2019.

range of activities grow, the greater attraction of the platform fosters a DNA feedback loop. As a result, competitors that lack interoperability with that platform will be at a competitive disadvantage and will shrink. These types of markets are particularly prone to “tipping”, when a single firm reaches a critical mass of users in its network, threatening to dominate the market by attracting all (or most) users. And, once dominant, they can entrench their position. They can do so for instance by using their competitive advantage in data to cross-subsidise services and retain customers.

Big tech and fintech firms, whose core strategy centres on technological innovation and personal data, represent a major competitive threat to incumbent PSPs. Their digital platforms embody the traditional characteristics of networks (ie network externalities, economies of scale and scope, large fixed costs of building the network, and low marginal cost of adding new users) alongside additional features (Graph III.4, right-hand panel). Firms with large digital platforms can leverage their platform to aggregate large quantities of data to further target their services; offer great diversity to users thanks to the cross-service nature of their technology; and develop links between different activities as they exploit data – the key input to their activities. Payment services become easy add-ons, given a broad user base, across both services and borders, and no need for a physical presence (ie bank branch offices). In such instances, and in order to preserve fair competition and drive further efficiency in payments, central bank interventions may be needed.

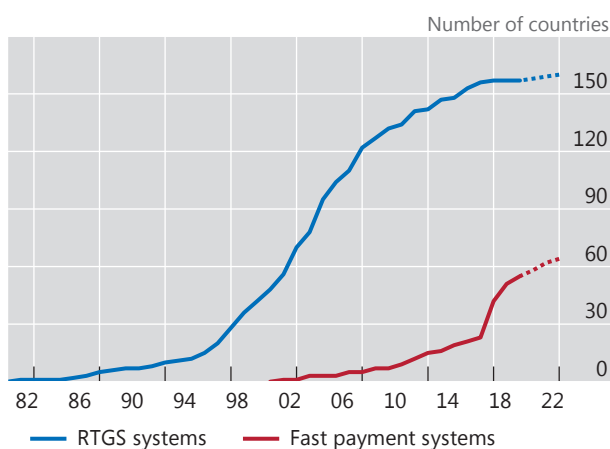
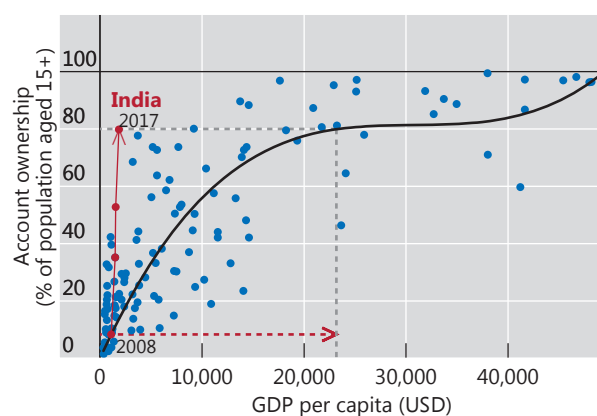
Central bank policies to improve efficiency

The combination of traditional and new market failures calls for central bank policy approaches that combine a number of roles. In their role as operator, many central banks directly offer and run payment infrastructures. As catalyst, central banks can support interoperability to foster competition. As overseer, central banks (and other authorities) may develop and implement new policies and standards. Finally, central banks could combine these elements to support the development and introduction of CBDCs. In all cases, central banks need to ensure the safety and integrity of the payment system.

As operator: providing public infrastructures

Central banks’ direct provision and operation of public infrastructures can promote competition, reduce rents and support high standards of safety and risk management. As an example, currently 55 jurisdictions offer fast (or near instant) retail payments (Graph III.5, left-hand panel). Central banks run or play a key operational role in many such systems, such as TARGET Instant Payment Settlement (TIPS) in the euro area, the Faster Payment System (FPS) in Hong Kong SAR, Cobro Digital (CoDi) in Mexico and PIX in Brazil. In India, the unified payments interface (UPI) was set up with central bank guidance and support. New initiatives like the open-source Mojaloop software may allow further progress while avoiding dominance by a few players.³⁵ The spread of fast retail payment systems is following a similar trajectory to that of wholesale real-time gross settlement (RTGS) systems two decades ago.

As providers of public infrastructures, central banks leverage new technology to improve and enhance payment systems. In the United States, the Federal Reserve has announced FedNow, a proposal for a fast payment system that would deliver real-time retail interbank services around the clock. The Bank of England is updating its wholesale payment system with an eye to enabling digital interoperability, eg with tokens.

Diffusion of fast payments¹Account ownership rises with income, but countries can leapfrog with new digital ID infrastructures²

¹ The dotted part of the lines corresponds to projected implementation. ² Data for 2011, and (for India) 2008 (estimate), 2011, 2014 and 2017.

Sources: D D'Silva, Z Filková, F Packer and S Tiwari, "The design of digital financial infrastructure: lessons from India", *BIS Papers*, no 106, December 2019; BIS, "Analysis of the 2018 Red Book statistics", November 2019; CPMI Survey; FIS, *Flavors of Fast report*, 2018; IMF, *World Economic Outlook*, October 2019; World Bank, Findex data; *Instapay*; national data.

These improvements are also designed to mitigate threats – both existing and emerging – to the safety and security of payment systems. Events over the past several years highlight how payment fraud is becoming increasingly sophisticated. The Committee on Payments and Market Infrastructures (CPMI) has developed a comprehensive strategy to reduce the risk of wholesale payment fraud related to endpoint security.³⁶ For retail payments, preventing payment fraud is a critical element of consumer protection.

An additional component of the public infrastructure, closely related to core payment systems in some jurisdictions, is digital identity (ID) systems. Such systems can help improve access, cost and quality in payments, including by enhancing financial inclusion. Government-provided digital ID systems, such as Aadhaar in India, MyInfo in Singapore and e-identity in Estonia, have facilitated compliance with anti-money laundering and combating the financing of terrorism (AML/CFT) rules and reduced onboarding costs.³⁷ In many instances, the central banks have promoted the use of digital ID systems; in others, private sector initiatives have also played a role.³⁸

The combination of publicly provided digital ID and an open API payment network is especially powerful. In India, such a combination has brought a large share of the previously unbanked into the formal financial system and lowered the costs of opening accounts.³⁹ By mandating bank accounts to link to Aadhaar for authentication, the Reserve Bank of India (RBI) has facilitated this progress. Account ownership rose from roughly 10% to 80% over 2008–17 – a level comparable to that of countries with much higher GDP per capita (Graph III.5, right-hand panel).

Central banks can also enhance competition by expanding participation of non-bank PSPs in their systems. Historically, participation has primarily been limited to banks, counterparties to a central bank's open market operations and government agencies. Over the past two decades, however, central banks have significantly increased participation in settlement accounts in terms of both the type of entity (beyond banks) and domicile (ie beyond domestic entities).⁴⁰ Initially,

access was extended to financial market infrastructures (FMIs) and central counterparties and subsequently, in some countries, to non-bank PSPs. More recently, prospective providers of digital tokens and new forms of banks have started to approach some central banks. In the United Kingdom, Switzerland, Singapore, Hong Kong SAR and China, central banks have also granted access to non-banks, albeit on a more limited scale than for banks.⁴¹ That said, such steps are not universal. In some jurisdictions, notably the United States and Japan, participation is still restricted to banks.

Ultimately, whether a jurisdiction decides to expand participation to non-bank PSPs depends partly on inherited institutional, legal and economic factors that differ across countries. Even so, with the emergence of new private sector payment technologies, some jurisdictions may have scope to revisit this policy. The benefits of enhanced eligibility include boosting competition. Costs include the introduction of new risks, particularly if new players are subject to less stringent regulation than banks. Broader access could also have consequences for monetary policy implementation and lender of last resort policies.

As catalyst: promoting interoperability

Interoperability is the technical and regulatory compatibility that enables one system to work seamlessly with others. It can help level the competitive playing field, further enhance efficiency directly, and support entry and innovation. In our town market analogy, interoperability corresponds to having an open market where buyers can approach many different stallholders. It includes the adoption of the food and safety standards that merchants observe when advertising and selling their wares, and underpins transparent pricing. Similarly, payment system interoperability allows participants in different systems to execute, clear and settle payments or financial transactions across those systems.

True interoperability may not always occur without public intervention. Here, the central bank has a critical catalytic role. By operating the core of the infrastructure – the foundation – the central bank controls a vital part of the payment chain and plays an important role in defining the standards for interoperability. In a two-tier system, commercial banks process and communicate with the underlying payment infrastructure that the central bank provides so as to allow settlement on its balance sheet. In the presence of closed-loop, vertically integrated systems, such as Alipay, the role of the central bank is still essential to allow settlement between firms on a net basis.

A number of initiatives to improve interoperability in payments are under way. Open banking is one important initiative, supported and encouraged in a number of jurisdictions by the central bank. Open banking allows users to authorise financial service providers to access their financial transaction data held at other providers, using secure online channels and APIs. Its goal is to promote a level playing field and reduce or eliminate closed, proprietary networks of individual service providers, including for payments. While APIs have been around since the 1960s, they have stepped into the mainstream and are now critical to promoting competition among digital platforms. To facilitate access, APIs need to have common standards and be open. In many jurisdictions, central banks and regulators have facilitated these initiatives, eg by publishing open API standards and technical specifications.⁴²

Making payment options expedient for consumers requires interoperability between different payment instruments and arrangements. While some forms of interoperability simply improve the user's experience, others are essential. For payment systems, interoperability can be vertical and/or horizontal. Vertical interoperability, ie along the payment chain, is a technical necessity. By connecting

the front end to the back end – or core infrastructure – of the system, it allows the parts of the chains offering different and complementary services to work together. For person-to-person payments, for example, front-end processors (such as Zelle in the United States) capture and authorise the payment from users. They then communicate with the back-end processors, which in turn move the money from the sender's bank to the receiver's bank, by connecting to the clearing and settlement systems.⁴³

Horizontal interoperability, on the other hand, allows competing PSPs to interact in a way that is conducive to a competitive level playing field. By analogy with the town square market, many types of sellers and buyers can all interact in the common marketplace. Horizontal interoperability may exist at different points along the payment chain. Front-end mechanisms that enable customers and merchants to use different payment services are convenient. For example, one interoperable point-of-sale interface is preferred over separate interfaces for each brand of credit card. But interoperability across different back-end infrastructures is necessary to enable smooth interoperation of payments across different platforms and the seamless transfer of different settlement assets.

If a single platform captures a large market share at the front end, it has no incentive to become horizontally interoperable. This presents an acute challenge in the presence of digital platforms. While such platforms may have interoperability within their system – for example, to offer additional services to their users – they will tend to limit horizontal interoperability if the market for the specific service has already tipped in their favour. Such platforms may offer (temporarily) low prices (even below cost) in one business line to build up market share in another. They may also seek to acquire competitors directly or partner with banks.⁴⁴ Adding payment services helps to retain customers in their “zone”, while bundling services with payments attracts new customers. The recent spike in merger and acquisition activity by large digital payment firms (Graph III.6), particularly large horizontal acquisitions, ie acquiring competitors, suggests this possibility.

Domestically, markets and authorities continuously work to harmonise the multiplicity of standards and procedures. For example, when ATM networks were first developed in many countries, customers had to use their particular ATM network, as other networks would not accept the cards. However, over time, and due to competition as well as legal and regulatory actions, these networks became better linked, offering more choice, lower prices and greater convenience.⁴⁵

Payment systems and, more generally, FMs around the world are becoming more standardised. They are implementing a common industry standard (called ISO 20022) for sending cross-border payment messages. Yet standards alone are insufficient to achieve full interoperability; they call also for coordinated efforts to minimise variability in implementation. For example, SWIFT, a global provider of financial message services, has launched an industry programme to reduce variability in the deployment of ISO 20022.

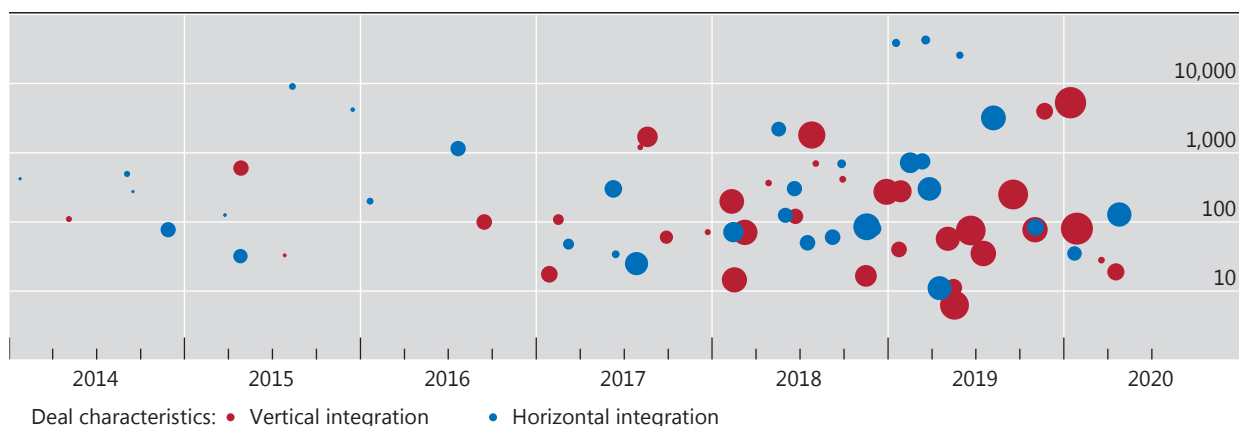
Across borders and payment systems, achieving interoperability is more complex when it requires joining or linking separate infrastructures. While such interlinking arrangements are not new, they are relatively rare and the volumes and values processed by existing interoperable systems are often still very low (both in absolute terms and relative to domestic systems).⁴⁶

Interoperability initiatives are unlikely to develop spontaneously. The public sector has a pivotal role as catalyst to support standardisation and open access. Indeed, central banks (and other public sector authorities) are working to enhance interoperability in a number of ways. In the United Kingdom and the European Union, for example, the authorities have focused on developing standards on uniform address formats and open APIs. These efforts allow consumers to “port”

Merger and acquisition (M&A) activity by selected global payment platforms

Purchase price in millions of US dollars, logarithmic scale

Graph III.6



For 2020, data up to 31 May 2020. Each dot represents an M&A deal by Ant Financial, Fidelity National Information Services (FIS), FISERV, Global Payments, Mastercard, PayPal, Square or Visa as collected by PitchBook and Refinitiv Eikon. This excludes divestitures and intra-company operations. M&A deals are classified as “vertical” when the acquiring and the target firm operate at different stages along the same payment chain, as determined by company reports. In “horizontal” deals, the acquiring and target firm are direct competitors in at least one key business line. The size of each dot is proportional to the acquiring company market capitalisation on the day of the deal or, in the case of Ant Financial, the valuation of Ant Financial as of end-2018, multiplied by changes in the market capitalisation of Alibaba Holdings relative to end-2018.

Sources: PitchBook Data Inc; Refinitiv Eikon; BIS calculations.

their data from one provider to another. Globally, ensuring that safety and integrity standards are common and robust and that measures are consistently implemented is paramount. For example, the Financial Action Task Force (FATF) standards for combating money laundering and related threats to the integrity of financial systems are recognised by and applied in nearly every country in the world.

Even with public sector intervention, making payment systems interoperable poses considerable difficulties. This is especially the case when changes are required to legacy IT systems, either in infrastructures or at individual institutions. Differences in the development and implementation of API standards across borders have also created complications. As with implementation of new standards, a number of legal and regulatory issues need to be resolved, including with regard to customer consent to share data and liability if a consumer is harmed by misuse of data. Across borders, differences in the development and implementation of APIs are particularly challenging and could hinder efforts to achieve interoperability.⁴⁷

The G20 has made enhancing cross-border payments a priority in 2020 and has asked the Financial Stability Board (FSB) in coordination with the CPMI to lead the work to address cross-border payment frictions. The identified frictions include fragmented and truncated data formats, complex processing of compliance checks, limited operating hours, legacy technology platforms, long transaction chains, funding costs and weak competition. Potential solutions to alleviate these frictions focus on areas such as public and private sector commitment; regulatory, supervisory and oversight frameworks; data and market practices; as well as improvements to existing and new payment infrastructures and payment arrangements.⁴⁸

As overseer: guiding and regulating

History shows that legislation and regulation can promote innovation by altering incentives for the private sector and by influencing market structure. Central banks

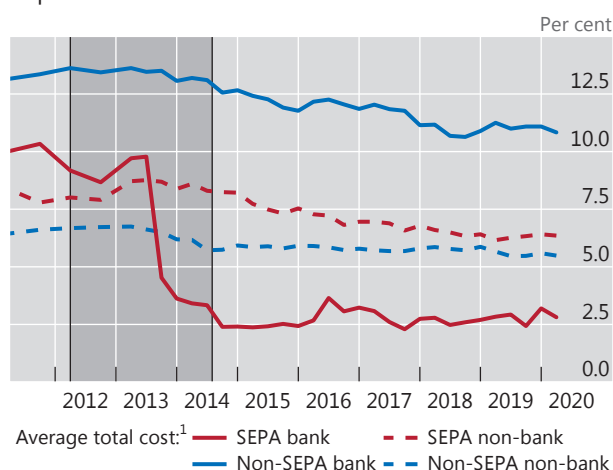
have often played a role in advising on, writing or implementing such rules. That said, lessons from other network industries indicate that market dominance is not easily remedied and requires continuous policy interventions. The US telecommunications industry presents an instructive example.⁴⁹ In the 1980s, US anti-trust authorities required the monopoly player (AT&T) to divest its local subsidiaries. As anti-competitive issues persisted, the public sector passed legislation to promote competition at all service levels. While the emergence of new communication channels, such as internet and mobile phone service, boosted competition, this alone was insufficient to promote robust competition in internet services. It took additional legislation about a decade later to foster it.

Policy can enhance efficiency and reduce costs. For example, the US Check 21 Act – a federal law effective in 2004, designed by the Federal Reserve – made cheque images legal tender, enabling banks to process cheques in a manner similar to debit cards. By doing away with the physical transportation of cheques, it made processing faster, cheaper and more efficient. Another example is the introduction of the Single Euro Payments Area (SEPA) for euro credit transfers and direct debits.⁵⁰ Under EU regulations, formulated with input from the ECB and national central banks, such payments and transfers between bank accounts in two different SEPA countries were to be priced equal to a regular, local transfer. As a result, the average cost of transfers in the zone declined substantially (Graph III.7, left-hand panel). A third example is use of caps on interchange fees. In the United States, fees on covered (regulated) debit card transactions fell dramatically after regulations took effect in 2011, while those on exempt cards remained stubbornly high, even after nearly 10 years (right-hand panel). More generally, across countries where authorities have introduced caps on credit and debit card fees, costs are lower than elsewhere for any given degree of competition (Graph III.8).⁵¹

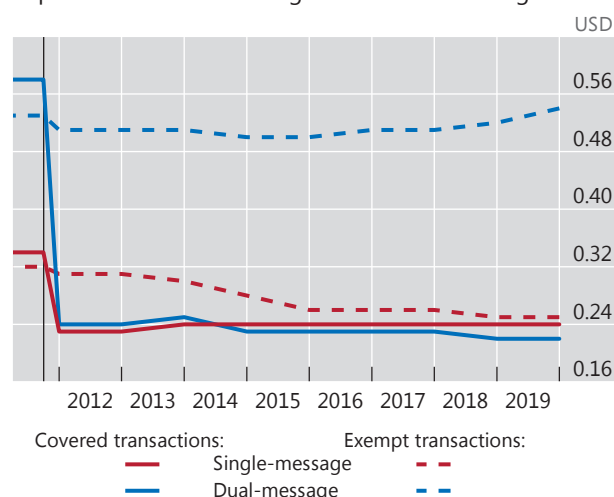
Mandating change: policy interventions can lower payment costs

Graph III.7

Impact of SEPA on cross-border remittance costs



Impact of US debit card regulation on interchange fees²



The vertical lines delimiting the shaded area in the left-hand panel indicate 31 March 2012 (entry into force of [regulation \(EU\) no 260/2012](#)) and 1 August 2014 (end date for the migration of domestic and intra-European credit transfers and direct debits in euros to the new SEPA standard). The vertical line in the right-hand panel indicates 1 October 2011 (Regulation II (Debit Card Interchange Fees and Routing) takes effect).

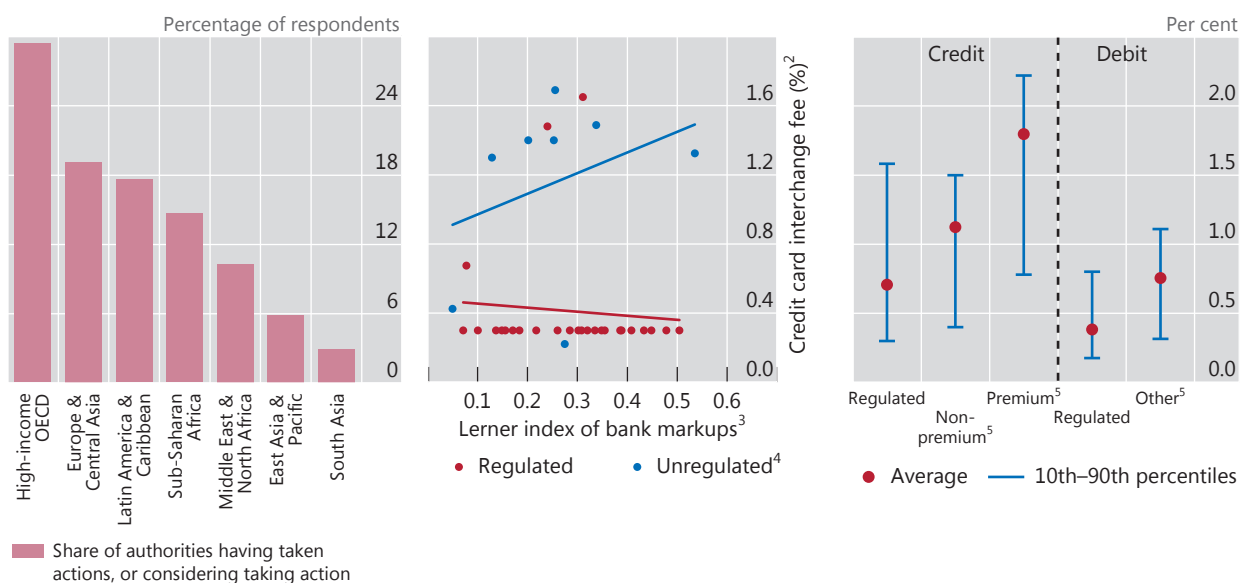
¹ Average total cost of sending \$200 or euro equivalent. For bank costs, average of bank, bank and other provider cost. Based on 13 SEPA member countries and 99 countries not participating in the SEPA. ² Average interchange fee per transaction.

Sources: [Board of Governors of the Federal Reserve System](#); World Bank, *Remittance Prices Worldwide* (remittanceprices.worldbank.org); BIS calculations.

Many authorities took actions...¹

...leading to lower interchange fees...

...for both credit and debit cards



¹ Based on survey responses from 68 countries. ² On retail face-to-face transactions. ³ The Lerner index measures market power in the banking sector; higher markups imply a less competitive market. The index has been extrapolated from World Bank data using estimates from Igan et al (2020). Data for 2017. ⁴ Average of Mastercard and Visa non-premium card retail face-to-face interchange fees. ⁵ Average of Mastercard and Visa cards.

Sources: F Hayashi, S Minhas and R Ruiz, "Credit and debit card interchange fees in various countries", Federal Reserve Bank of Kansas City, *Payments System Research*, August 2019; D Igan, M Martinez Peria, N Pierri and A Presbitero, "When they go low, we go high? Bank market power and interest rates", *IMF Working Papers*, forthcoming, 2020; World Bank, *Global Payment Systems Survey*, 2018; World Bank; BIS calculations.

Digital platforms raise challenges for traditional anti-trust or market power analysis. Today, the price structure of platforms does not conform to textbook models of monopoly pricing (eg when they offer "free" services in exchange for the provision of data). Likewise, even where prices for retail customers are declining, lack of competition may be slowing innovation.⁵² Thus, there is a need to reassess regulatory approaches, including by looking across platforms globally and enhancing cooperation among central banks and other authorities.

Ensuring safety and integrity

Any policy action must take into consideration the safety and integrity of the payment system. This relies heavily on work conducted by multiple authorities. Legal, professional and ethical standards are key. Compliance with anti-money laundering standards is critical for integrity. Digital ID, electronic know-your-customer (KYC) systems and a variety of regtech and supotech applications have reduced the costs of ensuring AML/CFT compliance.⁵³ That said, diligence is needed to ensure that compliance remains strong.

Cyber security is another priority. As perpetrators become increasingly sophisticated, the risks that cyber threats pose to financial stability are escalating.⁵⁴ In this context, the level of cyber resilience, which contributes to payment systems' operational resilience, can be a decisive factor in the overall resilience of the financial system and the broader economy. The CPMI and the International Organization of Securities Commissions (IOSCO) have published detailed guidance

on cyber resilience for financial market infrastructures, and the FSB has developed effective practices for cyber incident response and recovery.⁵⁵

Innovation is introducing new issues in consumer protection – that is, in preventing unfair, deceptive and fraudulent business practices. New payment products may have hidden costs, and faster or more convenient services may also speed up theft.⁵⁶ Public authorities regularly cooperate to see that consumers know their rights and how to respond when they may have been abused.⁵⁷

Alongside these innovations come calls for adjustment to data privacy regulation. New technologies make greater use of personal (payments) data. But for good reason, such data are often well protected with privacy rules, which in turn influence access, cost and quality.⁵⁸ The balance between efficiency and privacy goals will vary across jurisdictions. Some consumers attach a high premium to their data privacy. Others are more willing to share data if this improves financial services (Graph III.9, left-hand panel).⁵⁹ The use of personal data in the current pandemic, including for contact tracing, may change views towards privacy.⁶⁰ Regardless, policy interventions should help safeguard consumers' desire for privacy without unnecessarily increasing costs and making institutions less willing to serve financially excluded populations.

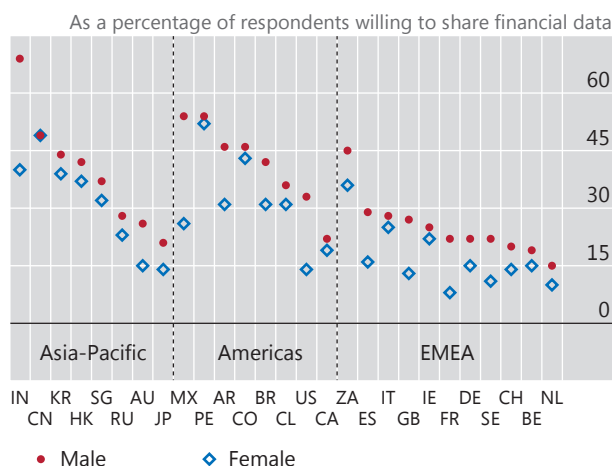
At the same time, digital innovation can also support broader policy goals. For instance, greater use of digital payments goes hand in hand with a smaller informal economy (Graph III.9, right-hand panel). Creating a digital record of payments can allow businesses and individuals to build up a transaction data history to access credit and other financial services. In addition, it can make tax collection, law enforcement and social protection more effective, as well as expand the coverage of supervision and regulation of financial services.

To achieve their policy objectives, central banks will need to cooperate with other bodies. Securities regulators, competition authorities, financial intelligence

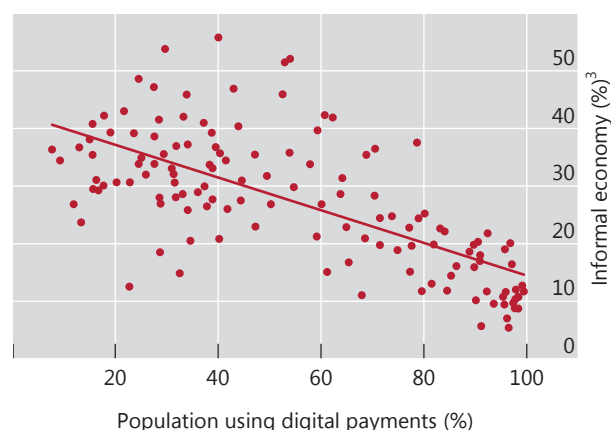
Digital payments create a data trail, bringing both risks and benefits

Graph III.9

Views on data privacy differ across and within societies¹



The informal economy is smaller where digital payments are more widely used²



¹ Based on a survey of 27,000 individuals across 27 countries. The exact question reads: "I would be comfortable with my main bank securely sharing my financial data with other organisations if it meant that I received better offers from other financial intermediaries". For Belgium, the figure covers Belgium and Luxembourg. The dots visualise the percentage of respondents answering the question affirmatively. EMEA = Europe, the Middle East and Africa. ² Data as of 2017. ³ Estimates of the informal ("shadow") economy based on a multiple indicator–multiple cause approach.

Sources: S Chen et al, "Data versus privacy: the role of gender and social norms", *BIS Working Papers*, forthcoming, 2020; EY, "FinTech adoption index", September 2019; L Medina and F Schneider, "Shedding light on the shadow economy: a global database and the Interaction with the official one", *CESifo Working Papers*, no 7981, 2019; World Bank; BIS calculations.

units and consumer and data protection authorities also have regulatory interests in and influence on various aspects of payment services. Addressing the various policy objectives requires striking a delicate balance, as well as cooperation and coordination. Arrangements between these agencies to exchange views and collaborate on relevant issues are key.

CBDC: designing safe and open payments for the digital economy

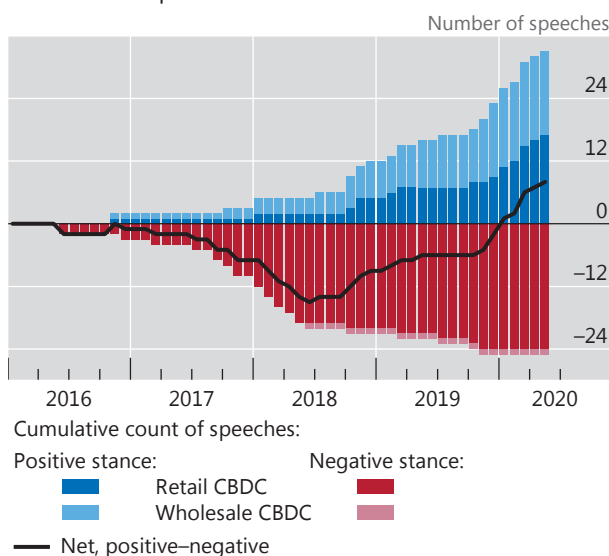
CBDCs are a prime example of how central banks can stand at the cutting edge of innovation themselves. Technology – in particular, in the field of digital currency – opens up opportunities for payment systems. CBDCs combine this innovative technology with the tried and trusted foundation of the central bank. It is central banks' choice to harness these forces for the common good. They can combine their role as catalyst, overseer and operator, and develop an entirely new set of payment arrangements that run on digital currencies.

CBDCs have the potential to be the next step in the evolution of money, but a thoughtful approach is warranted. CBDC issuance is not so much a reaction to cryptocurrencies and private sector "stablecoin" proposals, but rather a focused technological effort by central banks to pursue several public policy objectives at once. These objectives include financial inclusion; guaranteeing safety and integrity in digital payments; establishing resilient, fast and inexpensive payments; and encouraging continued innovation in payments.

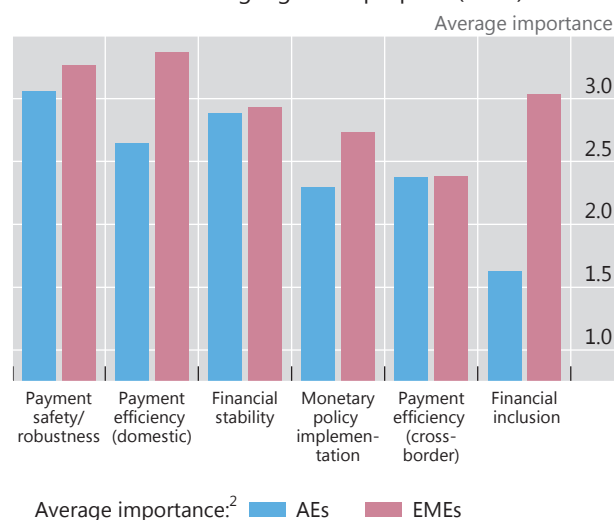
Wholesale digital money is not new – the financial sector has had direct access to such central bank money for decades. However, a wholesale CBDC, if well designed, has the potential to increase efficiency. For example, "programmability" could enable the automatic and near instant delivery of a traded security once a payment is received and verified. In this way, a wholesale CBDC can enhance safety and speed and potentially simplify the post-trade clearing and settlement cycle.⁶¹ A wholesale CBDC could also help mitigate the risk of fraud and cyber attacks; in particular, its technology could improve the irrevocability of digital record-keeping.

The implications of a retail CBDC would be more far-reaching. Such an innovation would provide general users with direct access to central bank money, and potentially offer a safe, reliable and universally accessible settlement instrument – just as cash does now. The benefits would have to be carefully weighed against the implications for the functioning of the financial system, such as the risk of disintermediation, including accelerating bank runs at times of stress, and a potentially larger central bank footprint in the financial system.⁶² The monetary policy implications would also warrant attention. In contrast to cash, retail CBDCs could be interest-bearing, influencing monetary policy transmission, including by reducing the effective lower bound on nominal policy rates.

Over the last several years, central banks and policymakers have become more favourably disposed towards issuance of wholesale and retail CBDCs.⁶³ They have featured more positively in central bank communications since late 2019 (Graph III.10, left-hand panel). The motivations for retail CBDCs are numerous and vary across jurisdictions. A 2019 survey of 66 central banks revealed that safety and efficiency of domestic payments are most important, while inclusion is a key motive among emerging market and developing economies (right-hand panel).⁶⁴ Recently, the need to address the declining use of cash has received increasing attention. As consumers migrate to electronic payments, for online transactions as well as in-person purchases, cash usage is declining precipitously in some jurisdictions.⁶⁵ The Covid-19 crisis, and the attendant rise of electronic payments, are likely to boost CBDC development across the globe (Box III.D).

Central bank speeches on CBDC¹

Motivations for issuing a general purpose (retail) CBDC



¹ Search on keywords “CBDC”, “digital currency” and “digital money”. The classification is based on authors’ judgment. The score takes a value of –1 if the speech stance was clearly negative or in case it was explicitly stated that there was no specific plan at present to issue digital currencies. It takes a value of +1 if the speech stance was clearly positive or a project/pilot was launched or was in the pipeline. Other speeches (not displayed) have been classified as neutral. ² 1 = not so important; 2 = somewhat important; 3 = important; and 4 = very important.

Sources: R Auer, G Cornelli and J Frost, “The rise of central bank digital currencies: drivers, approaches and technologies”, forthcoming, 2020; C Boar, H Holden and A Wadsworth, “Impending arrival – a sequel to the survey on central bank digital currency”, *BIS Working Papers*, no 107, January 2020.

Technically, a successful retail CBDC would need to provide a resilient and inclusive digital complement to physical cash. As such, a CBDC must have all the features and more that make cash so attractive. The basic elements are trust in the issuing entity, legal tender status, guaranteed real-time finality and wide availability. But a CBDC must also be equivalent to cash in other dimensions. First, CBDCs need to be user-friendly. Schoolchildren, seniors, and every age group in between handle banknotes and coins with ease; some central banks have even designed features to make banknotes accessible for the blind.⁶⁶ Second, CBDCs must be highly resilient to infrastructure outages and cyber attacks. Such events could wreak havoc if there was a disruption to electronic payments and cash was no longer generally used. Third, CBDCs need to guarantee the safety and integrity of payments. Just like cash, they need to be counterfeit-proof. And just like other digital means of payment, they need to safeguard the user’s privacy while allowing for effective law enforcement. There are opportunities with CBDCs to improve tracing and potentially improve anti-money laundering compliance. But societies’ preference may differ regarding how to balance better tracing with privacy protection.

More generally, CBDCs can coexist with both cash and current electronic payment options. They could be made fully consistent with the two-tiered payment system, allowing the public and private sectors to focus on their respective comparative advantages. Central banks can focus on ensuring trust, stability and integrity in payments. For their part, the private sector is best placed to undertake the consumer-facing activity of CBDCs. Designs would need to mitigate the risk of funds flowing out of banks and into the CBDC, in particular in times of stress. One possibility that is worth exploring is remunerating CBDC holdings at a lower interest rate than the rate paid on commercial bank reserves at the central bank.⁶⁷

Alternatively, central banks could restrict the amount of CBDC that households and businesses can hold, eg through caps.⁶⁸

A substantial role for the private sector raises the need to guarantee compliance with regulatory standards, ensure open competition and allow innovation to flourish. The central bank may grant private sector intermediaries the privilege to distribute CBDC to retail clients, but new entrants and new technologies will be subject to existing regulatory standards. A level playing field is necessary for the sake of incumbents, but also for newcomers. And the technical design and accompanying legal framework should ensure open competition among the various private sector intermediaries, including by avoiding the creation of closed-loop payment systems or introducing frictions when consumers want to switch providers. Guaranteeing open competition also pertains to the collection, use and sharing of data. In particular, starting with a clean slate, the CBDC design should find a new balance between allowing for data portability, safeguarding privacy and mitigating the risks of money laundering and illicit financing.

Ensuring that the retail CBDC allows for ongoing competition requires not only open competition, but also that the central bank operate an infrastructure that fosters innovation. This calls for a flexible and adaptable central bank-operated infrastructure. PSPs must be able to access the CBDC via multiple channels, including back-end interfaces and APIs. A level playing field in terms of access combined with adaptability should foster private sector innovation.

If the CBDC design succeeds in taking these various considerations into account, central banks could harness technological progress in the field of digital currencies and offer a stable and trusted digital unit of account, with guaranteed finality of payments. In this way, CBDCs could become a complementary means of payment that addresses both specific use cases and market failures as well as a catalyst for continued innovation in payments, finance and commerce at large.

That said, research on CBDCs is still in its early stages, and development efforts will take some time. Given their transformative nature, central banks are carefully considering all design options and determining which ones are the best fit for the specific circumstances of each jurisdiction. As insights advance, the exchange of information among central banks is critical. Through tight cooperation, central banks can benefit from peer learning and develop common approaches.

The BIS is closely supporting central banks in their CBDC research and design efforts (Box III.E). The institution is part of an international group of central banks assessing the potential case for CBDC issuance. The BIS Innovation Hub is developing a wholesale CBDC, which will allow for new forms of tokenised trading and settlements.⁶⁹ The BIS-based CPMI surveys global CBDC research and development efforts on an annual basis.⁷⁰ In its analytical publications, the BIS continues to shed light on the underlying economic and technological design challenges.

Conclusion

Central banks provide the solid foundation for payment systems, underpinning trust in money while supporting private sector innovation. Over centuries, in their roles as operator, catalyst and overseer, central banks have encouraged the private sector to provide payments that are safe, efficient and widely accessible. The innovations in money and payments that central banks have spurred have promoted increasingly efficient and convenient payments.

While the fundamental roles of central banks in payment systems will endure, payments will continue to evolve. Today, the digitalisation of the economy and

greater access to communication have hastened the replacement of cheques and cash with card and mobile payments. In many parts of the world, cash will continue to decline as a means of payment. Many technologies aim to improve payment access and security, including the use of biometrics. If anything, the demand for faster, more convenient and safer payments is likely to accelerate with the Covid-19 crisis.

Rapid technological progress presents central banks and other authorities with both options and challenges regarding how best to enhance efficiency and adapt payment systems. Across policy options, some general principles apply. First, competition and innovation, notably supported by interoperability, best encourage progress on access, cost and quality. When properly channelled, they can also improve safety. Second, to be successful, private sector innovation should be guided by the public sector with a view to improving efficiency and ensuring safety, integrity and trust. Third, cooperation between the public and private sectors, domestically and internationally, is paramount.

While authorities will foremost need to support competitive private sector markets that harness new digital technologies, new public payment instruments may gain traction. Central banks too can naturally play a key role. In particular, CBDCs, if properly designed, have the potential to give rise to a new payment mechanism that is interoperable by default, fosters competition among private sector intermediaries, and sets high standards for safety and risk management.

The current crisis may accelerate changes in payments – yet it also harbours new risks. Even though the pandemic has underscored the interdependence of countries, policy responses have been primarily national. As authorities have limited cross-border movement and implemented social distancing measures, international economic activity has come to an abrupt halt. Going forward, enhancing coordination and taking steps to prevent or reduce fragmentation in cross-border payment systems are public sector priorities. This is particularly important given that issues of competition policy and data privacy have so far been addressed primarily at the national level and in the light of the rising tide of economic nationalism.⁷¹

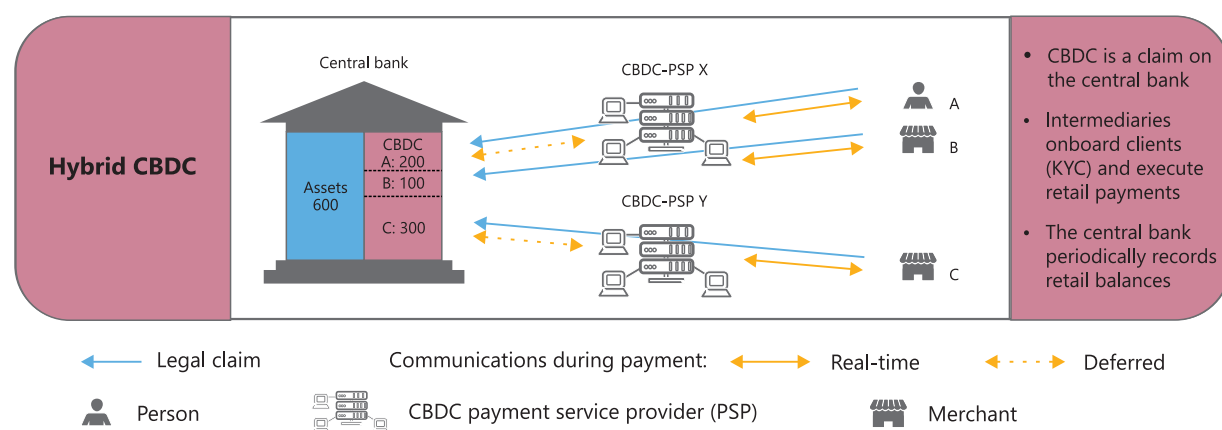
Here, too, central banks can be a force promoting international policy coordination, supporting not just domestic payment systems but, above all, their cross-border integration. In international committees such as the FSB and the CPMI, central banks can benefit from peer learning and develop common approaches. In international forums like the G20, central banks and governments can agree on mutually beneficial stances on payment policy. International coordination ensures that advancements in payments support greater efficiency and cross-border integration. International collaboration on innovative financial technology within the central banking community, such as through the newly established BIS Innovation Hub, is accelerating progress on these policy goals.

Designing retail CBDC: shaping the future of payments

The issue of how to design retail CBDCs was examined in the March 2020 BIS Quarterly Review dedicated to the future of payments.^① It shows that the bar for a technical design is high. The foundational design consideration for a CBDC needs to balance the operational role of the central bank and private intermediaries. Intermediaries can run into technical difficulties or solvency issues. A CBDC should be safe from such outages. CBDC payment intermediaries need to offer valuable services that have the same convenience, innovation and efficiency as in today's payments. One approach that makes for a safe means of payment while allowing the private-public partnership to continue is a "hybrid" CBDC. In this architecture, private intermediaries execute real-time payments and handle all customer-facing aspects, including ongoing customer due diligence. In addition, the central bank operates a backup infrastructure, enabling it to protect the payment system during a financial crisis or cyber attack (Graph III.E).

Hybrid CBDC architectures: a public-private partnership for the digital era

Graph III.E



Hybrid CBDC architectures aim to combine the benefits of direct claims on the central bank with the important services of private sector PSPs. A CBDC is a direct claim on the central bank, but PSPs onboard all retail clients, handle know-your-customer (KYC), anti-money laundering (AML) and customer due diligence and execute all payments in real time. The central bank acts as a backstop to the payment system. It retains a copy of all retail CBDC holdings and has the technical capability and legal power to transfer client relationships from one PSP to another in the event of insolvency or technical failure. For example, in the graph, should CBDC-PSP Y run into any such issues during a cyber attack, the central bank could switch customer C to CBDC-PSP X to guarantee working payments.

Source: R Auer and R Böhme, "The technology of retail central bank digital currency", *BIS Quarterly Review*, March 2020, pp 85–100.

^① See A Carstens "Shaping the future of payments", *BIS Quarterly Review*, March 2020, pp 17–20; R Auer and R Böhme, "The technology of retail central bank digital currency", *BIS Quarterly Review*, March 2020, pp 85–100; and R Auer, G Cornelli and J Frost, "Taking stock: ongoing retail CBDC projects", *BIS Quarterly Review*, March 2020, pp 97–8.

Endnotes

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- ² See M Bech and J Hancock, “Innovations in payments”, *BIS Quarterly Review*, March 2020, pp 21–36.
- ³ See N Kocherlakota, “Money is memory”, *Journal of Economic Theory*, vol 81, no 2, 1998, pp 232–51.
- ⁴ See N Kiyotaki and R Wright, “A search-theoretic approach to monetary economics”, *American Economic Review*, vol 83, no 1, 1993, pp 63–77; C Gu, F Mattesini, C Monnet and R Wright, “Banking: a new monetarist approach”, *Review of Economic Studies*, 80, 2013, pp 636–62; I Schnabel and H S Shin, “Money and trust: lessons from the 1620s for money in the digital age”, *BIS Working Papers*, no 698, February 2018; J Frost, H S Shin and P Wierds, “From stablecoin to proto-central bank: lessons from the rise and fall of the Bank of Amsterdam”, *BIS Working Papers*, forthcoming; U Bindseil, “Early French and German central bank charters and regulations”, ECB, *Occasional Paper Series*, no 234, September 2019; and C Borio, “On money, debt, trust and central banking”, *CATO Journal*, vol 39, pp 267–302, Spring/Summer 2019.
- ⁵ In the chapter, the terms “medium of exchange” and “means of payment” are used interchangeably.
- ⁶ See Committee on Payments and Market Infrastructures and International Organization of Securities Commissions (CPMI-IOSCO), *Principles for Financial Market Infrastructures*, April 2012, p 8.
- ⁷ See K Petralia, T Philippon, T Rice and N Véron, “Banking disrupted? Financial intermediation in an era of transformational technology”, *Geneva Report 22*, September 2019.
- ⁸ See BIS, “Cryptocurrencies: looking beyond the hype”, *Annual Economic Report 2018*, June, Chapter V.
- ⁹ See G7 Working Group on Global Stablecoins, *Investigating the impact of global stablecoins*, October 2019.
- ¹⁰ See BIS, “Big tech in finance: opportunities and risks”, *Annual Economic Report 2019*, June, Chapter III.
- ¹¹ See A Carstens, “The future of money and the payment system: what role for central banks?”, lecture at Princeton University, 5 December 2019b.
- ¹² For an in-depth discussion of the properties of a well functioning monetary system, defined as money plus the mechanisms to execute payments, see Borio (2019), op cit.
- ¹³ See Committee on Payment and Settlement Systems (CPSS), *The role of central bank money in payment systems*, August 2003.
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- ¹⁶ Volumes and values for large-value payment systems and retail cashless payment instruments. CH, RU, SA and ZA are not included because payment systems process both wholesale and retail; HK is not included due to data availability; and CN is not included due to differences in definitions. Source: CPMI, Red Book statistics.
- ¹⁷ The first credit card was Diner’s Club, introduced in 1950 and valid at 27 New York restaurants. It was popularised in the late 1950s by two US banks, eventually becoming a widely used payment technology. See T Wolters, “‘Carry your credit in your pocket’: the early history of the credit card at Bank of America and Chase Manhattan”, *Economy and Society*, vol 1, no 2, pp 315–54, June 2000.
- ¹⁸ For the case of big tech firms, see BIS (2019), op cit.

- ¹⁹ This is the proportion of domestic transactions in overall cashless transactions and cash withdrawals in the 27 CPMI jurisdictions. Source: CPMI, Red Book statistics.
- ²⁰ See World Bank, *The Global Findex Database 2017: measuring financial inclusion and the fintech revolution*, April 2018.
- ²¹ Source: World Bank Enterprise Surveys.
- ²² For an overview, see World Bank, *Retail payments: a practical guide for measuring retail payment costs*, November 2016.
- ²³ See McKinsey & Company, *Global Payments Report 2019: amid sustained growth, accelerating challenges demand bold actions*, September 2019.
- ²⁴ See European Commission, *Survey on merchants' costs of processing cash and card payments*, March 2015.
- ²⁵ See D Maurer, "An examination of the economics of payment card systems", Swiss National Bank, July 2009.
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- ²⁷ See CPMI, *Cross-border retail payments*, February 2018.
- ²⁸ A money transfer operator (MTO) is a non-deposit-taking payment service provider where the service involves payment per transfer by the sender to the payment service provider. See CPSS and World Bank, *General principles for international remittance services*, January 2007.
- ²⁹ See T Rice, G von Peter and C Boar, "On the global retreat of correspondent banks", *BIS Quarterly Review*, March 2020, pp 37–52.
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- ³³ The town market example of sellers and buyers differs from the "two-sided markets" where the two sides are merchants and users, and the issue is platform competition between PSPs. See J-C Rochet and J Tirole, "Platform competition in two sided markets", *Journal of the European Economic Association*, June 2003, pp 990–1029; J-C Rochet and J Tirole, "Cooperation among competitors: the economics of payment card associations", *RAND Journal of Economics*, vol 33, no 4, 2002, pp 1–22; and M Rysman, "The economics of two-sided markets", *Journal of Economic Perspectives*, vol 23, no 3, 2009, pp 125–43.
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- ³⁵ Mojaloop is an open-source software that aims to promote interoperability in payments and thus to promote financial inclusion; see mojaloop.io.
- ³⁶ See CPMI, *Reducing the risk of wholesale payments fraud related to endpoint security*, May 2018.
- ³⁷ For an overview of digital ID systems, see J Ehrentraud, D García Ocampo, L Garzoni and M Piccolo, "Policy responses to fintech: a cross-country overview", *FSI Insights*, no 23, January 2020, p 37.
- ³⁸ See B Carr, C French, A Khairy and D Pujazon, *Digital Identities in Financial Services Part 3: the business opportunity for digital identity*, Institute of International Finance, March 2020.

- ³⁹ See D D'Silva, Z Filková, F Packer and S Tiwari, "The design of digital financial infrastructure: lessons from India", *BIS Papers*, no 106, December 2019.
- ⁴⁰ The range of services a central bank might offer to its account holders differs by country and could include: direct participation in payment and settlement arrangements; safe custody of funds (potentially paying interest on such funds); intraday access to central bank liquidity to facilitate settlement; and access to emergency central bank liquidity to address a liquidity shortfall.
- ⁴¹ See SNB, "Swiss National Bank sets criteria for fintech companies' access to Swiss Interbank Clearing", 11 January 2019.
- ⁴² See Basel Committee on Banking Supervision, *Report on open banking and application programming interfaces*, November 2019.
- ⁴³ See [zellepay.com](https://www.zellepay.com) for more information on Zelle. Venmo and Cash App are also front-end processors that connect to users' bank accounts. For card payments, front-end processors such as Apple Pay and Google Pay connect to users' credit cards.
- ⁴⁴ For more on how acquisitions by incumbent digital platforms may discourage funding of new entrants, see S Kamepalli, R Rajan and L Zingales, "Kill Zone", University of Chicago, *New Working Paper Series*, no 39, updated April 2020.
- ⁴⁵ See Reserve Bank of Australia (RBA), *Review of Card Payments Regulation*, available at [rba.gov.au](https://www.rba.gov.au).
- ⁴⁶ See ML Bech, U Faruqui and T Shirakami, "Payments Without Borders", *BIS Quarterly Review*, March 2020, pp 53–65.
- ⁴⁷ See Petralia et al (2019), *op cit*.
- ⁴⁸ See FSB, *Enhancing Cross-border Payments. Stage 1 report to the G20: technical background report*, 9 April 2020.
- ⁴⁹ See J Alden, "Competition policy in telecommunications: the case of the United States of America", for the International Telecommunications Union, Workshop on Competition Policy in Telecommunications, CPT/05, 18 November 2002.
- ⁵⁰ The SEPA zone now covers 36 countries in Europe. European Commission regulation No 924/2009 on charges for cross-border payments in euro, adopted in the context of SEPA, requires banks to apply the same charges for domestic and cross-border electronic payment transactions in euros.
- ⁵¹ See also European Commission, *Study on the application of the Interchange Fee Regulation*, 2020; and S Carbó-Valverde, S Chakravorti and F Rodríguez Fernández, "The role of interchange fees in two-sided markets: an empirical investigation on payment cards", *The Review of Economics and Statistics*, vol 98, no 2, 2016, pp 367–81.
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- ⁵³ See Financial Action Task Force, *Guidance on digital identity*, March 2020, p 6; S di Castri, S Hohl, A Kulenkampff and J Prenio, "The supotech generations", *FSI Insights*, no 19, October 2019. Regtech can be defined as the application of financial technology for regulatory and compliance requirements and reporting by regulated financial institutions. Supotech can be defined as the use of innovative technology by financial authorities to support their work.
- ⁵⁴ See A Carstens, "A handful of cyber – five key issues for international cooperation", speech, Paris, 10 May 2019; B Cœuré, "Cyber resilience as a global public good", speech, Paris, 10 May 2019; and I Aldasoro, L Gambacorta, P Giudici and T Leach, "The drivers of cyber risk", *BIS Working Papers*, no 865, May 2020.
- ⁵⁵ See CPMI-IOSCO, *Guidance on cyber resilience for financial market infrastructures*, June 2016; and FSB, *Effective Practices for Cyber Incident Response and Recovery. Consultative document*, 20 April 2020.
- ⁵⁶ See National Consumer Law Center, *Fintech and consumer protection: a snapshot*, October 2019.

- ⁵⁷ See eg OECD, *G20 High-Level Principles on Financial Consumer Protection*, October 2011.
- ⁵⁸ See A Acquisti, C Taylor and L Wagman, "The economics of privacy", *Journal of Economic Literature*, vol 54, no 2, 2016.
- ⁵⁹ See A Carstens, "Data, technology and policy coordination", speech, 14 November 2019.
- ⁶⁰ See C Cantú, G Cheng, S Doerr, J Frost and L Gambacorta, "On health and privacy: technology to combat the pandemic", *BIS Bulletin*, no 17, 19 May 2020.
- ⁶¹ See Bech, M, J Hancock, T Rice and A Wadsworth, "On the future of securities settlement", *BIS Quarterly Review*, March 2020, pp 67–83.
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- ⁶⁶ See eg ECB, *The Euro for the visually impaired*, online at [ecb.europa.eu](https://www.ecb.europa.eu), accessed 5 April 2020; and RBA, *Accessibility features*, online at <https://banknotes.rba.gov.au/resources/for-people-with-vision-impairment/accessibility-features/>, accessed 5 April 2020.
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