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FINANCE



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PASCAL SAINT-AMANS
ARGUES THAT TAX FOR
CLIMATE FINANCE SHOULD
START WITH SHIPPING

FINTECH HAS A MAJOR
ROLE IN ENABLING GLOBAL
TRADE. GRAHAM BRIGHT
CONSIDERS THE KEY FACTORS

PAMELA MAR DISCUSSES
THE DIGITALISATION OF
TRADE AND SUPPLY CHAIN
PROCESSES

21ST CENTURY FINANCE

Foreword

W

elcome to the Autumn edition of **FINANCE21**, a *World Commerce Review* supplement.

This publication has been prepared in response to readership demand for an overview of the financial sector in these turbulent and unique times.

All aspects of the sector are examined, with the most respected authors providing the reader with the most comprehensive information available. Our brief is to provide all the data necessary for the readership to make their own informed decisions. All editorials are independent, and content is unaffected by advertising or other commercial considerations. Authors are not endorsing any commercial or other content within the publication. ■

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A time for resolve and realism



Agustín Carstens says with the global economy at a critical juncture, it is a time for resolute and realistic policy

will focus on the current state of the global economy, the key risks to the outlook and the roles that all arms of policy must play to meet today's challenges if they are to lay a solid foundation for resilient future growth. The need for resolute yet realistic policy is a key theme of the 93rd *BIS Annual Economic Report*. Resolve is needed because the global economy is at a critical juncture.

For the first time in decades, inflation and financial instability have emerged in tandem. If not addressed promptly, these short-run challenges could entrench themselves as long-run problems.

Realism is needed because many of today's short-run challenges reflect an overly expansive view of what macroeconomic policy can achieve. As a result, the long-run challenges are being neglected, with effects that are being felt right now.

High inflation prompts the end of 'low-for-long'

To set the stage, let me recap the main economic developments of the past year and the near-term outlook.

High inflation remained a dominant theme. Admittedly, inflation has come down from last year's multidecade highs. But these were largely the easy gains as commodity prices fell and supply bottlenecks eased. On core inflation, much less progress was made. And in much of the world, price growth in services – typically hard to budge – remains near its peak.

Central banks responded forcefully. The low-for-long era ended, as central banks embarked on the sharpest and most synchronised policy tightening since at least the 1970s. In doing so, they delivered collective monetary restraint that was more than the sum of its parts.

Yet economic activity remained, for the most part, resilient. Growth did slow, but less markedly than many had predicted. And, in many countries, labour market conditions were unexpectedly buoyant, with unemployment rates low by historical standards. This goes some way to explaining the persistence of core inflation.

Monetary policy must now restore price stability. Fiscal policy must consolidate. The opportunities of a future financial system must be grasped. And policymakers of all kinds need to keep their eye on the long term

Emerging market economies weathered the storm. In the past, global monetary policy tightening had tested them. This time, emerging market economies were ready. In many of them, central banks tightened policy earlier and faster than in advanced economies. This bolstered their exchange rates and reinforced the credibility of their monetary policy frameworks in the face of high inflation.

Even as economies continued to grow, serious financial strains emerged. The first signs came from the United Kingdom, where sharply rising bond yields saw pension funds run into trouble. Perhaps more serious and surprising has been the recent turmoil in the banking sector, with several regional banks in the United States closing their doors and a large European G-SIB merging with a competitor.

Once again, the authorities stepped in to limit the damage. Central banks activated or extended liquidity facilities. Governments guaranteed solvency, in some cases by broadening the scope of deposit insurance schemes. These measures calmed markets. But they raised many questions about banking regulation and supervision, as well as the size and scope of safety nets.

Despite these episodes, broader financial conditions tightened less than one might have expected. In part, this reflected a belief by some market participants – incorrect as it turned out – that central banks would blink in the face of higher inflation in order to ease financial strains.

Inflation and financial instability could prevent a soft landing

Against this backdrop, there is an emerging sense that the global economy could achieve a soft, or softish, landing. We all hope it does. But we must be ready to tackle the significant risks that stand in the way. Among those risks, persistently high inflation and financial instability are the two that are most likely to trigger an extended period of sub-par growth, or even a recession.

High inflation could persist. In addition to the inflationary pressures already in the system, new ones could emerge. For the latter, labour markets look to be a key flashpoint. In many countries, workers' purchasing power has fallen substantially, as wage growth has failed to keep pace with inflation.

It is conceivable that workers will seek to reverse that, particularly as labour markets are so tight. Firms, having found it easier to raise prices than before the pandemic, may in turn pass these higher costs on. A wage-price spiral could set in.

This story sounds disturbingly like the shift to a high-inflation regime that we analysed in our *Annual Economic Report* last year. As you may recall, in such a regime, inflation becomes a more salient factor in household and business decision-making, and transitions across regimes become self-reinforcing. Once an inflationary psychology sets in, it is hard to dislodge.

Meanwhile, financial stability risks loom large. Public and private debt levels, and asset prices, are much higher than in past global monetary policy tightening episodes. To date, pandemic-era excess savings and a general lengthening in debt maturities during the low-for-long era have masked the effects of higher rates. But these buffers are rapidly depleting. As they become exhausted, growth could slow more than currently expected.

The resulting financial strains will likely materialise in higher credit losses. Banks would be in the firing line. Historically, it is common for banking stress to emerge as monetary policy tightens. High debt, high asset prices and high inflation amplify the risks. The current episode ticks all the boxes.

Although banks' financial positions have improved since the Great Financial Crisis, pockets of vulnerability remain. Low price-to-book ratios suggest a worrying degree of investor scepticism about the long-term prospects of some institutions. And, as recent experience has shown, even small banks can trigger systemic collapses in confidence.

Non-bank financial intermediaries will also be challenged. This sector has grown in leaps and bounds since the Great Financial Crisis. It is also rife with hidden leverage and liquidity mismatches. Business models that worked in the low-for-long era will face stern tests in a higher-for-longer one.

Weak fiscal positions cloud the picture further. Financial instability, if acute enough, calls for a sovereign backstop. Its adverse effects on economic growth can also cripple fiscal revenues. This would heighten the pressure on already high public debt levels. In turn, doubts about the sovereign's creditworthiness can spark or intensify financial instability.

A shift in policy mindsets is required

How should policymakers respond to these large and unique challenges? For central banks, the task is clear. They need to restore price stability. A shift to a high-inflation regime would impose enormous costs. No one would benefit. Higher inflation won't boost real wages. It won't deliver growth. It won't bolster financial stability. And any gains from inflating away public debt would be small, risky, temporary and certainly not exploitable.

While central banks' goals are clear, the path is uncertain. The pandemic, in conjunction with broader structural changes, disrupted the usual relationship between interest rates, growth and inflation. With models providing less reliable signposts, judgment is of the essence. Central banks may think that they have done enough, only to find that they need to tighten further. In the meantime, more financial stresses could emerge.

Prudential policies should be deployed more forcefully to buttress the financial system. This would also create more space for monetary policy to tackle inflation. Macroprudential policies should be kept tight, or even tightened further. Research suggests that this can limit the strains that higher interest rates place on the financial sector.

And microprudential supervision should be stiffened to remedy the deficiencies that came to light in recent bank failures. Implementation of existing regulations – including Basel III – should be accelerated. Where gaps exist, new regulatory measures may be required.

Fiscal policy must consolidate. Not only for a year or two, but systematically, so as to put unsustainable fiscal trajectories onto a more secure footing. This too would help in the fight against inflation. By limiting the required degree of monetary restraint, it would also bolster financial resilience. And it would provide badly needed buffers that could be deployed against future downturns.

Above all, policy needs to adopt a longer-term focus. High inflation and financial instability were no accident. They were the result of a long journey. Macroeconomic policy had approached the boundaries of what we refer to as the region of stability.

We discuss this concept in more depth in Chapter II. The region of stability refers to the combination of monetary and fiscal policy that delivers sustainable macroeconomic and financial stability. The region evolves and is hard to pin down in real time. Its borders were particularly faint in the low-inflation era leading up to the pandemic. Our sophisticated and outsize financial system has blurred them further. But recent experience leaves no doubt about where we stand.

Several policy implications flow from this analysis. Most directly, monetary and fiscal policies need to operate firmly within the region's boundaries. More fundamentally, a shift in mindset is called for. Macroeconomic policy needs to be realistic about what it can achieve.

The journey to the region's boundary reflected in no small part an overly ambitious view of monetary policy's ability to hit narrow inflation goals and of a more general belief that macroeconomic policy could support growth indefinitely, without stoking inflation.

Moving forward, policy needs to be more realistic in its ambitions and more symmetrical over the business cycle. Buffers used in downturns must be rebuilt in recoveries. Unrealistic expectations that have emerged since the Great Financial Crisis and COVID-19 pandemic about the degree and persistence of monetary and fiscal support need to be corrected.

Greater attention should be paid to the prominence of financial factors in economic fluctuations, and in policy measures to limit the likelihood and severity of financial crises. As I have said on many previous occasions, governments need to reinvigorate structural reforms to drive long-term growth. There are no short cuts.

A vision for the future financial system

The inflationary outbreak reinforced the imperative for central banks to preserve the public's trust in money. Price stability is an essential part of this. Another is to provide a form of money that keeps pace with technology and the needs of society.

We have explored this theme in several recent *Annual Economic Reports*. In particular, we examined future forms of money, with a focus on the payments system.

In this year's report, we go a step further and lay out a blueprint for the future financial system. Our vision is of a system that enhances the parts of the system that work well today; and that will enable entirely new financial products tomorrow.

The core of the proposal resembles the arrangements we see today. We still envision a two-tier banking system, with central bank money used for wholesale transactions, and some retail ones, and commercial banks providing the bulk of the money used by households and businesses. Crucially, this arrangement ensures the singleness of money and finality of payments.

But in our vision, money takes a more advanced technological form. In addition to central bank reserves, banknotes and conventional bank deposits, there would be central bank digital currencies and digital commercial bank money. These forms of money would allow for new capabilities, including programmability and composability.

The real benefits, however, would come from linking new monetary arrangements with the broader financial system. To this end, we propose a new financial infrastructure – a unified ledger. The ledger, which in practice would likely resemble a network of networks, would allow for seamless transactions between digital money and other tokenised assets on a single programmable platform.

As we discuss in the chapter, this could greatly increase the efficiency of existing financial transactions, deliver instantaneous payment settlement and unlock entirely new economic arrangements.

The vision we propose is ambitious. And it won't be assembled overnight. That is all the more reason for us to get moving. Society rightly expects the monetary and financial system to take full advantage of technological advances to deliver better and more efficient services. If central banks don't take this agenda forward, other, less publicly minded players will fill this space.

Conclusion

The global economy is at a critical juncture. Stern challenges must be addressed. But these carry with them

significant opportunities: to put macroeconomic policy on a more secure footing; to reinvigorate long-term growth; and to craft a financial system that meets the needs of tomorrow.

Capturing these opportunities will take skill, nimbleness and a degree of courage. It will also require the right mindset. The time to obsessively pursue short-term growth is past. Monetary policy must now restore price stability. Fiscal policy must consolidate. The opportunities of a future financial system must be grasped. And policymakers of all kinds need to keep their eye on the long term. ■

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This article is based on a [speech](#) delivered on the occasion of the Bank's Annual General Meeting, Basel, 25 June 2023.

A close-up photograph of an ancient stone face sculpture, likely from a civilization like the Olmecs. The face is carved with a prominent nose and a circular hole for a mouth. The stone is weathered and has a greenish patina. The text is overlaid on the upper and lower portions of the face.

Policymaking in an age of shifts and breaks

The world has experienced an unprecedented series of shocks. Christine Lagarde says clarity, flexibility and humility will be three key elements of robust policymaking against this backdrop

Over the past three years, people around the world have experienced an unprecedented series of shocks, albeit to varying degrees. We have faced the pandemic, resulting in a partial shutdown of the global economy. We are confronting a war in Europe and a new geopolitical landscape, leading to profound changes in energy markets and trade patterns. And climate change is accelerating, compelling us to do all we can to decarbonise the economy.

One visible impact of these shifts has been the return of high inflation globally, which has caused anguish for many people. Central banks have responded by tightening monetary policy and, while progress is being made, the fight against inflation is not yet won.

But these shifts could also have profound longer-term implications. There are plausible scenarios where we could see a fundamental change in the nature of global economic interactions. In other words, we may be entering an age of shifts in economic relationships and breaks in established regularities. For policymakers with a stability mandate, this poses a significant challenge.

We rely on past regularities to understand the distribution of shocks we are likely to face, how they will transmit through the economy, and how policies can best respond to them. But if we are in a new age, past regularities may no longer be a good guide for how the economy works.

So, how can we continue to ensure stability?

The challenge we face was well-captured by the philosopher Søren Kierkegaard, who said that *“life can only be understood backwards; but it must be lived forwards.”* Since our policies operate with lags, we cannot wait for the parameters of this new environment to become entirely clear before we act.

We have to form a view of the future and act in a forward-looking way. But we will only ever truly understand the effects of our decisions after the fact. So we will have to establish new frameworks geared towards robust policymaking under uncertainty.

I will lay out the three main shifts characterising the current environment and how they could change the type of shocks we face and their transmission through the economy. I will then touch on the three key elements of robust policymaking in this setting: *clarity, flexibility and humility*.

Evidence of changing trade patterns is mounting. The fragility of global supply chains highlighted by the pandemic has also accelerated this process

Shifts in the global economy

Since the pandemic, the European and global economies have undergone three shifts which are changing global markets – and which are playing out over different time horizons.

First, we are seeing profound changes in the labour market and the nature of work. Labour markets are historically tight across advanced economies – and not only due to strong labour demand after the pandemic.

In some economies, workers who left the labour force have not fully returned, be it due to sickness or changing preferences¹. In others, like the euro area, employment is at record highs, but people are working fewer hours on average².

The pandemic has also accelerated digitalisation³, which is likely to affect both the supply of workers and the composition of jobs. Remote working has increased⁴, potentially making labour supply more elastic. And this is now dovetailing with the generative AI revolution, which – like all technological revolutions – is likely to both destroy some jobs and create new ones.

According to one estimate, more than a quarter of jobs in advanced economies rely on skills that could easily be automated⁵. But ECB research also finds that employment shares in occupations more exposed to AI have risen in most European countries over the past decade, refuting the idea that the AI revolution will necessarily lead to a decline in employment⁶.

Second, we are undergoing an energy transition, which in tandem with accelerating climate change is triggering profound transformations in global energy markets. Although Europe has experienced the largest shock, the global energy mix is also in flux as suppliers that previously balanced the market retreat from it.

For some years now, the US shale oil sector has been moving towards a slower growth strategy and investing less in production capacity. And OPEC+ members have been consistently missing their production targets.

At the same time, the push towards renewables is gaining momentum everywhere, driven by fresh concerns about energy security as well as the imperative of climate action⁷. The EU is now aiming for more than 40% of energy generation to come from renewables by 2030, while the United States is on track for the majority of its electricity to be solar and wind-generated by 2050⁸.

Third, we are facing a deepening geopolitical divide and a global economy that is fragmenting into competing blocs. This is being accompanied by rising levels of protectionism as countries reconfigure their supply chains to align with new strategic goals.

Over the past decade, the number of trade restrictions in place has increased tenfold⁹, while industrial policies aimed at reshoring and friend-shoring strategic industries are now multiplying. And while this has not yet led to de-globalisation, evidence of changing trade patterns is mounting¹⁰. The fragility of global supply chains highlighted by the pandemic has also accelerated this process¹¹.

These shifts – especially those related to the post-pandemic environment and energy – have contributed to the steep rise in inflation over the last two years. They have restricted aggregate supply while also directing demand towards sectors with capacity constraints¹².

And these mismatches arose, at least initially, against the backdrop of highly expansionary macroeconomic policies to offset the effects of the pandemic, requiring a rapid policy adjustment by central banks.

Whether all these various shifts will prove to be permanent is not clear at this stage. But it is already evident that, in many cases, their effects have been more persistent than we initially expected. And this raises two important questions about the nature of key economic relationships.

Two questions about key economic relationships

The first question is whether the shocks driving economic fluctuations will change. In the pre-pandemic world, we typically thought of the economy as advancing along a steadily expanding path of potential output, with fluctuations mainly being driven by swings in private demand. But this may no longer be an appropriate model.

For a start, we are likely to experience more shocks emanating from the supply side itself¹³. We are already witnessing the effects of accelerating climate change, and this will likely translate into more frequent supply shocks in the future.

More than 70% of companies in the euro area have been estimated to be dependent on at least one ecosystem service¹⁴. The shift in the global energy mix is also likely to increase the size and frequency of energy supply shocks, with oil and gas becoming less elastic¹⁵ while renewables still face intermittency and storage challenges.

Reshoring and friend-shoring also imply new supply constraints, especially if trade fragmentation accelerates before the domestic supply base has been rebuilt. ECB research finds that, in a scenario where world trade fragments along geopolitical lines, real imports could decline by up to 30% globally and could not be fully compensated by greater trade within blocs¹⁶.

At the same time, our higher exposure to these shocks can trigger policy responses which also move the economy. Most importantly, we are likely to see a phase of frontloaded investment that is largely insensitive to the business

cycle – both because the investment needs we face are pressing, and because the public sector will be central in bringing them about.

For example, the energy transition will require massive investment in a relatively short time horizon – around €600 billion on average per year in the EU until 2030¹⁷. Global investment in digital transformation is expected to more than double by 2026¹⁸.

And the new international landscape will require a significant increase in defence spending, too: in the EU, around €60 billion will be required annually to meet the NATO military expenditure target of 2% of GDP¹⁹. Even if carbon-intensive capital is written off more rapidly²⁰, all this should lead to higher net investment.

Such a phase of higher structural investment needs will make the economic outlook harder to read. In the euro area, for instance, investment rose in the first quarter of this year amid stagnant output, in part because of pre-planned investment spending under the Next Generation EU programme.

The second question concerns how these shocks transmit through the economy. The new environment sets the stage for larger relative price shocks than we saw before the pandemic.

If we face both higher investment needs and greater supply constraints, we are likely to see stronger price pressures in markets like commodities – especially for the metals and minerals that are crucial for green technologies²¹. And relative prices will also need to adjust to ensure that resources are reallocated towards growing sectors and away from shrinking ones²².

Large-scale reallocations can also lead to rising prices in growing sectors that cannot be fully offset by falling prices in shrinking ones, owing to downwardly sticky nominal wages²³. So the task of central banks will be to keep inflation expectations firmly anchored at our target while these relative price changes play out.

And this challenge could become more complex in the future because of two changes in price- and wage-setting behaviour that we have been seeing since the pandemic. First, faced with major demand-supply imbalances, firms have adjusted their pricing strategies.

In the recent decades of low inflation, firms that faced relative price increases often feared to raise prices and lose market share²⁴. But this changed during the pandemic as firms faced large, common shocks, which acted as an implicit coordination mechanism vis-à-vis their competitors.

Under such conditions, we saw that firms are not only more likely to adjust prices, but also to do so substantially²⁵. That is an important reason why, in some sectors, the frequency of price changes has almost doubled in the euro area in the last two years compared with the period before 2022²⁶.

The second change has been the tight labour market, which has put workers in a stronger position to recoup real wage losses. Previously, even when shocks did feed through to prices, the risk of second-round effects was contained as we were mostly operating with persistent labour market slack²⁷.

But as we are seeing today, when workers have greater bargaining power, a surge in inflation can trigger 'catch up' wage growth which can lead to a more persistent inflation process²⁸. We certainly cannot exclude that both these developments are temporary.

In fact, we are already seeing some evidence in the euro area that firms are changing prices less frequently, although in an environment with falling energy and input prices²⁹. And it is possible that the tightness in the labour market will unwind as the economy slows, supply-demand mismatches created by the pandemic fade and, over time, digitalisation leads to higher labour supply, including by reducing entry barriers³⁰.

But we also need to be open to the possibility that some of these changes could be longer-lasting. If global supply does become less elastic, including in the labour market³¹, and global competition is reduced, we should expect prices to take on a greater role in adjustment.

And if we also face shocks that are larger and more common – like energy³² and geopolitical shocks – we could see firms passing on cost increases more consistently.

In that setting, we will have to be extremely attentive that greater volatility in relative prices does not creep into medium-term inflation through wages repeatedly ‘chasing’ prices. That could make inflation more persistent if expected wage increases are then incorporated into the pricing decisions of firms, giving rise to what I have called ‘tit-for-tat’ inflation³³.

Robust policymaking in an age of shifts and breaks

So, in this age of shifts and breaks, where we do not yet know whether we are returning to the old world or entering a new one, how can we ensure policymaking remains robust?

To my mind there are three key elements: *clarity*, *flexibility* and *humility*. First, we need to provide *clarity* on our objective, and on unwavering commitment to deliver on it.

Clarity will be important to establish the proper role of monetary policy in the ongoing transitions. We must be clear that price stability is a fundamental pillar of an investment-friendly environment. Faced with a changing world, monetary policy should not itself become a source of uncertainty.

This will be crucial to keep inflation expectations firmly anchored even when there are temporary deviations from our target, as may be the case in a more shock-prone economy.

And it will also be key to maintaining public confidence that, even in a new environment, we will not lose sight of our target. We must and we will keep inflation at 2% over the medium term.

But in order to achieve our goals, we need *flexibility* in our analysis. We cannot make policy based on simple rules or intermediate targets in an uncertain economy³⁴. And this means that we cannot exclusively rely on models that are estimated with old data, attempting to fine-tune policy around point forecasts.

At the same time, we must also avoid the other pitfall of focusing too much on current data and 'driving in the rear-view mirror', since this is likely to make monetary policy a reactive force rather than a stabilising one.

We will instead have to construct policy frameworks that capture the complexity we face and provide a hedge against it – something central banks are already starting to do. In the ECB's case, we have made our future decisions contingent on three criteria: the inflation outlook, the dynamics of underlying inflation and the strength of monetary policy transmission.

These three criteria help mitigate the uncertainty surrounding the medium-term outlook by blending together our staff's inflation projections, the trend that we can extract from underlying inflation, and the effectiveness of our policy measures in countering that trend.

Looking ahead, I expect this type of ‘multi-legged’ approach will be needed to calibrate policy effectively. But we will also need to enhance this process by regularly updating our models and forecasting technologies³⁵, and with deeper analysis of the variables that act as the best leading indicators³⁶.

The third element that is crucial in this new environment is *humility*. While we need to continue striving to sharpen our picture of the medium term, we should also be clear about the limits of what we currently know and what our policy can achieve. If we are to maintain our credibility with the public, we will need to talk about the future in a way that better captures the uncertainty we face.

The ECB has already been moving in this direction in our forecasting process, but there is still a way to go. We have published sensitivity analyses of key variables like energy prices and wages, and we used scenario analysis during the pandemic and after the start of the war in Ukraine. We are also aiming to be more transparent in accounting for our forecast errors.

Research suggests that households trust central bank forecasts less if their recent performance has been poor³⁷, but we can mitigate this problem if we talk about forecasts in a more contingent way and provide better explanations for errors. For this reason, ECB staff have started publishing the main factors behind our inflation forecast errors and we intend to continue doing so³⁸.

Conclusion

There is no pre-existing playbook for the situation we are facing today – and so our task is to draw up a new one. Policymaking in an age of shifts and breaks requires an open mind and a willingness to adjust our analytical frameworks in real-time to new developments.

At the same time, in this era of uncertainty, it is even more important that central banks provide a nominal anchor for the economy and ensure price stability in line with their respective mandates.

In the current environment, this means – for the ECB – setting interest rates at sufficiently restrictive levels for as long as necessary to achieve a timely return of inflation to our 2% medium-term target.

And moving forward, we must remain clear in our objectives, flexible in our analysis and humble in how we communicate. As John Maynard Keynes once said, *“the difficulty lies, not in the new ideas, but in escaping from the old ones.”* ■

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Digital trade is good for growth: can it also solve our ESG challenges?

Digital trade is good for growth. Pamela Mar argues that digitalising trade could enable SMEs to be future ready, environmentally, and socially conscious businesses

The world expects a lot from SMEs (small and medium sized enterprises). These businesses account for between 70% and 90% of job creation in most economies (OECD and developing economies respectively), and their importance will only increase given the demographics in the developing world.

In Africa, for instance, one billion people will need jobs by 2050, almost 400 million more jobs than exist today. SMEs are the first step in formal employment for many unskilled workers, offering them skills and a way out of poverty. SMEs also provide essential services to poor and rural residents, contributing to social and economic stability, particularly where governing institutions may be weak.

Increasingly, SMEs are being called upon to play their part in the fight against climate change. 60% of the world's CO₂ emissions occur in global value chains largely comprising SMEs, in particular for consumer products and light industrial goods.

SMEs are the source of most Scope 3 emissions (ie. emissions generated along the company's value chain) for many large companies, which in many cases are 90% of a firm's total footprint. Put simply, the world will not meet its net zero imperative without massive action on the part of SMEs.

Alas, SMEs face myriad challenges to simply stay afloat: [one survey](#) reported that 80% of SMEs in Africa will fail within their first five years. While this is just one statistic, anecdotal evidence shows that many of the challenges facing SMEs are deeply set, persisting despite development aid, foreign investment, training support, and even periods of high growth.

The [International Finance Corporate estimates](#) that 40% of SMEs in developing countries have unmet financing needs totalling \$5.2 trillion. Surveys by organisations such as [We Mean Business](#) show that SME climate action is

hindered by a lack of financial resources, lack of capacity and technical know-how, and a lack of physical tools and technologies needed to drive their net zero programmes.

SMEs typically have a low capital base and fewer operating reserves even in the best of times. So, asking them to step up – whether for jobs or climate – particularly in an economic downturn, requires a new approach.

This is where digital trade could play a big role.

A digital trade environment, with its transparent rules and uniform standards could significantly level the playing field for SMEs across borders

The digitalisation of trade and supply chain processes is well known to be an economic opportunity with almost unparalleled upside from a growth perspective: it is good for business because it cuts costs, increases speed and transparency, and produces valuable data that can be used inside the supply chain and especially in financing.

For governments, digital trade is a potential growth driver and an accelerator of crossborder trade. It saves time and labour at the border, while offering transparency and traceability that make compliance easier and less corruptible.

And yet digital trade is difficult: physical systems must be converted; standards must be created and adopted; legal frameworks must be upgraded to acknowledge electronic records and forms; IT systems and networks must be connected; people must be trained to do things in new ways.

Digital trade does not just affect customs and border departments: in many cases a commitment to digital trade may involve over 20 government departments and agencies, including trade, finance, science, tax, interior, and so on.

Notwithstanding the complexity, there is a palpable sense of progress globally on the issue: over half the G7 (by GDP) is on its way towards a regulatory environment that legalises, and enables, digital trade. In the UK, the recent passage of the Electronic Trade Documents Act has the potential to kick-start trade transformation far beyond its borders because of the use of English law in many jurisdictions globally.

Digital trade has been recommended in a number of multilateral fora such as the G7, G20, APEC, the Commonwealth and others. Digital trade and economy agreements are being pursued by several major trading economies such as the EU, Korea, Australia, and Singapore. At least half a dozen other members of the G20 are making concrete steps towards legislation to support digital trade.

Drawing upon years of groundwork on trade standards by public bodies such as UNECE/UNCEFACT and the World Customs Organization, industry is making headway on digital standards for all key trade documents to be 'translated' into interoperable data by the end of 2023 in an effort led by the International Chamber of Commerce's Digital Standards Initiative (DSI).

Convergence toward key data standards will enable interoperability of data across networks and trade platforms, which will address a key barrier faced by SMEs seeking to trade internationally.

Today, trade platforms which facilitate data sharing do exist, but many are closed, meaning that data sharing can only take place between approved members. All companies within a supply chain – sometimes 10-15 different enterprises – must be on the platform so that the supply chain can transact digitally. At the same time, companies along a supply chain may have several customers, each using a different trade platform.

Multiple memberships and platforms become complex when these different platforms each uses their own data formats and data sets, meaning that for every instance, data must be reconfigured, reformatted, or recut entirely if taxonomies and standards differ.

SMEs, being lean by design, will more acutely feel such an administrative burden, while large companies can simply add administrative staff. The more platforms write their own rules, the more SMEs are disadvantaged. Add the complexity of different crossborder regulations, and it is no surprise that most SMEs do not trade internationally, and of those that do, most only manage to trade in one other market.

In other words, a digital trade environment, with its transparent rules and uniform standards could significantly level the playing field for SMEs across borders.

This is exactly what the evidence about paperless trade, customs single windows and digital aspects of [trade facilitation](#) shows: the implementation of these key measures not only boosts growth but is particularly empowering for SMEs.

Beyond this, initial work on digitalising trade documents by ICC offers hope in addressing financing hurdles faced by SMEs. Put simply, a consolidated dataset derived from digitalising seven key trade documents could address a significant portion of a bank's data needs for a typical trade finance transaction.

In essence, the supply chain dataset could function as the vaunted 'single source of truth' provided it uses globally interoperable standards, is secured by technologies of trust, and anchored by the use of verifiable digital identity.

The bank would not need to mount its own effort to ascertain this same information, potentially lowering the cost of financing, thus reducing the administrative burden which prevents many large banks from serving more SMEs.

This core supply chain dataset can also be applied to environmental data needs that must be met on the road to net zero. Virtually all of the critical data required to calculate Scope 3 – from raw material specs, quantities and product codes, shipment modalities, and ports of call – can be found within this core dataset, for obvious reasons.

Trade documents which summarise key terms of trade, enable goods to flow from partner to partner within global supply chains. The problem today is that in the analogue supply chain, data is manually gathered from different players and then passed along using spreadsheets, email, or other methods. It is rarely automated, prone to errors, and cannot be analysed in aggregate without a lot of effort and time.

As a result, the calculation of a Scope 3 footprint today is very painstaking across the supply chain, which is impractical for large or complex supply chains or for companies running thousands of products.

The alternative is to rely on a combination of big data or scoping of a part of a supply chain followed by extrapolating outward. And yet, the use of big data has already been [challenged by European governments](#) who realise, quite rightly, that such tactics are imperfect.

So, while climate activists may rejoice that Scope 3 emissions will eventually be disclosable (and subject to third party verification) under the recently released ISSB and European Corporate Sustainability Disclosure guidelines, it is openly known that most current methodologies for gathering such data are unfit for purpose, at least for many consumer-oriented supply chains.

Trade data from digitalised supply chains can provide the crucial bridge needed to close the gap. Indeed, the systems for sourcing and delivering such data are essentially the same whether for supply chain transactions or supply chain environmental impact calculations.

Moreover, secure, verified datasets sourced from key trade documents are by nature auditable; they will have passed multiple borders, customs authorities, and regulatory bodies. If financing can flow on this basis, so can climate data.

For companies in which sustainability still relies on the same practices – survey, upload, audit, monitoring – that have been used for years by social compliance programmes, the push for auditable, automated environmental data from the supply chain may seem like an impossible task. It need not be.

Of course, it is one thing to say that digital trade can help deliver the data needed to understand supply chain environmental impact, and another to say that mitigation actions are actually occurring. But providing transparency on the problem is a crucial first step.

And for small enterprises serving dozens of customers, digital supply chain practices – delivering standardised approaches to data, interoperability across platforms, and digital identity and credentials – hold the potential to drive the shift from an enterprise overwhelmed by data and the complexity of competing demands, to a future ready, environmentally, and socially conscious business. ■

Pamela Mar is the Managing Director of the Digital Standards Initiative at the International Chamber of Commerce

Enabling digital trade

A central image of a globe with a network overlay of white dots and lines, set against a dark blue space background with stars and nebulae. The globe shows the continents of Africa and Europe.

World Commerce Review interview Dr Graham Bright, a leading thinker on the digitalisation of trade, about the challenges that need solving



Tell us about Euro Exim Bank?

Founded in 2017, the bank is headquartered in St. Lucia, West Indies, regulated, supervised and authorised by the Financial Services Regulatory Authority. EEB also have a representative office in London.

From humble beginnings with a core team of 10, now, with a network of sales agents and partners in 190+ countries, we serve import and export businesses. EEB are one of the fastest growing and widest reach trade institutions anywhere across the globe.

EEB provides financial services to facilitate international trade, through issuance of key instruments for both buyers wishing to arrange imports, sellers to guarantee payment, and contractors wishing to bid for major infrastructure projects. Our clients are registered corporates based in active markets such as Asia, India, Middle East and Africa.

What is the main advantage of partnering with Euro Exim Bank?

In our extremely dynamic business sector, demand for new products and critical raw materials has changed the way that companies and countries are looking at new supply chains.

Globalisation is inevitable. The world is becoming increasingly connected, driving the need for faster and more efficient crossborder payments

From previously untapped markets, hit by lack of trust, low liquidity, expensive and compromised supply of fiat currency, withdrawal of major bank services and fragile infrastructure, the need is greater than ever for a specialist trade finance bank. Recognising our economic rates, fast issuance and local contacts in both developed markets and disintermediated emerging jurisdictions, EEB is a natural partner.

With free trade agreement opportunities and new partnerships, community events, and a growing network of agents and partners, EEB are ideally positioned to support and serve the ever-growing volumes of world trade.

What key services can EEB provide to the customer?

In addition to the issuance of stands trade instruments such as letters of credit and standby letters of credit, along with performance bonds and bank guarantees, the bank can also provide bank comfort letters, proof of funds and advanced guarantees.

In addition, the bank is providing services to corporate clients wishing to boost their balance sheets through bond issuance. Here we work in identifying companies looking to raise capital on USD markets by working on initial feasibility studies and introducing them to fund providers.

What sectors and geographical areas does Euro Exim Bank cover?

Our sales network now covers over 190 countries, and this gives us a unique global perspective which keeping contacts local.

Our clients deal in all manner of goods, from food to machinery, batteries to garments, and we have had dealings with clients on six continents.

Most business comes from Asia, Africa and India, and we are seeing more interest for critical raw materials, from Africa and South America fuelled by international free trade agreements and insatiable worldwide demand for metals.

What digital technologies does Euro Exim Bank employ?

As members of the ICC and as an active participant in the UK APPG All Party Parliamentary Group on trade, EEB are very aware of new technologies that will improve speed, accuracy and connectivity, in a long-awaited move from bureaucratic paper (mainly unchanged since the 1800s) to digital processes.

Specifically in the UK, The Electronic Trade Documents Act is a ground-breaking piece of law facilitating removal of legal barriers to digitalising commercial trade documents where information can flow more easily between the public and private sectors and across jurisdictions with trading partners. Our IT teams are purposefully embedding the recommendations and practical solutions offered by this legislation.

Our home-built trade platform also incorporates machine learning and blockchain capabilities, both of which technologies have improved internal processes, however, with all use of commercial blockchains is yet to see true benefits to end users, especially in geographically challenging countries.

Other technologies used include the transmission of standardised authenticated financial messaging via SWIFT, where we relay our instruments to banks securely for safe and verified delivery to ultimate beneficiary banks.

What plans for the future does Euro Exim Bank envisage?

Within 5 years, to be the largest, fastest growing, most trusted, truly global, reliable and innovative trade finance institution on the planet where our culture is driven by an obsession with excellence, integrity and an entrepreneurial spirit that recognizes and rewards vision and hard work.

Through partnerships, acquisition, and with a focus on adding value for our customers and making the necessary investments, we hope to ensure long-term success.

By offering services simply, efficiently and effectively, we will take advantage of opportunities in technology, ESG and supply chain dynamics to further establish ourselves as a global leader in the financial services industry, sustaining and accelerating our growth.

How do you see the future for crossborder payments?

This market is huge with C2C payments worth US\$800 billion in 2022, and B2B crossborder payments set to exceed US\$150Trillion by 2026. Banks have been the traditional de-facto providers of such services, managing international payments, which are essential to support the free flow of goods and services.

But change is coming, through emergence of fintech players looking to challenge the status quo. Their USP's? Faster, more efficient, cheaper, less error prone services, cloud based, secured and ready now.

Real-time payments systems make it possible to send and receive cross-border payments instantly, where formerly, the problem was the time it takes to reach the recipient and complete a transaction.

By reducing the number of intermediaries and not being hampered by operating schedules and time zones, or even currency exchange, real-time payments are the way forward.

Central Bank Digital Currencies (CBDCs), digital versions of fiat currencies, will increasingly be used for real-time settlements between central banks. Whilst take up has been slow, more countries are showing interest and working on pilots. Once these proofs of concept filters down to domestic banks, and accepted by local companies, we may see a situation of 'currency flight', a lessening dependency on the US Dollar as the primary currency of trade.

Technologies such as blockchains can provide a secure and transparent way to transfer money with efficiency and compliance, as all transactions are immutably and securely recorded on a distributed ledger, allowing instant secure transfer between two parties, even disintermediating banks.

Globalisation is inevitable. The world is becoming increasingly connected, driving the need for faster and more efficient crossborder payments.

We are already seeing a proliferation of alternative finance providers, fintech driven payment start-ups and interest from tech giants wanting to extend their market share as traders to full blown banking services supported by invoicing, identity and cross-border data management.

As these companies are not encumbered by the constraints of ever-changing financial regulations as applicable to traditional banks, they are uniquely positioned to rapidly innovate, offer new cost-effective solutions and ultimately take market share.

How will fintech enhance global trade?

The opportunities and economies of fintech in trade are significant.

Firstly, automating the process across the entire instrument lifecycle encompassing the full ecosystem, still consisting of siloed operations and disparate participants. Then, the accuracy and clarity of data, with early verification, identifying risk, enabling risk mitigation and lower contingent liability.

Also, connectivity, with easier communication and provision of new online banking services, for example, embracing digital and crypto currencies to reduce fx requirements, with real time transfer.

The latest iteration of fintech driven trade will be assisted through peer-to-peer (P2P) lending networks giving access to competitive funding for all sizes of companies.

This innovative mechanism may help smaller companies remove trade barriers, increase liquidity, and reduce administrative burden where they have traditionally been disadvantaged through small deal size, expensive FX and bureaucratic process.

Conclusion

Whilst trade remains vital to global economies, there are still deep-rooted challenges to be solved.

By employing technologies such as blockchain, real-time inter and digital currency payments through P2P networks and alternative funding options from non-regulated financial institutions, the trade landscape is undergoing rapid change.

Nirvana for trade is inclusivity, collaboration, affordability, security, digitisation, settlement finality and transparency, enabling all players regardless of geography, currency, culture, and tariffs to compete on the global stage effectively and economically, without being disadvantaged financially, exploited and bypassed. Fintech can only assist in this lofty ambition. ■

Fostering a sustainable digital transformation



Abeliansky *et al* discuss the two side effects of automation – increased inequality and a rise in carbon emissions – and propose a policy response to deal with both problems

Automation and digitalisation are progressing rapidly worldwide, auguring improved productivity and living standards but also the prospect of genuine social harm. This column discusses two side effects of automation – increased inequality and a rise in carbon emissions – and proposes a policy response to deal with both problems simultaneously.

By imposing a higher tax on automation-driven emissions and redistributing the proceeds so as to mitigate increased inequality through education and re-training, such a policy could reduce resistance to new technologies, increase skill levels, and foster the transition to cleaner electricity production.

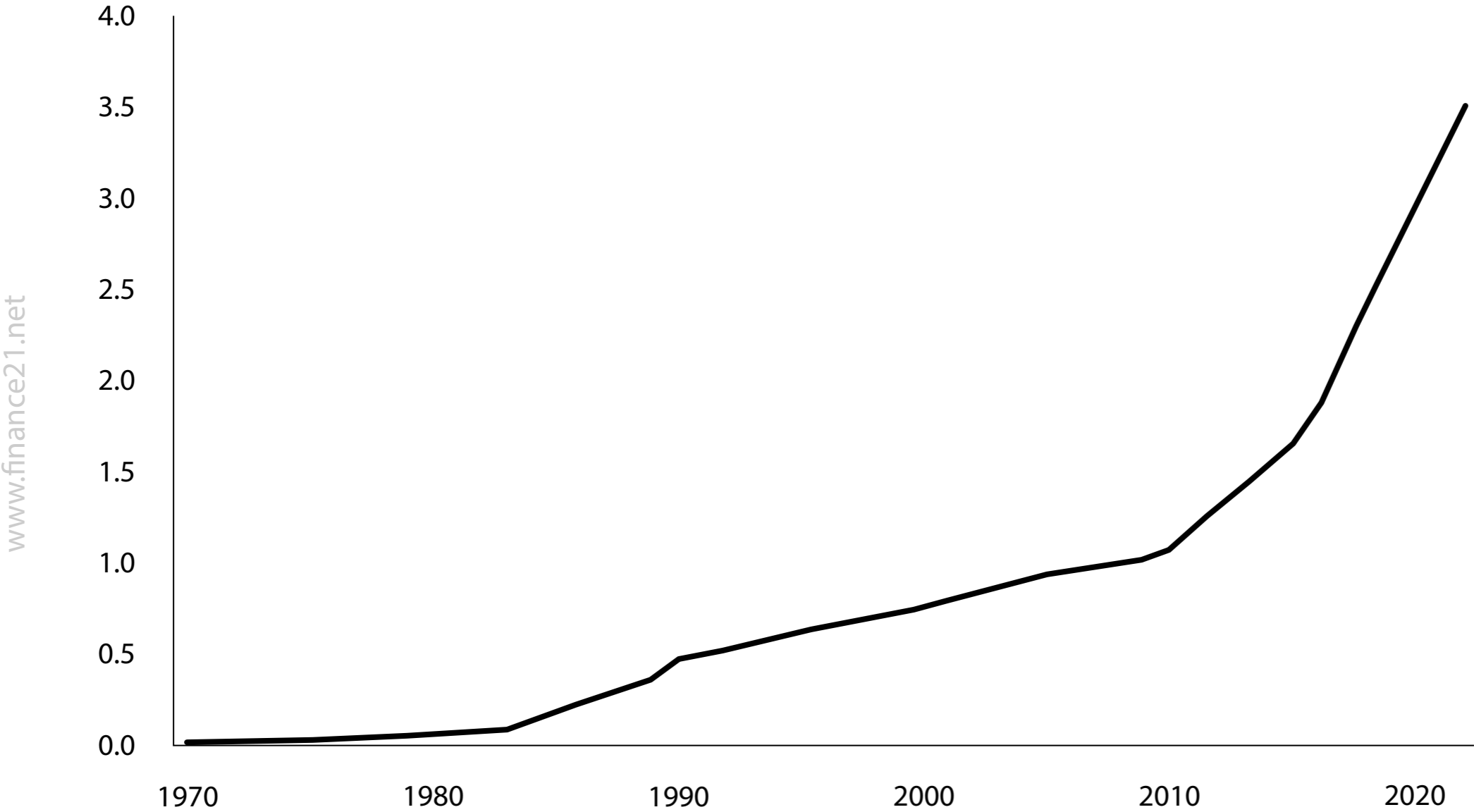
Automation, digitalisation, and artificial intelligence (AI) are progressing rapidly worldwide: robots increasingly substitute for humans in many assembly line tasks; 3D printers are used in the production of customised parts and medical implants; and AI-based models and devices are used to quickly diagnose disease, develop medical remedies, write reports, code, and generate inspiring ideas (*The Economist* 2014, Ford 2015, Brynjolfsson and McAfee 2016, Hu 2023).

Figure 1 illustrates the growth in automation based on one frequently used data source: the International Federation of Robotics (2016, 2017, 2018, 2022). The number of industrial robots¹ worldwide was negligible until the early 1990s, but has since increased steeply, by a factor of eight.

After the global financial crisis of 2007–2009, the growth rate of the number of robots increased markedly to about 10–15% per year (International Federation of Robotics 2022).

Most recently, the number of users of AI-based models has skyrocketed. ChatGPT, for example, surpassed 100 million active monthly users in January 2023, just two months after its launch (Hu 2023).

Figure 1. Worldwide stock of industrial robots (in millions of units)



Notes: International Federation of Robotics (2016, 2017, 2018, 2022) with authors' interpolations for the years lacking data.

While automation, digitalisation, and AI tend to raise productivity and per capita income (Graetz and Michaels 2018), they also raise several concerns. The first apprehension has to do with the potential for automation technologies and AI to replace human labour, and the associated fears of technological unemployment (Arntz *et al* 2017, Frey and Osborne 2017, Abeliansky *et al* 2020).

Policymakers might instead consider an automation tax, which would only be paid by a firm if and when it automated the production of a task and replaced a worker with a robot

A second concern relates to the role of automation and digitalisation in raising inequality levels. Because the corresponding technologies typically complement high-skilled workers but substitute for low-skilled workers, upward pressure is placed on the wages of the former and downward pressure on the wages of the latter, leading to greater wage inequality (Acemoglu and Restrepo 2018, Lankisch *et al* 2019).

Recent research suggests that AI increases the productivity of low-skill workers proportionately more than the productivity of high-skill workers (Brynjolfsson *et al* 2023) in terms of comparable tasks. Nevertheless, AI is used predominantly for tasks that are on average more skill-intensive (see eg. Marr 2023) such as coding and debugging, language translation, and summarising research results.

Humans are, as yet, not perfectly substitutable in these tasks, but are still required for appropriate and effective prompting, and for revising the output produced by AI. This stands in contrast to the use of industrial robots and 3D printers, which are able to perfectly substitute for (predominantly low-skilled) workers.

As a consequence, even if AI reduces the performance gap within given tasks, it could still increase inequality at the aggregate economic level.

The third concern has to do with the negative impact of robots, 3D printers, and AI on the labour share of income and its corresponding positive impact on the capital share (Eden and Gaggl 2018, Prettner 2019, Guimarães and Gil 2022a). This is because robots, 3D printers, and AI have properties resembling labour in the production process, and capital in terms of ownership.

Thus, their use transfers income from workers to capital owners and thereby reduces the labour income share. A final concern relates to the high electricity requirement of automation – in particular of AI. Because most countries

still use fossil fuels intensively in electricity production, this implies a potentially negative impact of automation, digitalisation, and (especially) AI on the efforts to mitigate climate change (Creutzig *et al* 2022).

Recent estimates by Patterson *et al* (2021) and Luccioni *et al* (2022) suggest that the training of the large language model GPT-3 required close to 1,300 megawatt-hours of electricity and led to more than 500 tonnes of carbon dioxide equivalent emissions.

These potentially negative aspects have led to calls for the implementation of 'robot taxes' (Dill 2017, Guerreiro *et al* 2022, Gasteiger and Prettner 2022). In this context, however, several drawbacks of such a tax should be considered.

Most immediate is the issue of what defines a robot and should therefore be used to delineate the tax base. The definition of an industrial robot, which replaces human labour alongside an assembly line, may be clear – but it is definitely unclear for algorithms that replace human labour in targeting ads to customers, in writing texts, or in coding.

In addition, because the use of robots, 3D printers, and AI raises productivity, a robot tax that impedes their general adoption would be associated with a loss of per capita income and a reduction in living standards (Prettner and Strulik 2020).

Policymakers might instead consider an automation tax, which would only be paid by a firm if and when it automated the production of a task and replaced a worker with a robot (ie. the automation tax is not paid by firms investing in robots upon entry).

Results suggest that a robot tax may have a much more negative impact on employment and wages than an automation tax (Guimarães and Gil 2022b), yet machines are usually not able to replace workers in all tasks, making the assessment of the replacement of workers by machines blurry in practice.

Moreover, it might be difficult to distinguish an automation-related job separation from other sorts of separations. This murkiness raises questions as to whether potential alternatives to a robot (or an automation) tax exist that could achieve similar outcomes without such drawbacks – or would at least minimise them.

In the following section, we propose a tax-subsidy scheme that may help alleviate automation-driven inequality and automation-driven emissions by linking them through one consistent policy response.

Solving two problems using one tax

One potential way to ensure a sustainable digital transformation is to link the negative economic and environmental consequences of automation and digitalisation by imposing a higher tax on carbon dioxide emissions and using some of the proceeds thereof to fund schemes for those who suffer negative consequences during the transition.

Such schemes could include:

- (1) retraining those who lose their jobs because their skills become obsolete;
- (2) ensuring more generally that the education system does not leave any children behind with inadequate skills for contemporary labour market success;

(3) providing (possibly temporary) public employment for displaced workers who struggle to find new jobs (eg. Kasy and Lehner 2023, who evaluate such a guaranteed job programme implemented in the Austrian municipality of Gramatneusiedl); and

(4) providing social security benefits in terms of unemployment insurance and health insurance for those who cannot get retrained or re-employed for various reasons (see Prettnner and Bloom 2020 for an overview on the effects of different policy responses to automation).

If the proceeds are used to reduce distortionary taxes, the effects of such a policy may resemble the double dividend of environmental taxes (Goulder 1995, Bovenberg 1999).

The difference is that, in this case, the proceeds of the tax would be used to mitigate increases in inequality – thereby reducing resistance to the adoption of new technologies – and to foster the skill level of the population through education and re-training (eg. Peralta and Gil 2021, who show that a direct subsidy to low-skilled workers displaced by automation is roughly neutral in terms of economic growth). Both the tax and the subsidy are expected to be beneficial to long-run economic growth.

To summarise, the crucial advantages of a tax-subsidy scheme that links the negative environmental externalities of automation and digitalisation with the undesired inequality effects are as follows:

- The negative pollution externalities of the increasing use of robots and AI could be internalised.
- Those who suffer due to automation and digitalisation during the transition could be compensated (at least partly) by the proceeds of such a tax, which should help contain a further rise in inequality.

- The problem of defining a robot to designate what is being taxed – and all associated bureaucratic complications in executing robot taxation – do not occur.
- The resistance to new technologies that are beneficial on average and at the aggregate level could be reduced, with corresponding long-run benefits for economic growth and development.
- As a consequence of all the previous items, overall living standards could be raised.
- In addition, and in contrast to a pure robot tax, a higher emissions tax would provide an additional incentive to switch from polluting sources of electricity generation to cleaner technologies, thereby fostering their adoption and innovation.

Overall, a tax-subsidy scheme along the lines proposed here could be an important instrument to ensuring a sustainable digital transformation that keeps both emissions and inequality in check.

Conclusions

Automation and digitalisation improve productivity and living standards, but tend to have negative social side effects by creating 'losers' from the transformation and negative environmental side effects by increasing emissions due to higher electricity demand.

To compensate the losers, robot taxes have been proposed. Even if these taxes could be implemented from a practical perspective, which is highly uncertain, they reduce efficiency and living standards by slowing the adoption of technologies that rely on automation and digitalisation.

To overcome this problem and foster a sustainable digital transformation, we propose a policy response that links its two negative side effects – increasing inequality and higher emissions.

The environmental externalities from the transition to automation and digitalisation could be internalised by a higher tax on emissions, while the proceeds of this tax could be redistributed to compensate the losers from the transition.

Implementing such a scheme would also be helpful for reducing resistance to the new technologies, increasing the skill level of the population, and fostering a transition to cleaner electricity production. All these effects would be in line with the goal of ensuring a sustainable digital transformation.

Thus, it is important to start this discussion and to evaluate the effects of such a proposed tax-subsidy scheme quantitatively. Of particular significance is the question of the appropriate size of such a tax and its fiscal impact. ■

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Endnote

1. *The International Organization for Standardization (ISO) defines an industrial robot as an “automatically controlled, reprogrammable, multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or fixed to a mobile platform for use in automation applications in an industrial environment.”*

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Climate risk stress tests underestimate financial sector losses

Henk Jan Reinders, Dirk Schoenmaker and Mathijs Van
Dijk review current climate risk stress test methods
and identify new approaches

Central bank concerns about climate change are on the rise, and a plethora of new methods have been developed to assess the impact of climate-related shocks on the financial sector. This column reviews current climate risk stress test methods and identifies six types of climate shocks and four types of modelling approaches.

Given the complexity of the link between climate shocks and financial sector outcomes, the authors argue that current methods have several key limitations that may lead to significant underestimation of potential financial sector losses.

Climate change can potentially cause highly adverse shocks to the financial sector. Central banks and other policy institutions increasingly rely on a host of newly developed climate risk stress-testing (CRST) methods to assess these potential effects.

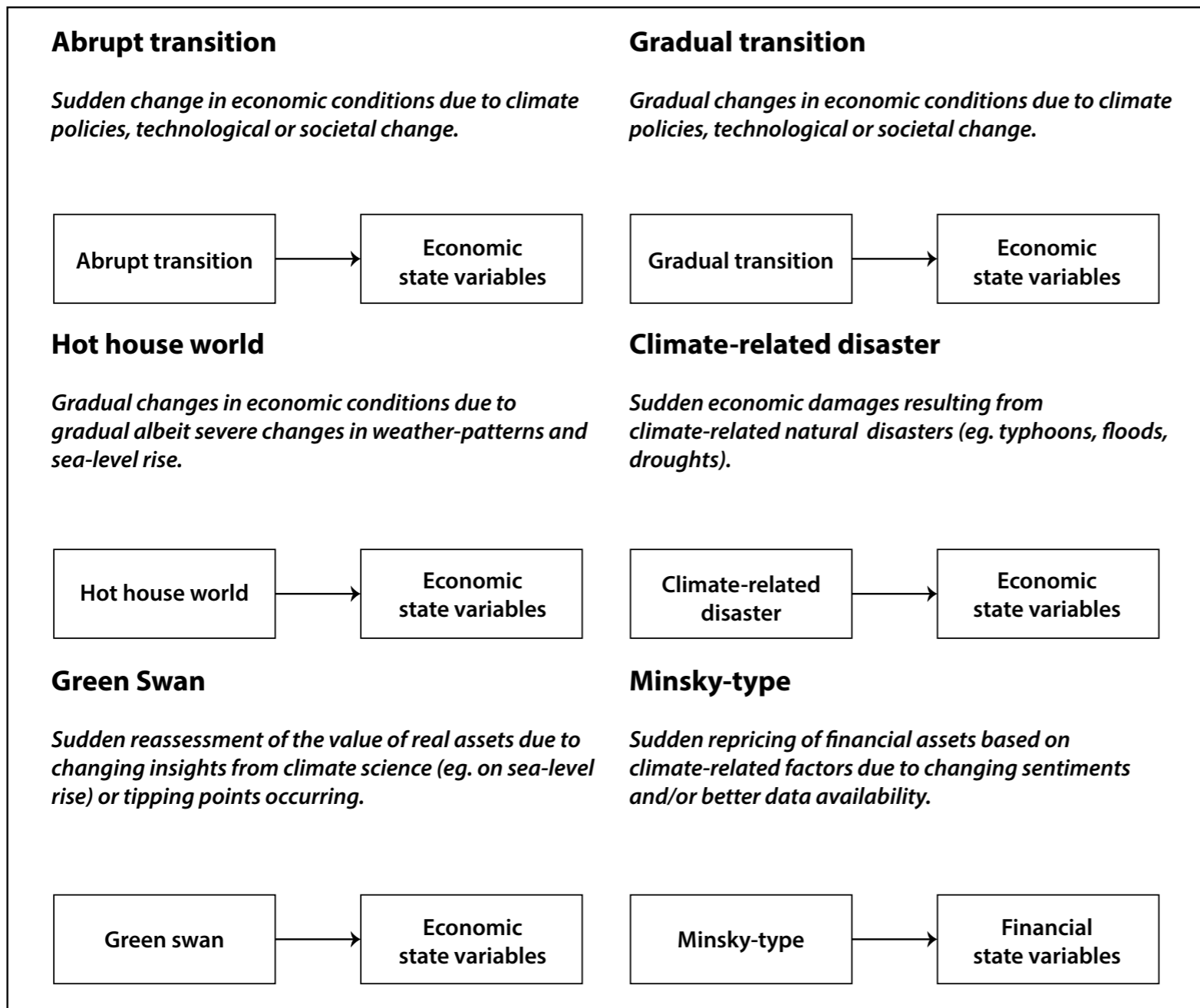
While traditional financial risk assessment methods typically assume that the future will be similar to the past, climate change is likely to lead to unprecedented and often detrimental changes in a broad set of regions and economic sectors over a long period of time. This implies a need for forward-looking risk assessments, based on those future outcomes that are potentially most detrimental.

We identify six types of climate-related shocks that are relevant for climate risk assessments: abrupt transition, gradual transition, hot house world, climate-related disaster, 'green swan' events, and Minsky-type shocks. Figure 1 provides an overview.

Several of these shocks have been investigated in some detail in current CRST applications. These include orderly transitions, disorderly transitions, and gradual changes in economic conditions due to changes in weather patterns and sea-level rise. The latter is also referred to as a 'hot house world' scenario (NGFS 2022).

Figure 1. Classification of climate shocks

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Disorderly transitions have primarily been investigated by looking at the sudden introduction of climate policies (eg. Battiston *et al* 2017) or policy uncertainty (Berg *et al* 2023). Furthermore, an emerging strand of literature investigates the occurrence of one or more climate-related natural disasters on financial institutions (Hallegatte *et al* 2022).

This type of shock is highly relevant from a financial stability perspective, as disasters may cause high losses for banks and manifest themselves in very short time horizons (Klomp 2014).

We believe it is important that the next generation of CRST exercises assess the potentially most damaging scenarios and include feedback loops that can amplify shocks between climate, economic, and financial systems

Other shocks have received much less attention. This is specifically the case for scenarios in which financial sector agents suddenly change their perception of current and future risks, which would be rapidly reflected in today's market prices of financial instruments.

In the climate context, this could chiefly be for two reasons. First, a shock could emanate directly from our changing perception of the state of the global climate system. This could include the unexpected occurrence of climate tipping points or changing insights from climate science – for example, when research would find that sea-level rise occurs more quickly than previously thought.

Bolton *et al* (2020) label these tipping points and changing insights as a 'green swan' event. Second, a shock could emanate from the financial sector if it fails to continuously incorporate the latest climate science and financial sector agents suddenly do so at some point in time – for example, due to increased awareness, a large natural disaster event, or strongly improved climate risk data. We label the latter as a Minsky-type shock.

CRST modelling approaches

To assess the impact of climate shocks on the financial system, different modelling approaches are emerging. CRST must convert initial parameters (climate shocks) into key financial sector variables such as solvency and liquidity ratios.

The typical way that CRST methods do this is by employing macroeconomic models and translating shocks to key variables, such as GDP, into expected losses for the financial system. Additional modelling steps are often required to model the effect of severe climate shocks on the economy and financial system, as they do not have precedents in the past.

Furthermore, climate-related shocks often have specific sectoral and regional impacts, increasing the need for disaggregated (micro-based) modelling approaches. Our review of CRST methods (Reinders *et al* 2023) finds that, besides traditional macro-financial modelling, three new approaches are emerging:

1. The micro-financial approach focuses on firm or asset-level variables and uses valuation models and regression or structural models to estimate financial risk measures and losses.
2. The non-structural approach treats the economic effects of a shock as a black box and directly models the relationship between climate shock and financial outcomes, often using empirical methods.
3. The disaster risk approach links disaster risk models to financial sector outcomes, estimating the impact on variables such as economic damage and total factor productivity, which can be further linked to insurance liabilities or non-insurance financial variables.

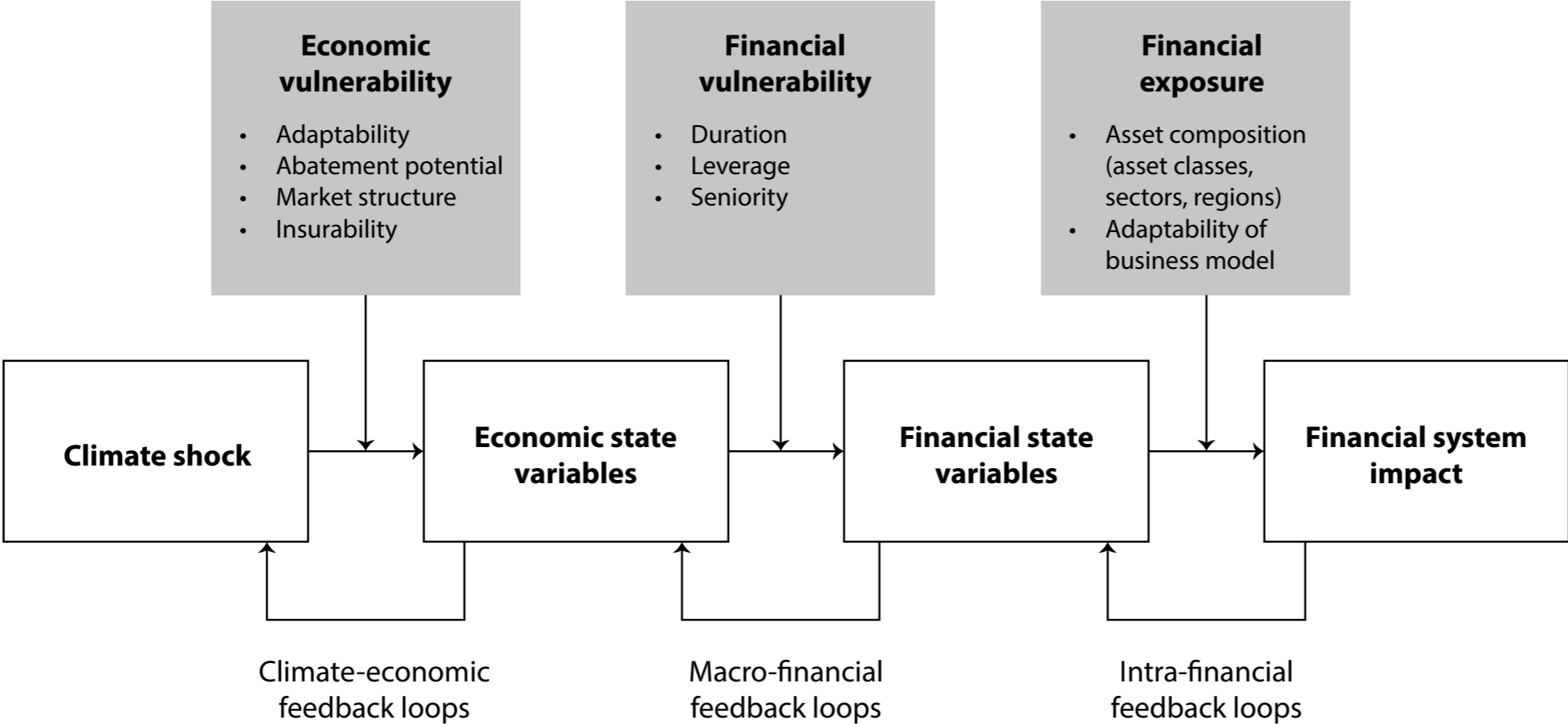
Next to several relevant moderating effects, there are important feedback loops within the financial system (intra-financial), from the financial system to the economy (macro-financial) and from the economy to climate risk (climate-economic). These feedback loops are endogenous and may amplify the initial shock, as happened during the Global Financial Crisis of 2008-2009 (see Figure 2).

Policy recommendations

Given the complexity of the link between climate shocks and financial sector outcomes, we conclude that all CRST exercises to date have substantial drawbacks. CRST is a developing field with, so far, a wide variety of approaches to model the relation between climate shocks and financial sector outcomes. Common limitations include limited

Figure 2. Moderating variables and feedback loops in the climate-financial relation

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scopes (such as including only subsets of channels and asset classes) and incomplete modelling (such as excluding feedback effects).

Furthermore, our review points to an overreliance on macro models with low sectoral and spatial granularity and neglect of certain climate shock types. We conclude that these limitations may well lead to a significant underestimation of potential system-wide financial losses.

We offer suggestions for improving CRST approaches, summarized in Table 1. In particular, we believe it is important that the next generation of CRST exercises assess the potentially most damaging scenarios (such as 'green swan' events or rapid repricing of financial assets) and include feedback loops that can amplify shocks between climate, economic, and financial systems. ■

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Table 1. Avenues for future research

Climate shock

- Improve understanding of tail risks related to a changing climate (eg. tipping points)
- Assess plausible but severe 'Green Swan' and Minsky-type scenarios on the economy and financial sector

Vulnerability modelling

- Develop integrated modelling approaches that capture a comprehensive set of feedback loops within the financial sector, and from the financial sector to the economy and climate
- Develop microeconomic approaches to climate stress testing (to assess impacts on specific economic sectors and regions)
- Develop disaster risk stress tests for financial institutions other than insurers (building on existing disaster risk models)

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Limiting climate change requires rechanneling of SDRs to MDRs

Dirk Schoenmaker and Rens van Tilburg argue that closing the climate investment gap can bring down the high cost of climate finance to acceptable levels

Investments are needed around the globe to mitigate climate change, but it is in developing countries, where population growth and economic growth prospects are greatest, that climate mitigation investments need to grow the most.

This column argues that closing the climate investment gap in these countries requires rechanneling of Special Drawing Rights to Multilateral Development Banks, which can bring down the currently often prohibitively high cost of climate finance to acceptable levels.

A stable climate is one of the foundations of our welfare and wellbeing. In order to limit climate change, investments in climate mitigation are needed globally. It is in developing countries, where population growth and economic growth prospects are greatest, that climate mitigation investments need to grow the most (IPCC 2022).

Currently, however, liquidity constrained low-income countries are often not able to invest in renewable energies, despite the fact that the life cycle costs of renewable energy production is in most places already lower than that of fossil fuel options.

However, renewable energies do come with higher initial investment costs due to the relatively high capital expenditures. Investments that are often prohibitively expensive for low-income countries (Schoenmaker and Volz 2022, van Tilburg *et al* 2022). The cost of capital for a solar PV project in advanced economies and China is around 4%, whilst for emerging and developing economies this figure is around 12% (IEA 2022).

In absolute terms, developing countries now need to invest annually \$1 trillion more in climate mitigation (Bhattacharya *et al* 2022). On top of this come costs of climate adaptation of \$300 billion (UNEP 2021) and up to \$580 billion for loss and damage by 2030 (Markandya and Gonzalez-Eguino 2018). Against these numbers, the 2009

promise of high-income countries to bring \$100 billion to the table – a promise that still has not been fulfilled – pales.

At COP27 a roadmap was presented for how to get the needed extra climate mitigation investments by 2025. According to this roadmap, most is expected from two sources of finance: domestic resource mobilisation and private finance, with an increase of \$417 billion (from \$236 billion) and \$326 billion (from \$69 billion), respectively (Songwe *et al* 2022).

Rechannelling SDRs to MDBs has the potential to increase the available capital for climate investments where it is needed most: in developing countries

With many developing countries struggling with their debt situation and private finance flows to many low-income countries on a downward trajectory, other sources of public finance are needed (Murawski *et al* 2023).

Special Drawing Rights delivering the billions needed

One rare source of finance for developing countries that has increased since 2021 is the IMF's Special Drawing Rights (SDRs). At the height of the pandemic, the IMF created \$650 billion worth of SDRs. Developing countries were able to trade these for the much-needed dollars and euros to invest in their health and social support systems. The \$53 billion of SDRs that went to lower-middle-income countries and \$9 billion to low-income countries have quickly been spent.

The G20 committed to reallocate another \$100 billion of SDRs to developing countries. Up to around \$60 billion of this can be absorbed by two IMF-trusts: the already existing Poverty Reduction and Growth Trust (PRGT) and the newly created Resilience and Sustainability Trust (RST).

While the \$60 billion limit for the combined IMF trusts is not set in stone, it is also not easy to expand these by too much – the reasons for this being the capacity to distribute the funds and the real money needed to provide the loans on concessional terms.

Rechannelling through Multilateral Development Banks

Given the limitations of the IMF trusts, proposals have been made to rechannel SDRs through Multilateral Development Banks (MDBs) like the World Bank and its regional counterparts the African and Asian Development Banks.

These MDBs have a much broader apparatus and longer experience with development and climate finance in developing countries. They have thus a large potential to scale up their climate finance. MDBs can bring down the currently often prohibitively high cost of climate finance to acceptable levels.

MDBs have tried and tested methods of leveraging private finance for development. For instance, the International Bank for Reconstruction and Development has leveraged the total paid-in capital by a factor of ten (Humphrey and Prizzon 2020).

By doing so, MDBs can also create safe, investable local currency assets that can attract domestic savings. Domestic savings that currently are exported to a large extent at low returns to financial centres in advanced countries (Schoenmaker and Volz 2022).

Most MDBs are already prescribed holders of SDRs. One option therefore is for MDBs to issue 'SDR-bonds' (Setser and Paduano 2023). As this is structured as a security, it is easy for all the major SDR holders to purchase it.

Most importantly, this would allow the US to make good on its pledge to rechannel \$20 billion of SDRs. The SDR bond would strengthen the MDBs' liability structure by providing them with a low-cost, long-term financing source. This should facilitate MDBs in the implementation of capital adequacy reform to reduce their equity-to-loan ratio limits.

An even more effective use of SDRs for MDBs is to use them as hybrid capital which can be leveraged at the rate of four to one, as proposed by the African and the Inter American Development Banks (Plant 2023).

Yet, the largest block of SDR holders – the members of the EU, which hold around \$200 billion of the roughly \$900 billion of SDRs – are still in doubt as to whether they can rechannel their SDRs to MDBs. The reason for this are previous legal opinions of the ECB that indicate that not all rechanneling of SDRs to MDBs may be compatible with the EU's legal framework, more specifically with the monetary financing prohibition.

However, no legal opinion has been published by the ECB yet on the two specific proposals discussed here. Given that these preserve the reserve asset status of the rechannelled SDRs and are being used for similar purposes as the IMF trusts that have received clearing by the ECB, it should be possible to also allow this use of the SDRs by EU member states.

What's more, the European Investment Bank already has access to Eurosystem reserve assets through its access to the ECB's repo facility and borrowings from Eurosystem national central banks (Paduano 2023).

Conclusion

Rechanneling SDRs to MDBs has the potential to increase the available capital for climate investments where it is needed most: in developing countries. Given that no clear substitutes are in sight, this route deserves priority in being explored and made passable through finding a construction that is compatible with the EU's legal framework. ■

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The economic effects of carbon pricing

Carbon pricing policies are critical tools to mitigate the effects of climate change. Diego Känzig and Maximilian Konradt examine the impact of European emission reduction policies

Carbon pricing policies are increasingly used as a tool to mitigate climate change. While there is mounting evidence on the effectiveness of such policies for emission reductions (eg. Martin *et al* 2014, Andersson 2019), less is known about their economic effects. In this column, we provide new empirical evidence on the aggregate and regional impacts of carbon pricing, drawing on our recent research on the European experience (Känzig and Konradt 2023).

There are two main climate policy tools in Europe. The cornerstone to combat climate change is the EU Emissions Trading System (EU ETS). However, many European countries have also enacted national carbon taxes to complement the common carbon market.

We assess the dynamic effects of both policies in a unified empirical framework to be able to attribute any potential differences to policy design.

Specifically, we estimate a panel model of European countries and identify the effects of carbon pricing by controlling for global and local macro-financial conditions in addition to country fixed effects, building on the approach by Metcalf and Stock (forthcoming).

For the carbon market, we also employ the high-frequency strategy proposed in Känzig (2023) and find that the two approaches produce comparable results.

Our findings suggest that while both policies have successfully reduced emissions, the economic costs of the European carbon market are larger than for national carbon taxes, leading to a stronger fall in GDP and a sharper rise in unemployment.

To account for the differential effects, we evaluate the role of (1) fiscal policy and revenue recycling, (2) pass-through and sectoral coverage, (3) spillovers and leakage, and (4) monetary policy. We find that all four played a significant role.

Carbon pricing policies in Europe have been successful at reducing emissions but can come at economic costs that are borne unequally across different regions

Lastly, we study the heterogenous effects of the common carbon market on European countries. Our results imply substantial differences in the economic impacts of a similarly sized carbon shock across European countries, depending on the share of freely allocated emission permits and the degree of market concentration in the power sector.

The effects of Europe's carbon pricing initiatives

The EU ETS is one of the largest carbon markets in the world and accounts for over 40% of the bloc's total emissions. It covers the most carbon-intensive sectors, such as the power sector and heavy-emitting industrial sectors.

Figure 1 shows the estimated responses to a euro increase in the coverage-weighted carbon price on emissions and the economy. We see that higher carbon prices lead to a significant increase in energy prices and a persistent fall in emissions.

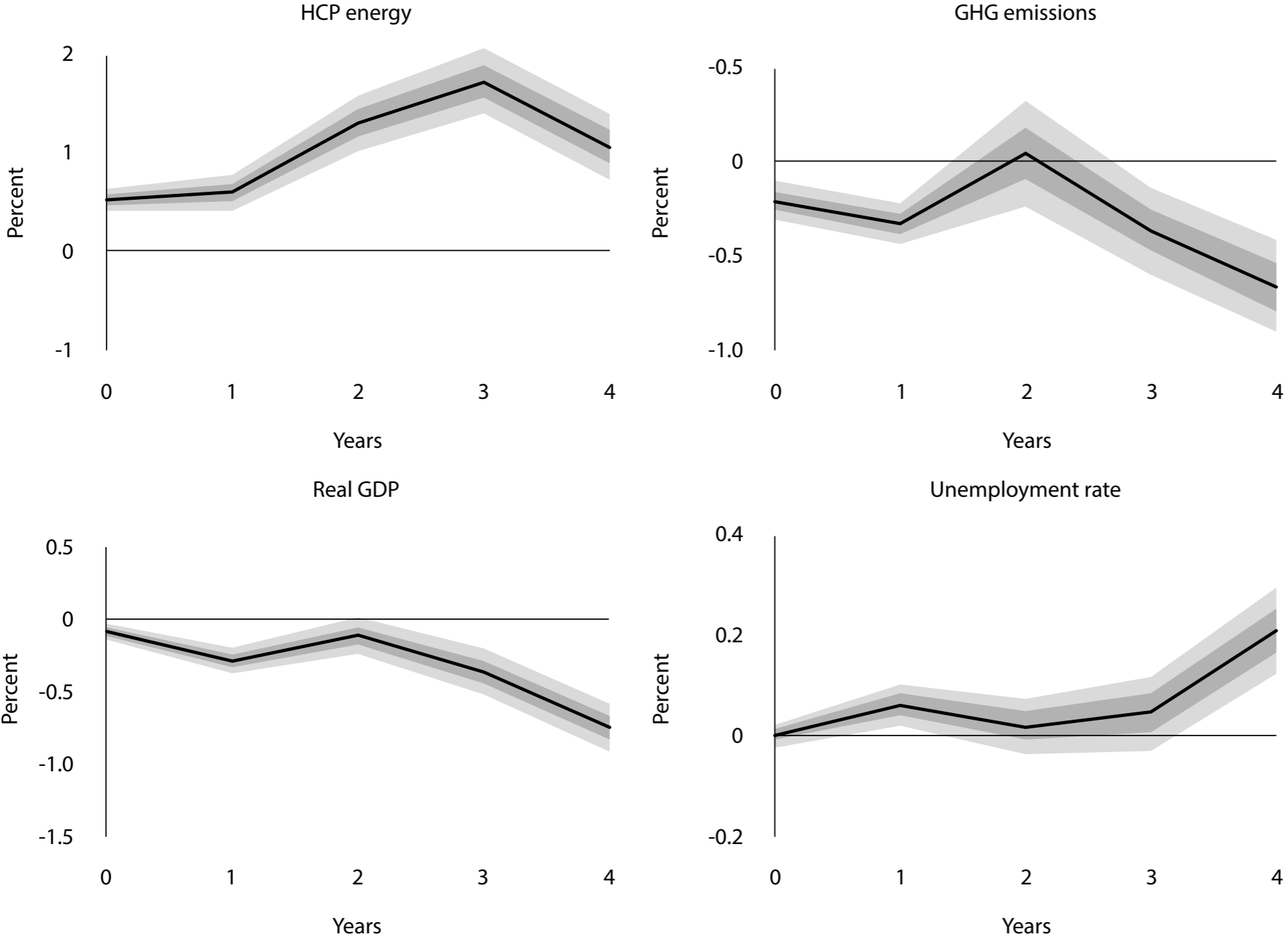
However, this does not come without a cost. Output falls persistently and consumer prices increase, along with a rise in the unemployment rate. These results are broadly consistent with the findings in Känzig (2023), even though the responses are estimated to be somewhat more persistent.

In addition to the EU-wide carbon market, many European countries enacted national carbon taxes to further reduce emissions. These taxes cover sectors and industries that are not part of the emissions trading scheme, such as the transportation and buildings sectors as well as smaller, less energy-intensive industries. Since taxes vary in scope and ambition, we focus on a more homogenous sample of Western and Northern European countries.

How do the empirical effects compare between the two types of policies? Figure 2 shows a similar fall in emissions following a euro increase in the coverage-weighted carbon tax. The increase in energy prices is more muted, however, and there is little pass-through to overall consumer prices.

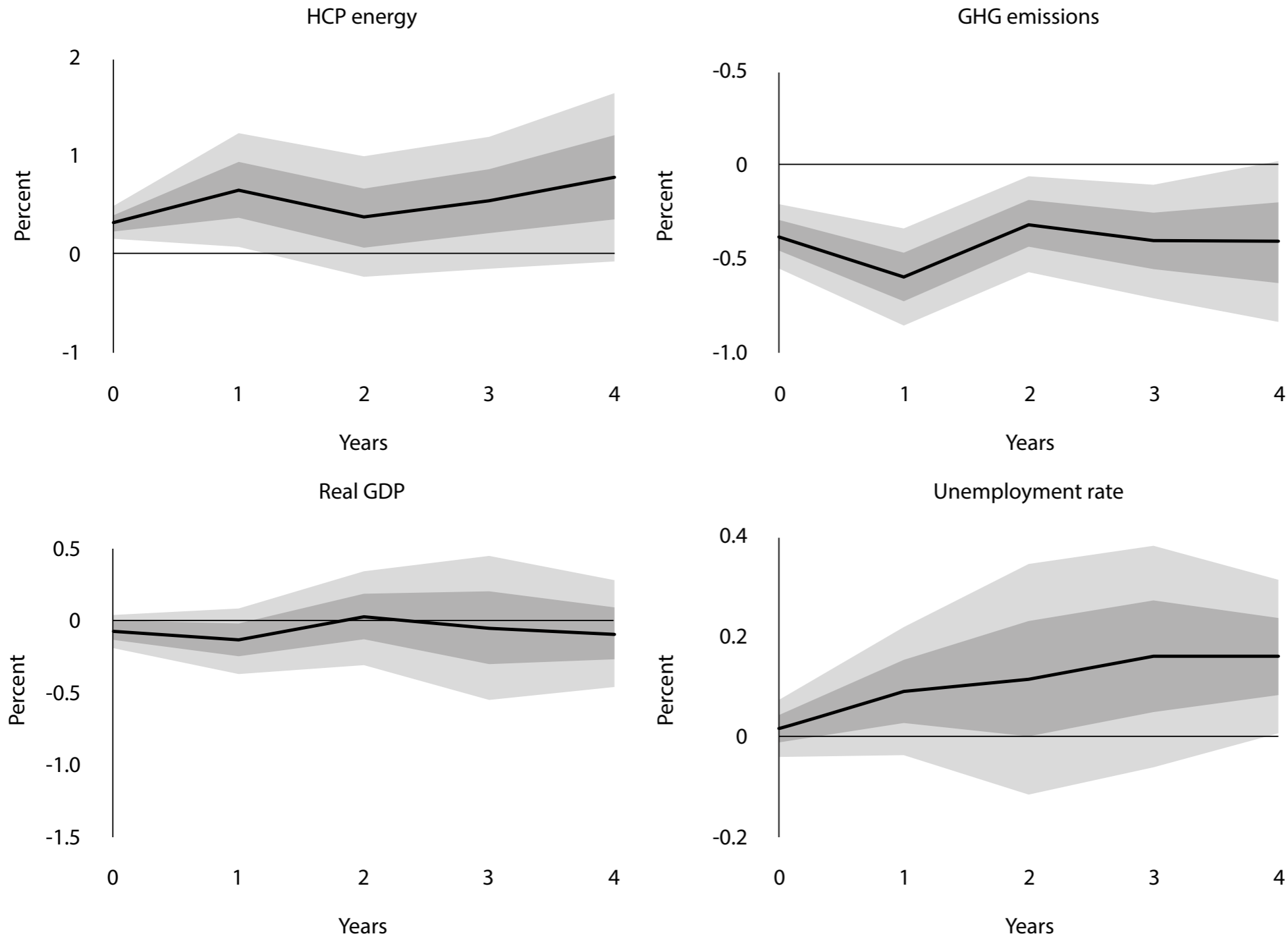
Figure 1. The effects of an increase in EU ETS carbon prices

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Notes: Impulse responses to an innovation in the ETS carbon price, normalized to increase real coverage-weighted carbon prices by one euro. The solid line is the point estimate and the dark- and light-shaded areas are 68 and 95 per cent confidence bands.

Figure 2. The effects of an increase in European carbon taxes



Notes: Impulse responses to an innovation in European carbon taxes, normalized to increase real coverage-weighted carbon taxes by one euro. The solid line is the point estimate and the dark- and light-shaded areas are 68 and 95 per cent confidence bands.

Further, we find only modest impacts on GDP, industrial production, or unemployment, corroborating the findings of Metcalf and Stock (forthcoming) and Konradt and Weder di Mauro (2021, forthcoming).

What explains the different effects?

What can explain the differential economic effects of carbon prices and carbon taxes? We shed light on four factors, which all play a role. First, unlike the EU ETS, national carbon taxes are frequently implemented alongside broader fiscal reforms that potentially cushion some of the burdens for firms and households.

To show this, Figure 3 separately estimates impulse responses for countries that indicated an intention to recycle carbon tax revenues. We see that the adverse economic effects are more pronounced in countries that do not recycle tax revenues, displaying a stronger fall in output and an increase in unemployment.

However, these differential impacts cannot be uniquely attributed to revenue recycling as non-revenue recycling countries also display a somewhat stronger response to energy prices.

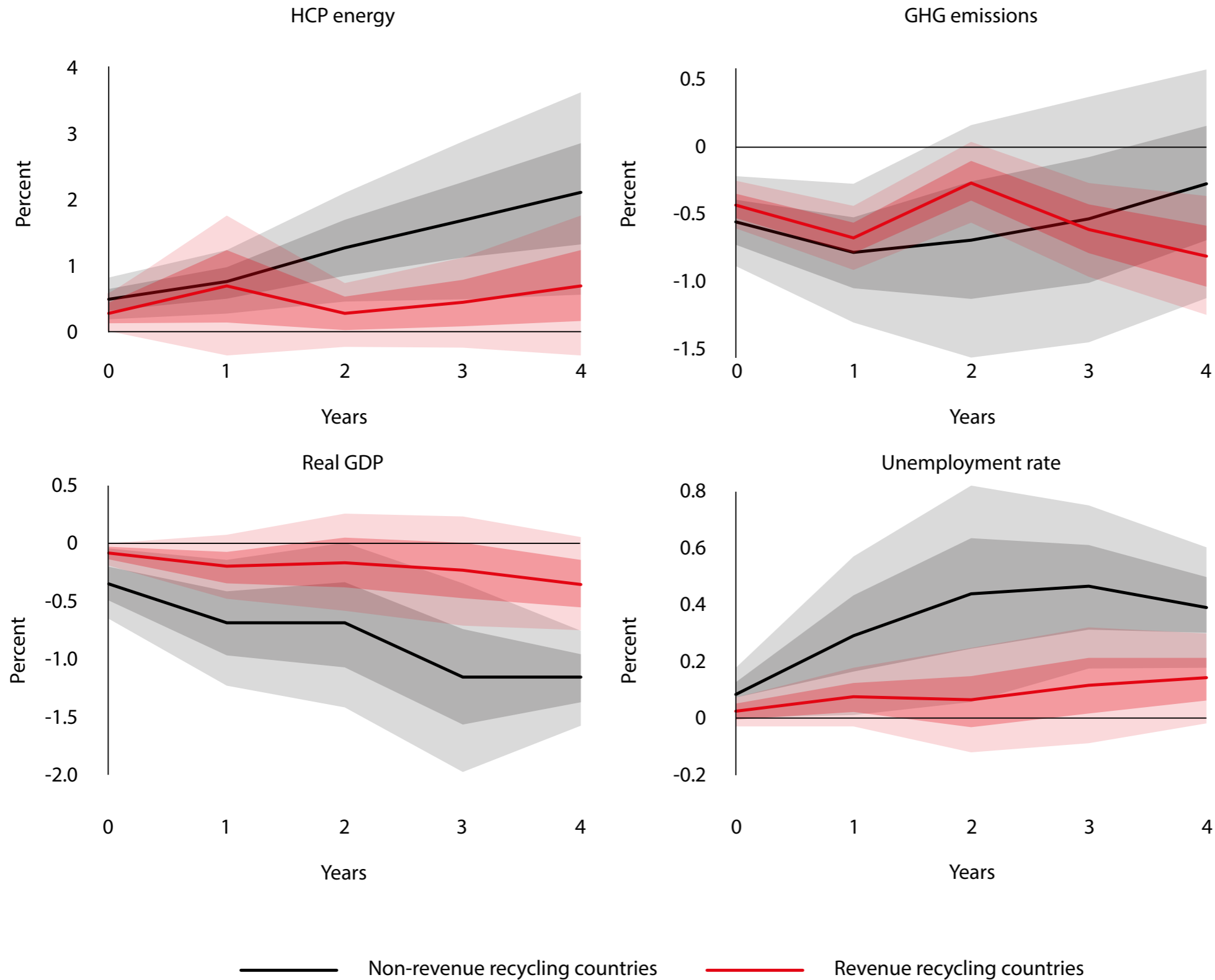
Interestingly, the emission responses turn out to be comparable, suggesting that redistributing tax revenues can lower economic costs without compromising emission reductions.

Second, an important distinction between the two carbon pricing initiatives relates to the type of sectors that are covered. Since energy-intensive firms likely pass through a larger fraction of emission costs (Fabra and Reguant 2014), prices could be more affected by the EU ETS, which covers the heaviest emitters.

Indeed, we document a significant response of energy, consumer, and producer prices after an increase in EU ETS prices while the price responses after an equivalent increase in carbon taxes are small and insignificant.

Figure 3. The role of revenue recycling

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Notes: Impulse responses to a carbon tax innovation in revenue (red line) and non-revenue recycling (black line) countries. The dark- and light-shaded areas are 68 and 95 per cent confidence bands.

Third, the broader scope of the ETS implies that countries experience simultaneous price changes, limiting the role of potential cushioning effects with unaffected trade partners or carbon leakage to third countries, compared to national carbon taxes. Consistent with this view, we estimate that only ETS prices significantly reduce overall EU emissions.

Lastly, monetary policy could also play a role in accounting for the differential impacts. Carbon policy-induced changes in consumer prices could trigger a policy reaction by the ECB, further reinforcing recessionary effects.

Conversely, one would not expect a monetary response to national carbon taxes, especially given the limited price pressure associated with these policies. Our estimates support this view: while interest rates rise significantly after an increase in ETS prices, the response to a carbon tax increase is estimated around zero and insignificant.

Regional heterogeneity

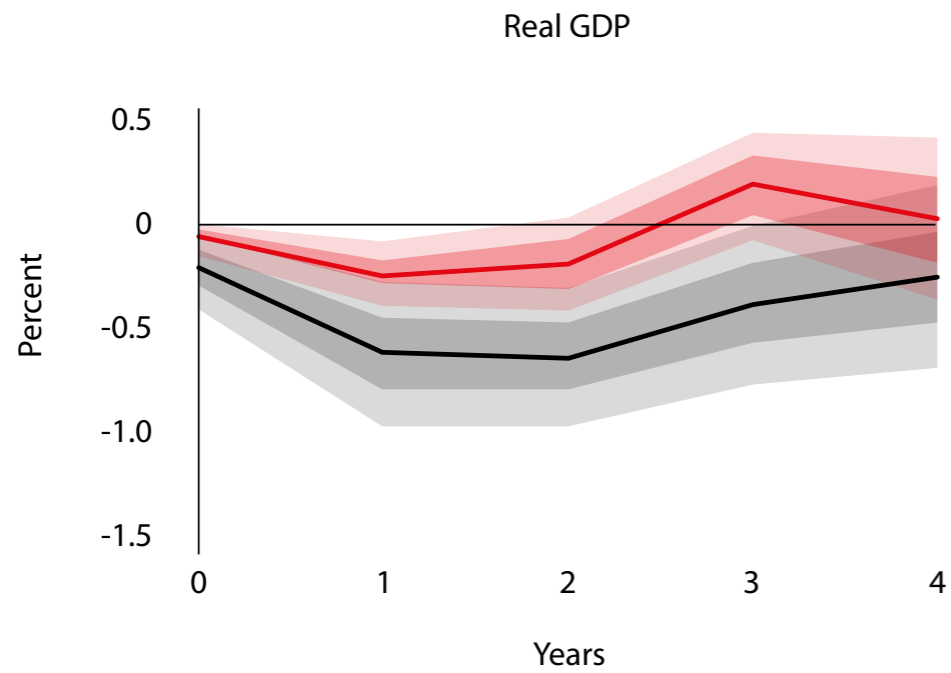
Although all European countries are faced with common carbon price changes in the ETS, the transmission likely depends on country characteristics.

We focus on the share of freely allocated emission certificates (relative to total emissions) and the degree of market concentration in the power sector as possible transmission channels. The former affects the costs that local firms incur to offset emissions while the latter likely influences the strength of pass-through to energy prices.

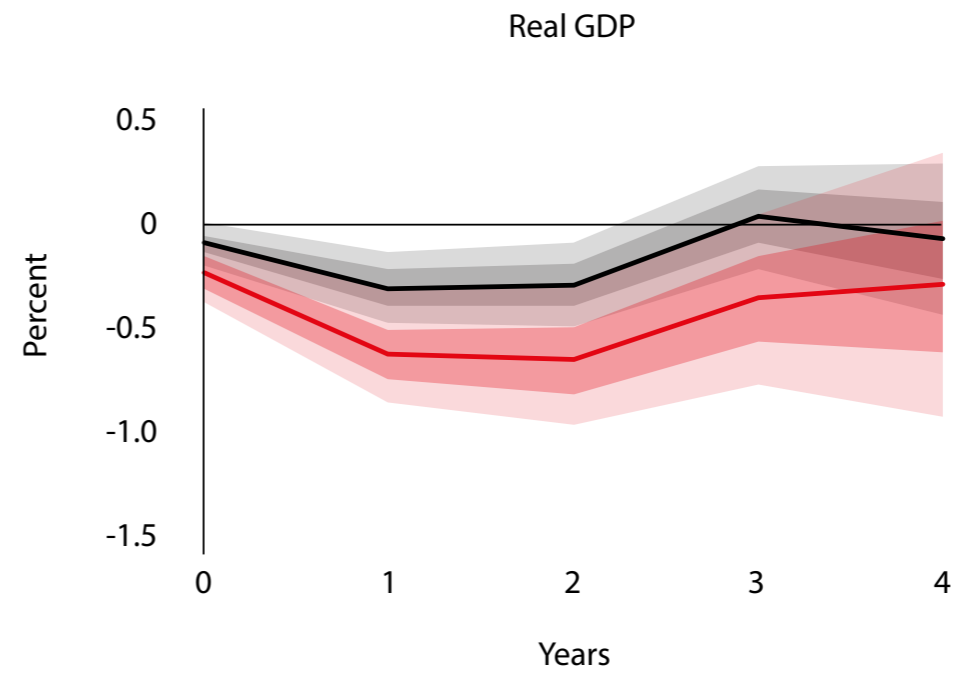
Figure 4 illustrates the effects on output based on the carbon price shocks identified in Känzig (2023), normalized to increase the HICP energy component by one per cent on impact.

Figure 4. Regional effects of the EU ETS

a) Free allowances



b) Market concentration



Notes: Impulse responses to a carbon price shock at the mean in grey and with one standard deviation higher share of free allowances to total emissions (panel A) and higher concentration in the power sector (panel B) in red. The black/red line is the point estimate and the dark- and light-shaded areas are 68 and 95 per cent confidence bands.

We see that a greater share of free allowances substantially dampens the output response (Panel A). Similarly, Panel B shows that higher concentration in energy markets is associated with a stronger negative effect on economic activity, as the energy price response turns out to be more pronounced.

Interestingly, the fact that free allowances were disproportionately allocated to the poorest member countries implies that they are largely insulated from the economic costs associated with carbon pricing. Instead, our findings suggest that countries in the second quartile of the per capita income distribution are most affected by the carbon market.

Concluding remarks

Carbon pricing policies in Europe have been successful at reducing emissions but can come at economic costs that are borne unequally across different regions.

Our results from contrasting the EU ETS with national carbon taxes suggest that the recycling of carbon revenues is a key policy tool that can mitigate the potential adverse economic effects of carbon pricing.

However, any complementary fiscal policies should also take the sectoral composition and strength of pass-through into account. ■

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The EU must stop carbon leakage at the border to become climate neutral

The EU is committed to achieve climate neutrality by 2050. Justus Böning, Virginia di Nino and Till Folger argue that to meet this aim carbon leakage at the border must be stopped

The Emissions Trading System has been the cornerstone of the EU's efforts to achieve climate neutrality by 2050. However, as currently implemented, it does not charge a price for the carbon embedded on import goods. This column shows that while the scheme has been successful in curbing the EU's carbon emissions, this has come at the cost of increased imports of carbon-intensive goods. It also highlights how the extent to which firms can outsource their carbon emission depends on ownership structure, with foreign-owned firms better placed to reorganise production to avoid the scheme.

The EU is determined to achieve climate neutrality by 2050. The environmental benefits of this resolution will be global, but will the burden be equally shared worldwide? What is the risk for the EU to incentivise relocation or imports of high carbon footprint production from emissions havens?

Carbon leakage¹ is a risk of environmental policies adopted without international coordination (Ishikawa and Cheng 2021). While scholars tend to agree that leakage has remained limited after the introduction of the EU Emissions Trading System (ETS) (Dechezleprêtre *et al* 2022, aus dem Moore *et al* 2019), they tend to argue in favour of exempting exports from carbon pricing (Weder di Mauro *et al* 2021).

However, their conclusions assume market conditions that the 'Fit for 55' package, with the aim of reducing net greenhouse gas (GHG) emissions in the EU by at least 55% by 2030, could rapidly change. In line with the reduction in emission allowances in recent years, the price of emissions, which represents the cost companies must pay for polluting in the EU and thus determines the incentive to relocate to unregulated regions, has increased considerably.

Against this backdrop, to preserve competitiveness of firms in the region and prevent carbon leakages, a carbon border adjustment mechanism (CBAM) on imports will charge foreign companies the same price paid by local businesses for their emissions when supplying the EU.

By charging the same price irrespective of the geographical location of emissions and producers, the CBAM aims at placing companies on an equal footing in the EU market, offsetting eventual competitiveness losses.

To preserve competitiveness of firms in the [EU] and prevent carbon leakages, a carbon border adjustment mechanism (CBAM) on imports will charge foreign companies the same price paid by local businesses for their emissions when supplying the EU

In this column, we contribute to the debate about the efficacy of EU green policies and their fallout on EU firms' competitiveness in three distinct ways. First, we provide new evidence on the ETS efficacy in curbing EU carbon emissions; at the same time, we highlight that the success came with costs. Carbon leakage occurred in regulated industries, and they appear less negligible than previously identified.

Second, we present the result of a novel study about the anti-competitive effects on EU industries associated to the ETS implementation. We shed light on the fact that uniformly applied policies can still produce differential effects on firms' output depending on their company's ownership structure.

Finally, because the choice to introduce a CBAM is connected to incentives for companies to dodge costly regulation, our analysis sheds light on the conditions under which it could deliver the EU's climate neutrality goal (Böning *et al* 2023).

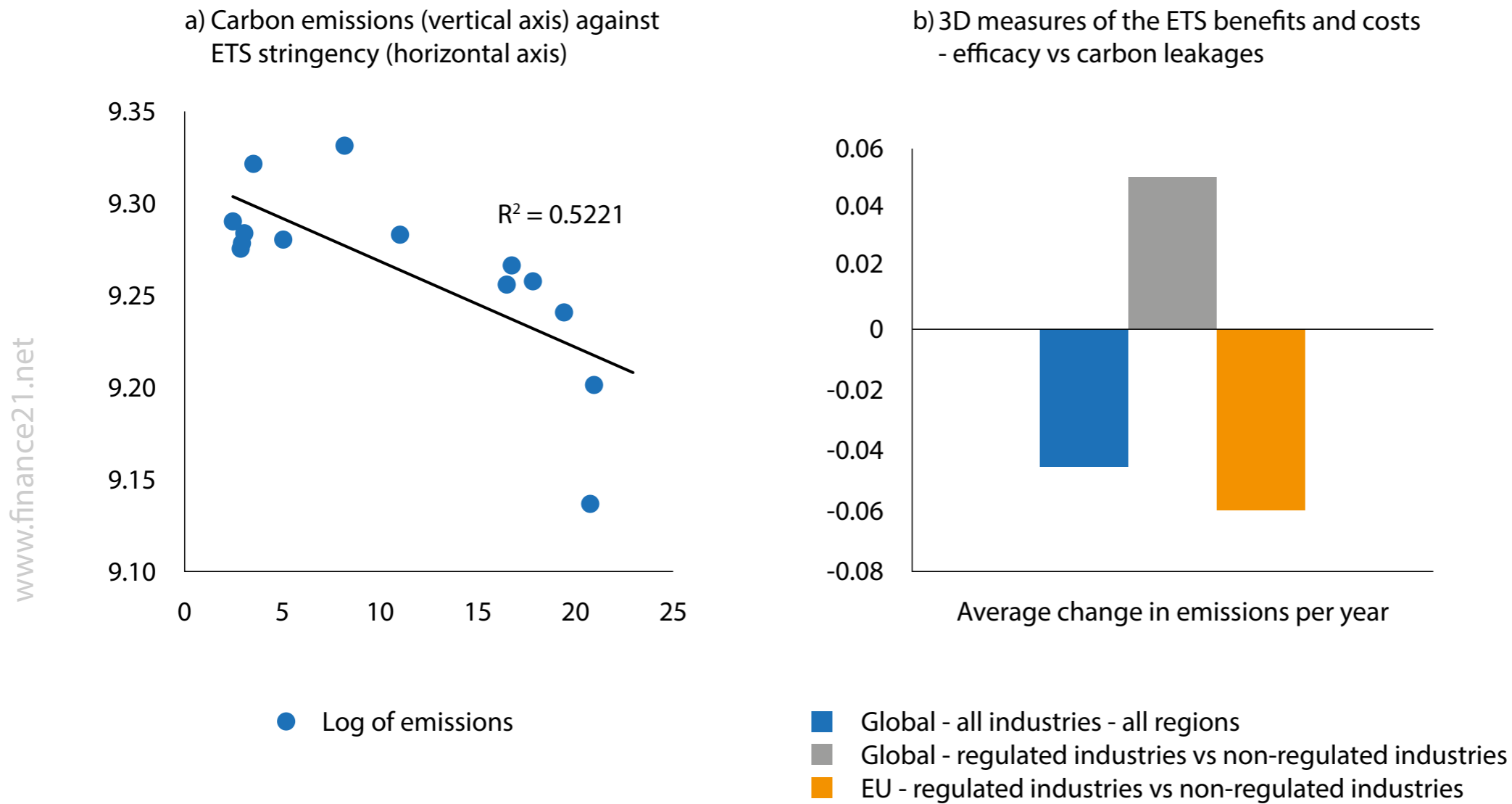
The ETS has delivered on its mandate, but prompted carbon leakage in regulated industries

A provisional deal on a revised ETS has already been reached and the discussion about introducing a CBAM on imports are at an advanced stage². A prerequisite for the new deal to work is proving that the existing ETS scheme has indeed reduced regional and global emissions. We determine the effectiveness of the ETS in two ways.

Firstly, by looking at yearly emissions we can see that these are negatively correlated with ETS stringency, which is proxied by the share of traded in total allowances in the previous year³. The linear negative association explains more than half of the variance in the average log of yearly emissions (see Chart 1).

These are estimated to have declined by about 2 percentage points more for each unitary increase in the ETS stringency⁴. The economic mechanism can be summarised by some firms investing in cleaner technology and selling unneeded emissions allowances.

Figure 1. ETS efficacy and associated carbon leakages



Notes: The sectoral emissions plotted in the left hand side chart were regressed against sectoral trends, country, time and sector characteristics then averaged across sectors. The scatter bin-plot show that the emissions, unexplained by these determinants, correlate negatively with the ETS stringency. ETS stringency is proxied with the lagged value for the shares of traded allowances over total allowances. The 3D measure of ETS benefits and costs are derived from a diff-in-diff-in-diff estimate of yearly log emissions between 2005 and 2018, on its lagged value, country, sector, time fixed effects price of emissions, sectoral trend and country deterministic trends. The blue bars is the reduction in global emissions after the ETS came into force in 2005. The grey bar shows the change in emissions in ETS industries but global level. They are offsetting the global reduction. Last, the yellow bar depicts the average change in emissions of ETS industries in the EU relative to the average change in emissions of the same industries but global level (grey bar). Overall, EU efforts to reduce emissions were countered by the increase in global emissions of ETS industries.

Sources: Tonnes of CO₂ equivalent greenhouse gas emissions are from the European Environment Agency (EEA), which also provides the number of allowances and the amount of surrendered emissions by sector and country since 2005.

Meanwhile, other firms may cut back on production, thereby reducing emissions and allowing them to sell the saved emissions permits. To corroborate this hypothesis, we also find that pricier emissions and more stringent caps accelerated the EU greening process after 2013.

Thereby, we conclude that the pricing mechanism was effective as emissions declined faster the higher the stringency and the higher the price of each emission permit, in line with other analyses in the literature (Känzig 2023).

However, these achievements came with costs that are uncovered when the study is extended to unregulated industries and regions. A distinct analysis estimates the ETS's efficacy through a '3D' (difference-in-difference-in-difference) approach which leverages on the triple dimensional (time-sector-region heterogeneity) to identify the scheme's effects, while controlling for emissions autoregressive processes, sectoral trend and time, industry and country fixed effects. This second analysis confirms that the ETS resulted in cuts in the EU's GHG emissions of approximately 2–2.5 percentage points per year.

Nevertheless, unlike earlier studies which found limited empirical evidence of carbon leakages, our analysis finds that heavy emissions activities increased outside the EU, as emissions in regulated industries within the EU declined.

Against a backdrop of declining emissions since 2005 (Figure 1b, blue bar), the global yearly emissions by regulated industries rose over the same period (grey bar). Thus, the additional reduction in regulated industries within the EU (yellow bar) were offset by a simultaneous rise in emissions of those same industries elsewhere. This runs counter to the EU's efforts to also help reduce emissions globally.

The ETS's anti-competitive effects: a guide for the equal footing of the CBAM

In order to see whether the ETS equally incentivised all companies to relocate or import emission intensive inputs, we utilised information on sectoral output values and input-output linkages. We also distinguished companies by location (within and outside the EU) and ownership structure (domestic and foreign affiliates of multinational enterprises) which we match with industry's emissions and ETS prices⁵.

We then regress the value of production by sector-country and ownership type on (1) emissions intensity by sector-country-ownership type, (2) exposure to emission intensive inputs distinguishing them by sourcing region (EU and outside the EU), and (3) the cost of the exposure to EU ETS regulation⁶.

The aim is to verify whether a uniform regulation can trigger differentiated effects depending on the companies' ownership and the exposure of production to high-carbon footprint inputs, which are either sourced from within the EU and, hence, covered by the ETS or from outside the EU.

We find the EU production in regulated sectors to generally be more sensitive to emissions intensity than non-EU production, irrespective of the company ownership structure. We also find that purchasing high-emission inputs from within the EU translates into a competitive disadvantage for companies located within the EU.

For these companies, shifting the sourcing of inputs from within to outside the EU raises total production but to a different extent for domestic and foreign owned companies.

Specifically, the production of domestically owned companies in regulated industries from within the EU correlates negatively with the share of high-carbon footprint inputs sourced from within the EU and correlates positively with

the share of the same inputs when they are sourced from outside the EU. Production of foreign-owned companies behaves similarly in terms of correlations across sourcing regions.

However, the impact of a reshuffling across sources of emission intensive inputs from within to outside the EU grows larger as the price for allowances rises (Figure 2). Because ETS prices have risen in recent years and are anticipated to continue growing as the FIT-for-55 package comes into force, the incentive to change sources for foreign owned companies is ever growing.

Against this background, foreign-owned companies seem better placed to dodge the regulation and reshuffle their inputs sources in favour of those located outside the EU unless these are also held accountable for their emissions when supplying the EU customers.

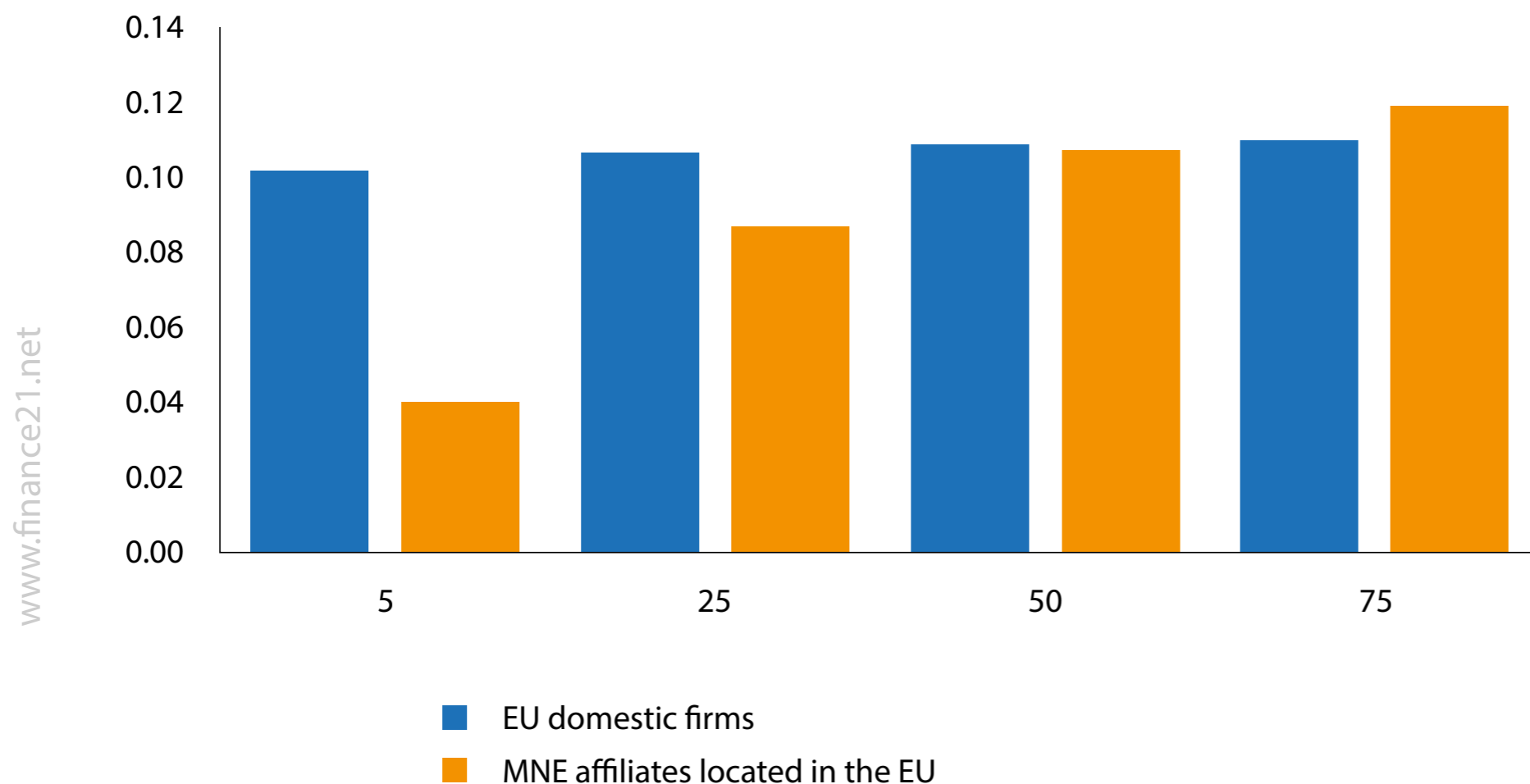
The analysis does not reach the same conclusions when investigating production of companies located in the EU but operating in unregulated sectors; reshuffling across input sources in this case did not lead to any sizeable increase in total production, at least not for the time under consideration.

Conclusion

Overall, our study confirms that the ETS is effective in curbing EU emissions, but at the cost of burdening companies in the EU, especially domestic ones, and triggering carbon leakages.

Different sensitivity of EU production to sourcing of emissions-intensive inputs depending on the company's ownership, suggests that some business models may have more leeway in reorganising production processes and sourcing high-carbon footprint inputs from outside the EU.

Figure 2. Sourcing high-carbon footprint inputs: The effect on production of a 1 percentage point shift from the regulated EU to unregulated regions (in percentage points)



Notes: The chart depicts the effect of a hypothetical shift by one percentage point across sourcing regions of high carbon footprint inputs from within to outside the EU based on estimates from regression analysis. The log value of sectoral production is regressed on country-sector-ownership fixed effects, emission intensity (emissions per euro worth of production), log value of inputs and the four shares of high carbon footprint inputs sourced from Domestic and MNE companies. The coefficient on these four regressors return the sensitivity of sectoral production to emission intensive inputs depending on regions they are originated, eg. from within and outside the EU. The specification also includes the interaction of these shares with the price paid on allowances in t-1, to capture the non-linearity of exposure to ETS regulation depending on the cost/price for allowances. The equation specification encompasses also deterministic country and industry trend and time unobserved heterogeneity, besides proper country-sector-ownership type fixed effects. Matching the AMNE and WIOD databases eventually yields 34 sectors and 44 countries (including RoW) spanning 2000-2016. Regulated (ETS) industries are Coke and refined petroleum products (C19), Basic metals (C24), Other non-metallic mineral products (C23), Electricity, gas, water, waste and remediation (DTE), and Transport and storage (H).
 Sources: OECD-AMNE, authors estimations

Because the new EU environmental legislation aims at preventing similar behaviour through the CBAM, there is a need for a careful design of this mechanism, in terms of equivalent tariff charged on emissions embedded in imports and of CBAM industry's coverage. Our analysis advises in favour of extending the application of a CBAM on all regulated productions. ■

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Endnotes

1. According to the European Commission website, “[c]arbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints. This could lead to an increase in their total emissions. The risk of carbon leakage may be higher in certain energy-intensive industries” (https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/carbon-leakage_en)

2. Both these tools are devised to strike the best possible trade-off between carbon emissions reduction and the preservation of production competitiveness in the region by minimising the occurrence of carbon leakages also taking into consideration administrative, technical and political aspects related to their enforcement. The remodelled ETS envisages stricter trading rules, extends the industry coverage, in particular to transport and buildings, and cuts more decidedly on emission allowances. More importantly it gradually phases out the free carbon allowances, granted to emission-intensive and trade-exposed (EITE) industries to prevent carbon leakages. The EITE industries are those with an increase in direct and indirect production costs induced by the ETS, as a proportion of the gross value added, by at least 5%; and that operate in sectors with trade intensity with non-EU countries (imports and exports) above 10%. In this context, a CBAM on imports of certain EITE products (cement, iron, steel, aluminium, fertilisers, and electricity) is phased in as of 2026 to guard EU production from the competition of foreign companies operating in unregulated regions. Importers will buy certificates proportional to the emissions embedded in imports at the ETS market price. For further details, see <https://www.consilium.europa.eu/en/press/press-releases/2022/03/15/carbon-border-adjustment-mechanism-cbam-council-agrees-its-negotiating-mandate/> <https://www.consilium.europa.eu/en/press/press-releases/2022/12/18/fit-for-55-council-and-parliament-reach-provisional-deal-on-eu-emissions-trading-system-and-the-social-climate-fund/>. Stepping up Europe’s 2030 climate ambition - Investing in a climate-neutral future for the benefit of our people,” Communication.

3. For a given technology and industry’s production, the ratio of traded over total surrendered allowances rises in those sectors where granted allowances become scantier, mimicking the degree of sectoral stringency of the emissions’

regulation. However, the contemporaneous values of these sectoral ratios could be plagued by endogeneity since they co-move with relative industry's production, thus pushing up also the traded ones. Thereby in our study, the ETS stringency is defined by the share of traded allowances over total surrendered allowances per regulated sector at t-1. Intuitively if in a given period companies were forced to purchase a higher share of total emissions, their production cost will increase proportionally to the spending on allowances, incentivizing them to cut down on emissions the year after. This is what our empirical estimates confirm.

4. The sectoral emissions are regressed against sectoral trends, country, time, sector characteristics, the ETS stringency (e.g. share of traded in total allowances) and the cost associated to the traded emissions.

5. Data on gross output by country and sector, the share of emission-intensive inputs and imports on total were obtained from the OECD AMNE database that distinguishes companies according to domestic and foreign ownership (see Cadestin et al. 2018). The period covered spans 2005-2016

6. The exposure is defined by the share of high carbon footprint inputs on total inputs. The cost is the same share multiplied by the price of emission allowances per period. In the attempt to eliminate any bias which could affect the results coming from other unobservable factors affecting production which are unrelated to the ETS, the analysis controls for 3D fixed effects (sector-country-ownership), include time fixed effects and sectoral and country deterministic trends.

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Carbon trade-offs: how firms respond to emissions controls

Regulatory efforts to control carbon emissions are intensifying around the world. Maria Cecilia Bustamante and Francesca Zucchi examine the effects of carbon pricing mechanisms on businesses

Given that regulatory efforts to control carbon emissions are intensifying around the world, understanding the incentives that carbon pricing creates for firms is paramount. This column presents a framework showing that whilst carbon pricing mechanisms curtail firms' carbon emissions, as it becomes costlier to comply, these mechanisms also tilt polluting firms' investment mix towards short-term abatement and away from green innovation. Subsidies for innovation can partly offset this shift and, overall, can boost firms' green investment.

To limit global warming, several countries around the world have adopted carbon pricing mechanisms (or are considering doing so). As shown in Figure 1, regulators rely on two carbon pricing mechanisms: emissions trading systems and carbon taxes (or a combination of the two).

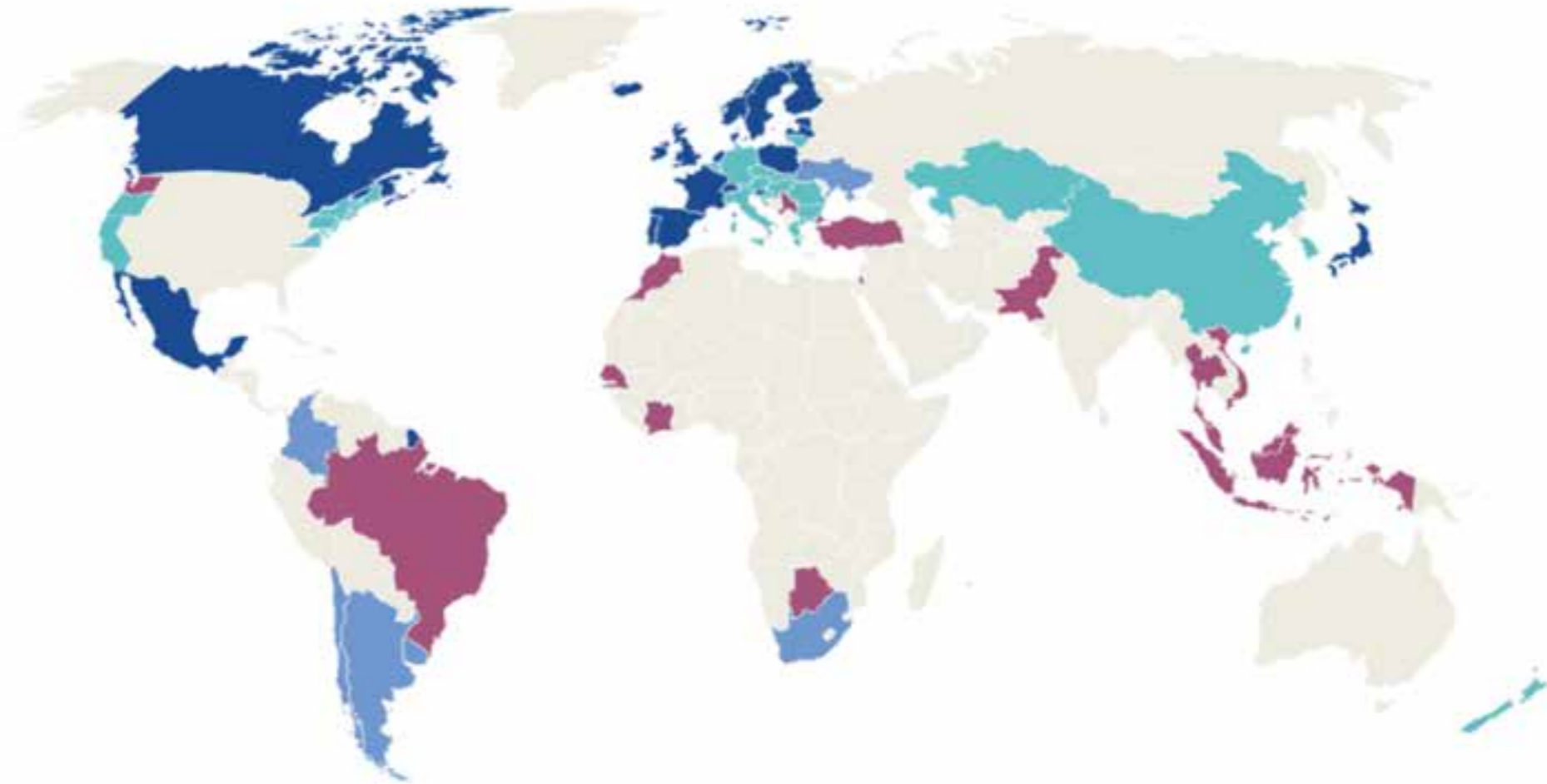
Under emissions trading systems, carbon credits give firms the right to release a set volume of emissions into the atmosphere (generated through their production processes). These credits are also tradeable, which means firms with a shortage of credits can buy them, and firms with an excess of credits can sell them.

In contrast, under carbon tax systems, a central authority sets a predetermined price that emitters pay for a set volume of emissions. A common feature of carbon pricing mechanisms is that they impose additional costs on businesses.

As a result, every tonne of carbon dioxide produced through industrial processes needs to be paid for, either by surrendering carbon credits (which are costly) or by paying a tax on it.

Given that regulatory efforts to control carbon emissions are intensifying around the world, understanding the incentives that carbon pricing creates for firms is paramount. Intuitively, by making pollution costly, carbon pricing mechanisms should provide incentives for firms to reduce their carbon footprint.

Figure 1. Carbon pricing around the world



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*Notes: The map illustrates the adoption of carbon pricing mechanisms around the world. The boundaries and other information shown do not imply on the part of the IMF any judgment on the legal status of any territory or any endorsement or acceptance of such territories.
Sources: World Bank Group, IMF staff calculations and national sources, July 2022.*

However, a key question is how firms attain this goal. The answer is indeed not obvious, as firms can have various options at their disposal to limit their carbon footprint; for instance, they can cut their output or engage in green investment with various horizon and cost profiles.

The control of carbon emissions by regulators poses a new challenge in the corporate world, namely maximising shareholder value by developing an optimal carbon management policy

To answer this question, in a recent paper (Bustamante and Zucchi 2023) we have constructed a theoretical framework to investigate the incentives that carbon pricing creates for firms and how they should therefore best respond.

We study the three most prevalent regulatory frameworks: laissez-faire (or no regulation), emissions trading systems and carbon tax systems. We assume that firms choose the mix of policies that maximises shareholder value.

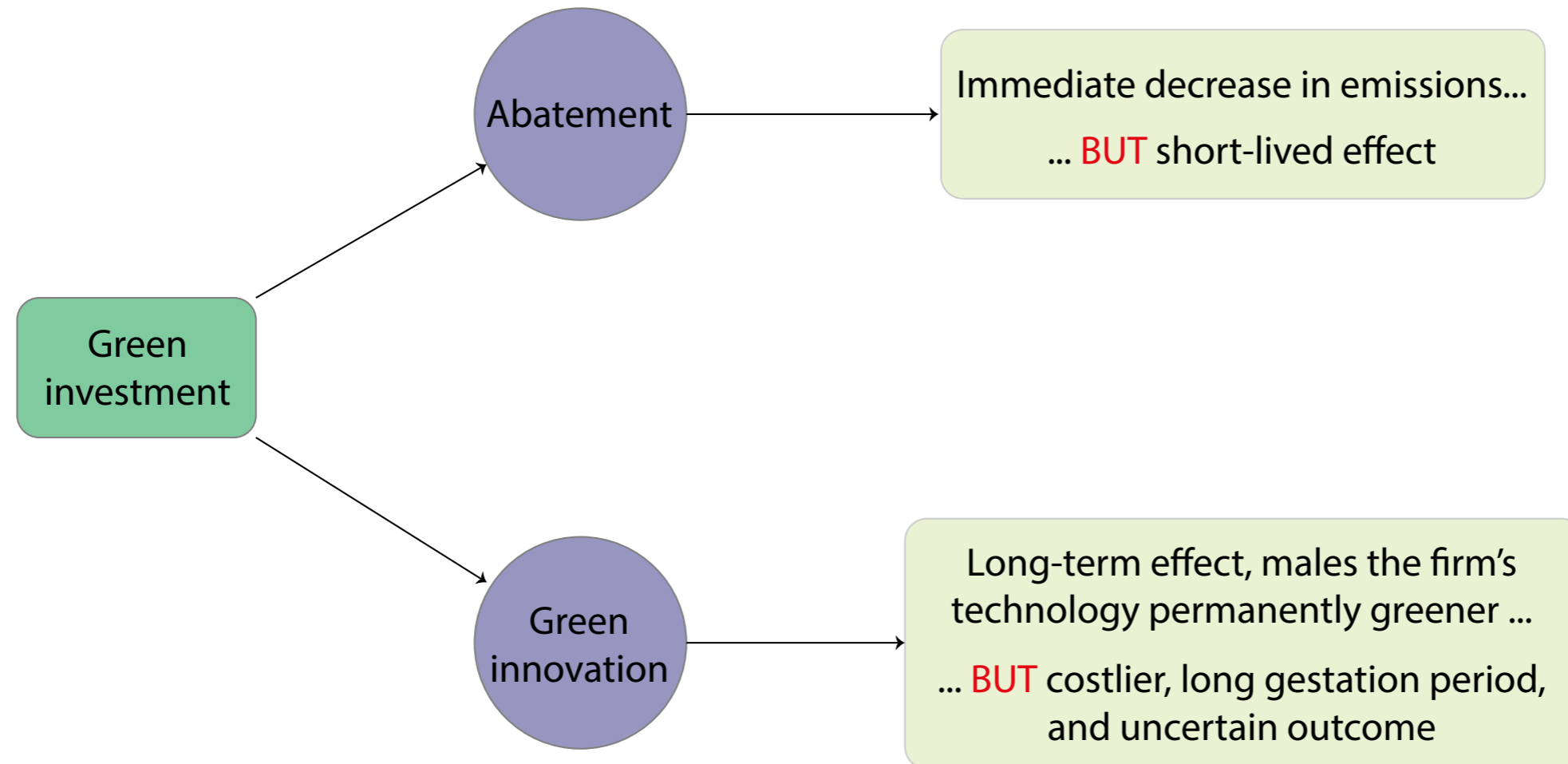
First, they can adjust their scale of production, which directly determines their gross carbon emissions. Second, firms can engage in green investments, which are intended to make industrial processes cleaner. Third, under emissions trading systems, they can optimally manage and trade carbon credits. As a result of this dynamic problem, firms' net emissions depend on the choices they make, and vary over time.

As a novel distinction, our framework acknowledges that green investment projects feature different characteristics. Two green investment projects at opposite extremes of the spectrum can be considered, as illustrated in Figure 2: abatement and green innovation.

At one extreme, abatement projects are aimed at offsetting some of the firms' emissions. That is, firms generate emissions through their production processes and abatement projects have the effect of 'cleaning up' some of these emissions. Planting trees or carbon capture and storage are just some examples. While immediately reducing firms' net emissions, abatement projects do not result in structural technological change.

At the other extreme, green innovation fosters the transition to novel, more sustainable technologies and has a long-lasting effect – it makes a firm's technology permanently less polluting¹. Pioneering inventions which accelerate the phasing-out of fossil fuels are a key example. While having a long-term impact on sustainability, green innovation is costlier than abatement, has a long gestation period, and has an uncertain outcome².

Figure 2. Green investment types



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Note: The diagram shows the different types of green investment that a firm can undertake along with the associated benefits and downsides, as described in Bustamante and Zucchi (2023).

How do firms respond to carbon pricing?

A first insight of our analysis is that carbon pricing effectively leads to a reduction in firms' net carbon emissions compared with laissez-faire, which is consistent with the available evidence (See, for instance, Fowlie *et al* 2012, Martin *et al* 2016).

This happens for two reasons. First, firms produce less compared with laissez-faire, as carbon pricing makes them internalise the externalities associated with their industrial processes. Second, firms engage in green investment.

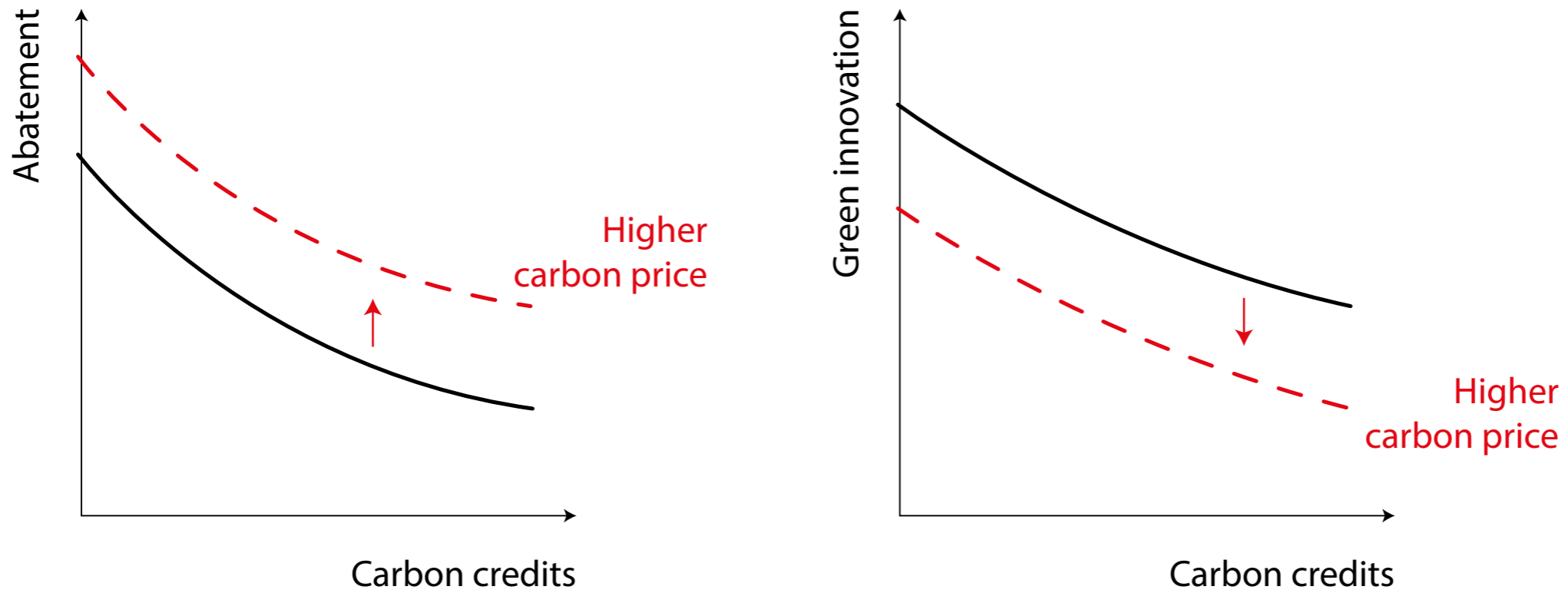
Moreover, our analysis reveals that carbon pricing affects firms' green investment mix. As it becomes costlier to comply, polluting firms tilt their green investment mix towards short-term abatement and away from green innovation, as illustrated in Figure 3.

The reason is that abatement effectively and immediately reduces a firm's expected cost of carbon regulation, whereas green innovation has a delayed and uncertain outcome. That is, by engaging more in abatement, firms decrease their net emissions with immediate effect – thus, they reduce their need to buy credits under emissions trading systems, or they lower their tax liability under carbon tax systems.

Shifting to abatement, however, can slow down the transition to greener technologies. Our analysis shows that this shift can be (at least partly) offset by complementing carbon pricing with subsidies for green innovation. Such subsidies not only spur greater engagement in green investment, but also tilt the mix in favour of green innovation.

In the specific case of emissions trading systems, our model also warns that firms holding larger balances of carbon credits are less committed to curbing their emissions (consistent with the empirical evidence in De Jonghe *et al* 2020).

Figure 3. Carbon pricing and the green investment mix



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Notes: The diagram shows how the different types of green investment (abatement and green innovation) respond to an increase in the carbon price, as described in Bustamante and Zucchi (2023). If the carbon price increases – meaning that it becomes costlier to comply – polluting firms increase their investment in abatement and decrease their investment in green innovation. The figures also show that firms’ engagement in green investment decreases as their balances of carbon credits increase.

The reason is that firms adopt precautionary policies to minimise their need to buy carbon credits and incur the ensuing costs. This precautionary need is especially strong when firms have low balances of carbon credits. In those instances, firms optimally cut production to reduce their consumption of credits and, additionally, increase their green investment.

Conversely, a large balance of carbon credits reduces this precautionary need. Thus, firms increase production and reduce their engagement in green investment, leading to higher emissions overall. Our model then suggests that limiting the distribution of free carbon credits can make firms more committed to green investment.

Lastly, our model suggests that carbon regulation does not necessarily decrease shareholder value. Despite the long-standing perception of a conflict of interests between businesses and environmental regulators, a growing body of empirical literature documents that the effects of climate regulation vary across firms (eg. Bolton *et al* 2023, Trinks and Hille 2023).

Our paper provides theoretical grounds for this evidence. In fact, the sale of carbon credits as well as subsidies for green firms can effectively increase valuations if firms are sufficiently committed to reducing their carbon footprint.

Conclusion

The control of carbon emissions by regulators poses a new challenge in the corporate world, namely maximising shareholder value by developing an optimal carbon management policy. We show precisely how firms should optimally manage carbon emissions through their scale of production, green investments of various types, and the management of carbon credits.

Our analysis suggests that carbon pricing mechanisms curtail firms' carbon emissions but, as it becomes costlier to comply, these mechanisms also tilt polluting firms' investment mix towards short-term abatement and away from green innovation.

Subsidies for innovation can partly offset this shift and, overall, can boost firms' green investment. Our model also shows that, under emissions trading systems, firms with large balances of carbon credits are less committed to reducing emissions, which provides an argument in support of limiting the allocation of free carbon credits. Overall, we conclude that carbon regulation does not necessarily decrease shareholder value. ■

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Endnotes

1. Green innovation is viewed as necessary to limit global warming to the Paris Agreement's targets, as noted by Aghion et al (2022), among others. A seminal contribution studying endogenous green innovation is Acemoglu et al (2012).
2. De Haas and Popov (2023) document how these characteristics make green innovation hard to finance.

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Flight to climatic safety

Weather-related disasters are increasing in frequency and intensity. Fabrizio Ferriani, Andrea Gazzani and Filippo Natoli investigate whether these events can shape international investors' portfolio flows

Natural disasters can shape global financial investment. This column employs a dataset that spans 2009-2019 to study the effect of extreme natural events on global financial flows. The authors find that when disasters strike, investors reduce their net flows to mutual funds exposed to affected countries only if the latter are emerging economies at higher climate risk.

At the same time, they reduce flows into unaffected, high-climate-risk countries in the same region and increase them into climatically safer advanced economies. Natural disasters appear to trigger an updating of beliefs about the global climate threat, with investors searching for climatic safety.

Weather-related natural disasters are increasing in frequency and intensity worldwide because of climate change. Their economic consequences are highly heterogeneous across countries, as some countries are more exposed or more vulnerable than others (Rossi-Hansberg and Cruz 2021, Blanchard and Tirole 2022). This heterogeneity may have profound financial implications at the global scale.

However, while the economic analysis of climate change and natural disasters has often adopted a multi-country perspective (Dell *et al* 2014, Botzen *et al* 2019), evidence of the effects of local climate events beyond country borders is rare at best. Notable exceptions are Gu and Hale (2023) and Hale (2023), who study the implication of natural disasters for foreign direct investment and exchange rates, respectively.

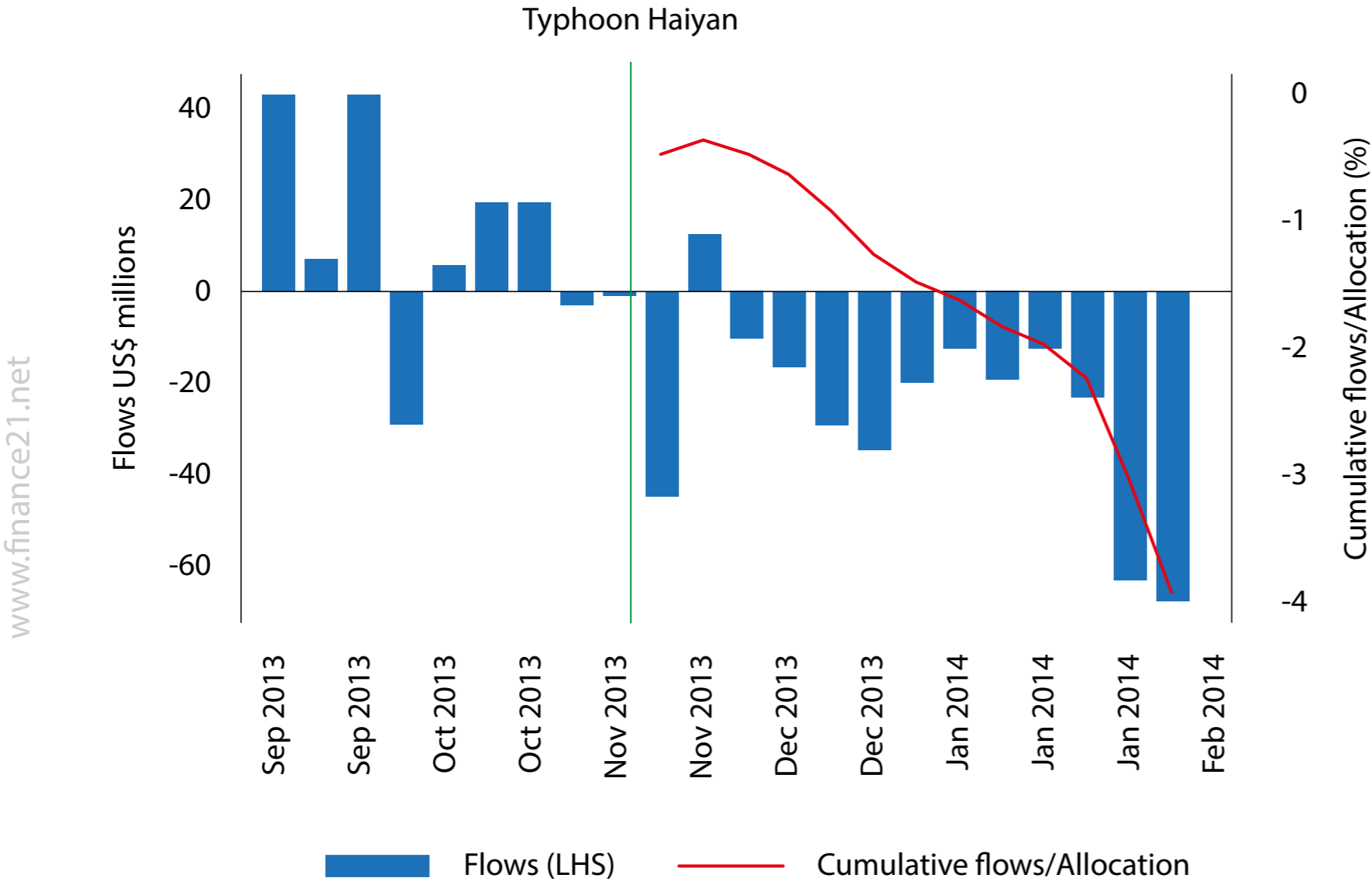
We take up this issue by investigating whether these events can shape international investors' portfolio flows. We construct a multi-country weekly dataset tracking the occurrence of large natural disasters and net inflows to equity mutual funds by destination country¹. We employ the dataset that spans 2009-2019 to study the effect of extreme natural events on global financial flows².

The Typhoon Haiyan case study

A neat illustration of the mechanism we uncover is exemplified by the dynamics of net inflows to mutual funds investing in the Philippines before and after Typhoon Haiyan in 2013 (Figure 1). Whereas, before the disaster, equity flows to the country were fluctuating, after the typhoon a clear and persistent pattern of capital outflows emerged. We generalise this narrative and investigate the drivers underlying this phenomenon through rigorous econometric analysis.

Results suggest that international investors flee countries that are risky from a climatic standpoint and recompose their portfolios towards safer economies that are also more resilient to future natural disasters

Figure 1. Case study: Impact of Haiyan Typhoon on equity portfolio flows to the Philippines



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The impact of natural disasters on portfolio flows

In our recent paper (Ferriani *et al* 2023), we use several panel regression models to estimate the effect that natural disasters exert over time on portfolio equity flows³.

Our estimates point to a significant response of international investors exclusively when disasters hit emerging economies (EMEs), in particular those classified as the most vulnerable to climate change, see Figure 2⁴.

Inflows to these countries drop gradually after the disasters unfold, with inflows remaining persistently subdued for about three months. The cumulated impact of each event at its maximum is, on average, associated with a 0.1 percentage point decrease in net portfolio flows (scaled by asset under management), a sizable effect if compared with average weekly net flows that are equal, in our sample, to 0.16%⁵. Conversely, advanced economies and less climate-vulnerable EMEs do not see a reduction in capital inflows.

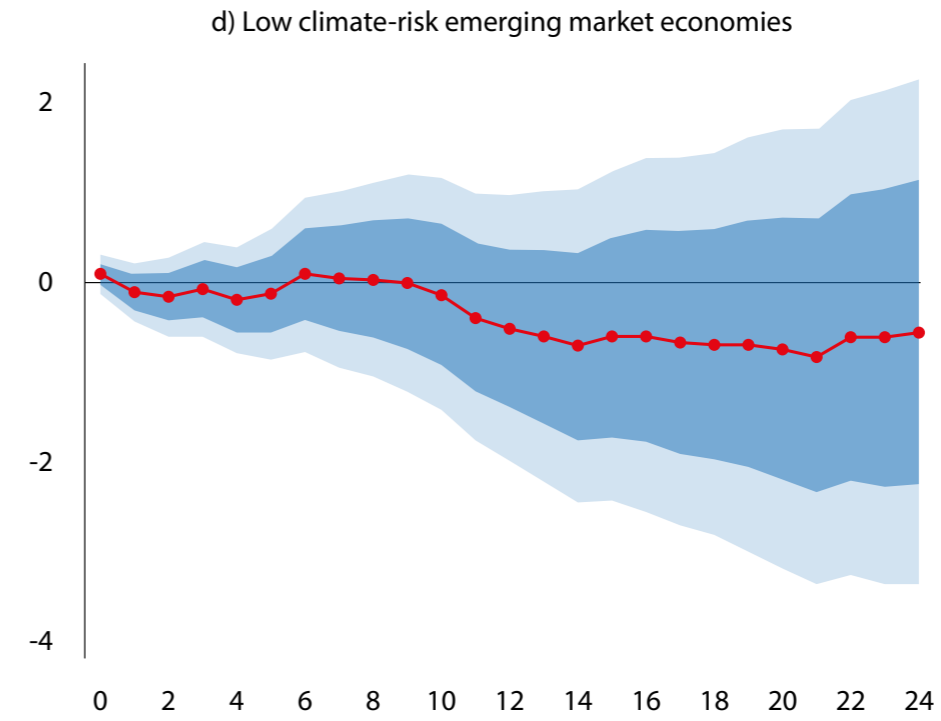
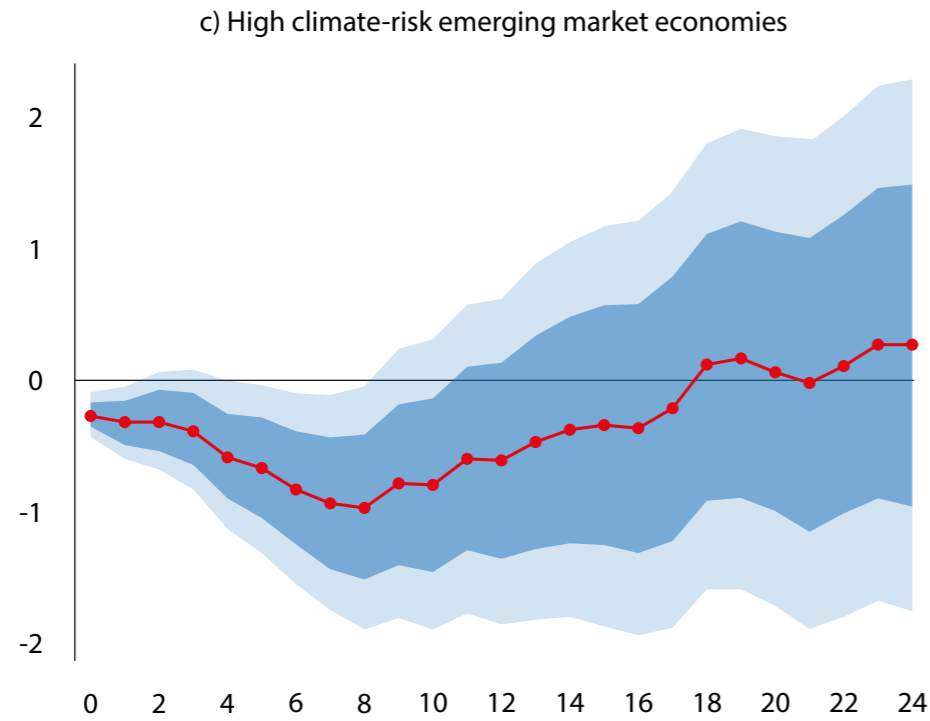
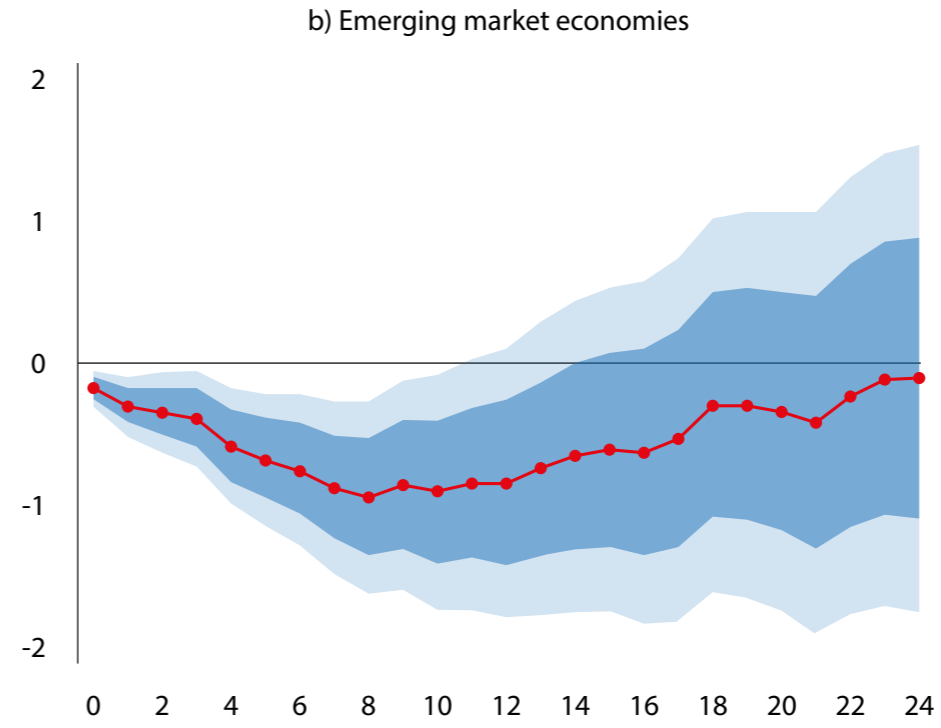
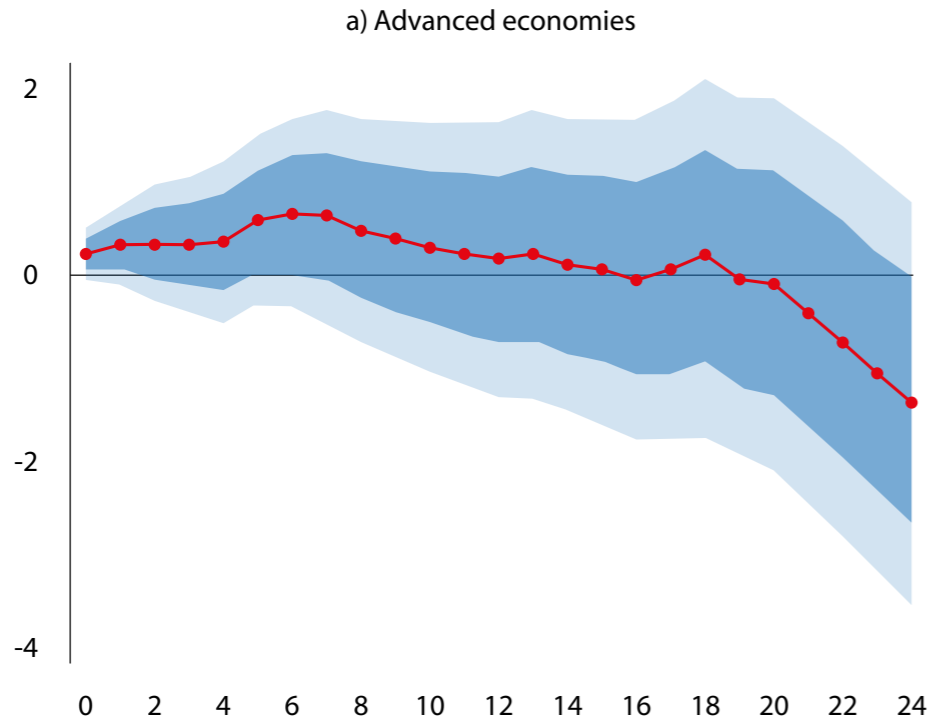
Search for climatic safety

What drives the response of investors? Disasters can physically disrupt the productive structure of the economy and investors may pull out of the country due to the fall in expected cash flow. Our analysis suggests, however, that the investors' behaviour is primarily driven by an update of beliefs on the global climatic threat.

This conclusion builds on two additional results. First, we show that investors pull out even from neighbouring countries that have not been directly hit by a disaster but that are arguably subject to the same climatic risks. This result holds even controlling for trade linkages between neighbouring countries, ie. net of any spillover effect coming from the disaster.

Figure 2. Impact of natural disasters on equity portfolio flows

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Note: Impact of natural disasters on equity portfolio flows, the horizon is weekly; coefficients represent percentage points, with 68% and 90% confidence bands.

Second, after a disaster occurs in climatic-vulnerable EMEs, advanced economies benefit from increased inflows proportionally to both their exposure to climatic risk and their level of insurance to climatic events (Figure 3)⁶.

Among advanced economies, traditional safe haven countries such as Japan, Germany, and Switzerland, which are typically beneficiaries of standard flight-to-safety episodes, do not receive heightened flows in response to natural disasters occurring in high climate-risk EMEs.

Taken together, these results suggest that international investors flee countries that are risky from a climatic standpoint and recompose their portfolios towards safer economies that are also more resilient to future natural disasters.

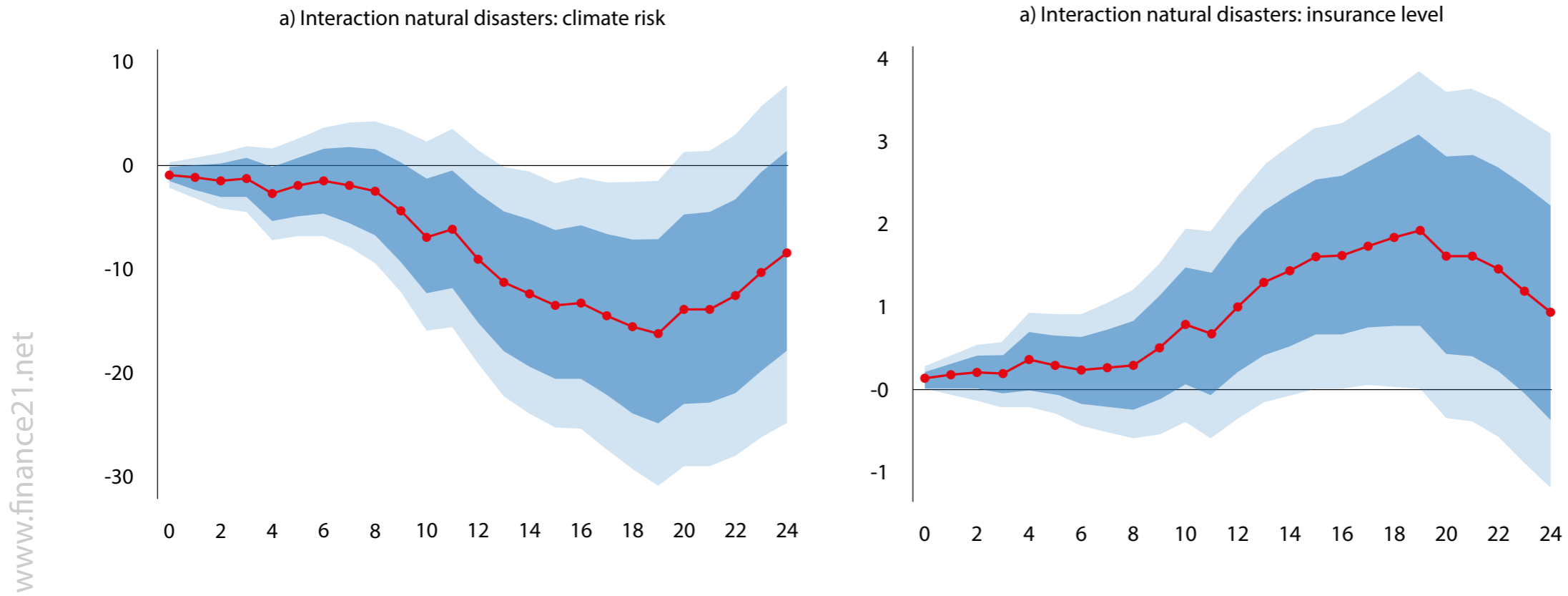
The occurrence of such events appears to raise investors' attention towards the global climatic threat, shaping their beliefs about the portfolio risks attached to the invested countries. According to this interpretation, disasters can shape mutual funds inflows and outflows by triggering a specific flight-to-safety motive for trading, based on the perceived climate risk of the invested assets – a flight to climatic safety.

Importantly, all these results hold after multiple robustness tests where we use alternative measures of portfolio flows, climatic riskiness, insurance level, definitions of climate events, and controls for each countries' fiscal capacity.

Conclusions and policy implications

We uncover a novel and relevant dimension through which climate change affects the global economy that was previously disregarded in the international finance literature.

Figure 3. Spillovers to advanced economies



Note: Spillover from high-risk EMEs to AEs. The left plot displays the IRFs of the interaction term between ND-GAIN vulnerability index and the dummy for natural events occurrence in HCR EMEs; the right plot displays the IRF of the interaction term between non-life insurance coverage and the dummy for natural events occurrence in HCR EMEs. The horizon is weekly; coefficients represent p.p., with 68% and 90% confidence bands

Going ahead, these portfolio movements are likely to become more sizable and volatile as climatic disasters increase in frequency and intensity over time due to climate change, raising uncertainty about financial capital availability at the country level.

These findings are relevant for the policy debate on the design of effective mitigation and adaptation policies at a regional scale. ■

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Endnotes

1. The data on natural disasters comes from the Emergency Events Database (EM-DAT) of the University of Louvain. Data on portfolio equity is provided by the Emerging Portfolio Fund Research (EPFR) dataset.
2. For ease of exposition, we consider natural disasters and extreme weather events as interchangeable.
3. We estimate the dynamic causal effect using local projections (Jorda 2005).
4. According to the vulnerability component of the University of Notre Dame-Global Adaptation Index (ND-GAIN). We define vulnerable EMEs as those countries above the median.
5. The obtained effect on net flows is roughly equivalent to a 5 basis point US monetary shock, based on the study of the impact of US monetary policy shocks on EME mutual funds provided in Ciminelli et al. (2022).
6. Insurance is measured as the amount of non-life insurance premium to GDP (as %) obtained from the World Bank.

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Impact of CBAMs on the Indian metals sector



Developing countries believe CBAM is a trade-restrictive policy. Nikhil Joshi and Geethanjali Nataraj consider CBAMs and the impact on Indian manufacturers

Introduction

Carbon Border Adjustment Mechanism (CBAM) is among the potential policy measures to address the critical issue of carbon leakage across the world. A CBAM functions by imposing a levy on imported goods based on their carbon content, which is determined by evaluating the greenhouse gas emissions associated with the production process.

The goal is to harmonize the carbon costs between domestic and imported goods, thereby preventing carbon leakage. This approach ensures that imported goods face a comparable carbon cost to domestic goods, thereby reducing the competitive disadvantage faced by domestic industries operating under more stringent climate regulations.

The European Parliament on April 18, 2023, approved legislation to implement the CBAM as part of the EU's Green Deal, which aims to reduce greenhouse gas emissions by 55 per cent by 2030.

Accordingly, commencing on October 1, 2023, enterprises that export steel and aluminium to the EU are obligated to establish robust monitoring systems that quantify the carbon intensity inherent in their production processes.

Additionally, they must furnish comprehensive reports detailing this measured carbon intensity. Although several other industries, such as cement, fertilizer, and electricity, are also encompassed by this regulation, their relevance to India's exports to the EU is negligible.

Subsequently, starting from January 1, 2026, exporting companies operating within the EU jurisdiction will be mandated to provide CBAM certificates. These certificates serve as a mechanism to bridge the discrepancy between the carbon pricing paid in the country of production and the prevailing price of carbon allowances within the EU Emissions Trading Scheme.

However, there is criticism, particularly from developing countries like India that the CBAM is a trade-restrictive policy and India has also taken this matter to the WTO.

The UK is also considering moving along the same lines as the EU and the Government initiated a comprehensive consultation encompassing various interconnected policies, including CBAM, mandatory product standards (MPS) relating to embodied emissions, additional measures aimed at stimulating the demand for low-carbon products, and emissions reporting. The consultation period lasted 12 weeks and concluded in June 2023.

To maintain competitiveness globally and mitigate the impact of the measures to address carbon leakage, it is important for India to prepare a comprehensive response including possible retaliatory measures

The UK is mulling to cover all sectors and products eventually under the proposed measures. It is also looking at emission measurement, CBAM price measurement, and the timing and manner of introduction of these measures.

One proposed option is to initially introduce the UK CBAM for a select number of sectors and then gradually expand its coverage in a phased approach.

As set out in the consultation, the UK Government intends to proceed to introduce embodied emissions reporting in 2025. This would be followed by a phased implementation of the CBAM in 2026 in conjunction with reforms to the UK ETS allocation of free allowances.

For the UK, any MPS would only be introduced following successful pilots in the late-2020s. The steel industry of the UK has also supported the move towards a CBAM, as it fears that if the UK is not aligned to the EU standards, non-EU steel, made commercially unviable in the EU due to the CBAM, will flood the UK markets at lower costs and adversely impact the domestic steel industry.

Other countries are also considering the EU CBAM as starting point for their efforts to adopt a direct Carbon price, such as Ukraine, Uruguay, and Taiwan, China.

Possible impacts

The steel industry is considered a sector that is difficult to decarbonize and currently accounts for around eight per cent of global emissions. According to the International Energy Agency (IEA), carbon emissions from this sector have risen in the past decade, primarily due to the growing demand and the energy required for steel production.

The introduction of potential policy measures to address carbon leakage is expected to present a substantial challenge to India's metals sector as India is still coal-dependent for 55% of its power needs.

The policy measures to address carbon leakage that will be applied in the EU and will potentially be applied in the UK from the mid-2020s onwards; including a CBAM; MPS; and other demand-side measures to grow the market for low-carbon industrial products could have an adverse economic impact on India's exports of energy-intensive products like steel, aluminium, cement, and fertilizers.

Indian manufacturers have expressed apprehensions regarding the imposition of a tax that could potentially lead to a significant tariff ranging from 20% to 35% on India's exports of steel, aluminium, and cement.

Presently, these exports incur a duty of less than 3%. This tax measure could have a considerable impact, as approximately 27% of India's total exports of steel, iron, and aluminium products, amounting to \$8.2 billion, are destined for the European Union and India's exports of articles of iron or steel to the United Kingdom amounted to US\$359.1 million in 2022 (COMTRADE).

India's overall export of CBAM commodities, which include iron and steel (\$5,083.7 million), aluminium (\$2,679.7 million), fertilisers (\$0.64 million), and cement (\$0.04 million), collectively constitute approximately 8 per cent of India's total exports to the EU during the fiscal year 2022-23.

Over the preceding five-year period, the export of CBAM goods from India to the European Union has demonstrated a surge of 84 per cent, rising from \$4.2 billion in the fiscal year 2018-19 to \$7.8 billion in the fiscal year 2022-23.

The process of primary aluminium production is known for its high energy consumption, and in India, the utilization of coal-based power plants results in elevated greenhouse gas (GHG) intensity compared to their European counterparts.

During the initial phase of the CBAM, Indian exports to the EU are anticipated to remain steady, as domestic manufacturers adhere to stringent GHG reporting standards that fulfil the requirements until the end of 2025.

Nevertheless, once tariffs are enforced from 2026 onwards, Indian primary aluminium producers will be compelled to procure ETS certificates for emissions that surpass the allocated free allowance, subsequently leading to increased costs.

At present, there exists a disparity in emission intensity between Europe and India, which equates to potential additional costs of around \$1500 per tonne. The resulting cost differential is expected to render Indian exports economically unfeasible in the European market, particularly when compared to competitors, who boast significantly lower emissions, as it would be very difficult for domestic manufacturers to achieve a 25% reduction in emissions intensity by 2030.

Another significant challenge for India is the absence of a domestic emissions trading system. This absence may make it difficult for Indian firms to show that their products are produced using low-carbon technology, leading to higher charges resulting in higher prices, reduced competitiveness, and decreased demand.

Several companies have already set targets to reduce emission intensity to levels more comparable to the current global average by the end of this decade.

However, the adjustment process would require substantial investments and may pose challenges in terms of technological upgrades and operational changes. The impact of these potential policy measures to address carbon leakage will not be limited to steel and downstream steel products alone.

Upstream sectors, including iron ore, will also be affected. However, the emission intensity of iron ore is relatively low, suggesting that its inclusion under the potential policy measures to address carbon leakage should have minimal impact on trade flows.

The UK Government had sought inputs on how to address the trade concerns that are likely to arise with the introduction of the CBAM, such as the treatment of developing country exports, including those from India.

The concerns are that exempting high-carbon intensity products from developing countries could undermine net zero objectives but not doing so could undermine development objectives. Another concern is that post-imposition of the new regime, India is likely to become vulnerable to the dumping of steel items by various countries.

In the context of India's journey towards climate transition, domestic companies have embraced renewable energy sources, either in the form of captive generation or through purchasing from external sources for two primary reasons: firstly, the superiority of renewable energy in terms of cost-effectiveness and reliability compared to traditional grid-based power; and secondly, the increasing pressure from Environment, Social, and Governance (ESG) investors who advocate for decarbonization measures.

The emergence of the CBAM in Europe, and potentially in other advanced economies such as the UK, presents a third influential factor that encourages a greater emphasis on renewable energy adoption by Indian firms.

In response to this, companies in India may identify specific production locations that offer more favourable conditions for procuring unrestricted and affordable renewable electricity. Such favourable conditions may arise due to either the leniency of distribution companies in their renewable energy policies or the physical accessibility to the Inter-State Transmission System.

This growing preference among exporters to procure renewable energy, therefore, has the potential to stimulate increased investments in renewable energy infrastructure within India.

Conclusion and way forward

To maintain competitiveness globally and mitigate the impact of the measures to address carbon leakage, it is important for India to prepare a comprehensive response including possible retaliatory measures as well as explore carve-outs for certain sectors/goods and MSMEs with the EU, and possibly the UK if it implements an CBAM.

These could include exemptions, or longer timeframes as well as technical assistance and financial support for compliance. India should also continue to oppose the discriminatory provisions of the CBAM.

If left unopposed, there exists a potential peril wherein the EU could progressively broaden the scope of its designated product range in the forthcoming years, a direction that their official stance appears to indicate.

Beyond the potential trade distortions, a concern surrounding the CBAM mechanism pertains to funding the transition towards the adoption of less carbon-intensive production methods, particularly within the realms of least developed and emerging economies.

Considering the EU's leadership role in ambitious global climate targets, it is an opportune moment to remind the EU of its prior commitment to contribute \$100 billion annually to facilitate developing economies in financing their climate-focused initiatives.

Indian companies can adopt various strategies to minimize the impact of the potential policy measures. One approach is to invest in renewable energy sources and energy-efficient technologies to decrease carbon emissions, consequently reducing the tax burden under the CBAM.

Another strategy involves optimizing supply chain processes to lower the carbon footprint of their products. Additionally, India is laying the groundwork for establishing a carbon market. The Ministry of Power released a draft of the Carbon Credits Trading Scheme (CCTS) on March 27, 2023, which outlines the institutional framework and operational mechanisms that will govern the future carbon credit market in India.

The Indian government is seized of the matter and has termed CBAM 'unjustifiable discrimination' on developing nations and that it is being 'selectively applied' to sectors that are in foreign trade in turn impacting their competitiveness.

While considering retaliatory measures against similar measures by the EU, India had pitched for mutual recognition of its carbon certificates as well as recognition of India's proposed Carbon Credit Trading System. India is also looking at promoting carbon auditors.

Moreover, India has sought special treatment for its MSMEs as almost half of such companies will be affected by CBAM. The Indian steel industry, among the CBAM-impacted sectors, is taking initiatives to switch to being renewable energy-powered and to green manufacturing processes.

The EU, which deems CBAM as not protectionist but a measure to fight climate change, has shown a willingness to collaborate with India to reduce the 'administrative burden' on businesses for CBAM compliance.

India must therefore implement a carbon pricing mechanism and advance the development of low-carbon technologies. These measures will assist Indian businesses in complying with potential policy measures to address carbon leakage and reduce the carbon intensity of their products.

Furthermore, India should re-evaluate its export strategy and explore alternative markets where its products can remain competitive if the potential policy measures to address carbon leakage are implemented. ■

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The views are personal and cannot be attributed to the organization to which the authors belong.

Rebooting the EUs Net Zero Industry Act

CO₂

Simone Tagliapietra, Reinhilde Veugelers and Jeromin Zettelmeyer argue that the EU should reboot the proposal and refocus its objectives, improve its governance and add financial incentives to ensure implementation

Executive summary

In March 2023, the European Commission published a legislative proposal for an EU response to the US Inflation Reduction Act: the Net Zero Industry Act (NZIA). It is an unconvincing policy proposal, both for what is in it and for what is not in it.

The proposal has five problematic aspects. First, it takes a top-down approach, in which specific technologies are selected for preferential treatment. Preferable would be a technology-neutral approach open to all current and future technologies that help tackle the net zero challenge.

Second, its blanket 40 percent self-sufficiency benchmark for EU domestic cleantech manufacturing by 2030 sends a protectionist signal, is poorly defined and does not reflect the differences in EU capacity in the cleantech sector.

Third, it relies on the acceleration of permitting procedures as the main policy instrument, although this is not the main obstacle to cleantech investment in the EU.

Fourth, it proposes more strategic use of public procurement. While this is an objective to be supported, the specific proposals are likely to be ineffective because of the way they are designed. Fifth and not least, the NZIA would lack a governance structure that would ensure effective implementation.

In addition, the NZIA does not tackle three critical issues. It does not address investment obstacles related to failures of the single market. It does not tackle the coordination problem at the core of developing an EU green industrial policy.

Finally, it does not develop an EU-level funding strategy, but rather relies on state aid, with the related risk of fragmentation.

The European Parliament and EU countries in the Council of the EU should reboot the proposal and refocus its objectives, sharpening its limited instruments, improving its governance, and adding financial incentives to ensure implementation.

In parallel, the EU should develop a broader green industrial policy strategy that leverages the single market in a credible manner, building a solid new governance framework and a new EU-level funding approach.

The EU needs to preserve the power of its competition policy toolbox to avoid incumbency, protectionist and rent-seeking traps

1 Introduction

Europe's industrial policy, with its green and digital twin focus, has long emphasised resilience and 'open strategic autonomy' as a policy objective. The declared aim of the European Commission's March 2020 New Industrial Strategy for Europe was to manage the green and digital transitions while avoiding external dependencies, particularly on China (European Commission, 2020).

Its policy goals included securing the supply of clean technologies and critical raw materials, stepping up investment in green research, innovation, deployment and up-to-date infrastructure, creating lead markets in clean technologies and making more strategic use of single-market regulations, public-procurement rules and competition policy.

One day after the publication of the strategy, the World Health Organisation declared the COVID-19 outbreak a pandemic. That shock, with all its consequences for the emergency procurement of personal protective equipment and vaccines, challenged the strategy and led to a substantial revision in May 2021.

The updated strategy emphasised strengthening the resilience of the single market in key areas including health, green and digital policy. This would be done by diversifying international partnerships, developing Europe's strategic industrial capacities and monitoring strategic dependencies (European Commission, 2021).

Additional concerns about strategic autonomy have now made Europe's quest for a green industrial policy even more pressing. The war in Ukraine has further highlighted Europe's geostrategic vulnerabilities, including fears about the possibility of China weaponising cleantech and critical raw materials exports in a similar way to what was done by Russia with gas supplies.

The United States's 2022 Inflation Reduction Act (IRA) has been another wake-up call for Europe to scale-up its cleantech efforts and establish itself as a competitive, autonomous player in what are considered to be major growth sectors. The International Energy Agency estimates that the global market for key manufactured clean technologies will triple in size by 2030 (IEA, 2023).

Facing these strategic autonomy and economic competitiveness pressures, the European Commission is again seeking to revise its industrial policy proposals. This is a difficult task for at least three reasons.

First, EU countries differ in terms of industrial structure, geography, preferences for certain technologies and fiscal space. These differences influence how they think about achieving resilience and open strategic autonomy. They also imply that EU-level proposals can be divisive (and they usually are).

Second, even setting aside these differences, the question of how resilience and strategic autonomy should be defined and achieved is difficult to answer. What are the most effective and efficient policy instruments to achieve resilience? To what extent are there trade-offs with other critical policy objectives, including economic efficiency, growth and rapid decarbonisation? How far should the EU move away from a horizontal approach shaping framework conditions, such as strong competition policy and open trade, towards a vertical approach that favours specific industries and projects?

Third, the EU has limited industrial policy powers. While the European Commission leads on competition and trade policy, it has much weaker instruments to influence public investment, innovation and skills. For instance, its Horizon Europe budget for research and innovation (R&I) only covers about 7 percent of public R&I spending on cleantech by EU countries (European Commission, 2022).

Spurred by the shock of the Russian invasion, geopolitical tensions and the challenge presented by the US IRA, the European Commission in March 2023 published two important legislative proposals: for a Net Zero Industry Act (NZIA) (European Commission, 2023b) and a Critical Raw Materials Act¹. This policy brief focuses on the NZIA².

We describe and review the key elements of the proposal. We also point out obstacles to cleantech reform that the NZIA does not address, in part because these obstacles relate to single market and EU governance failures that require a broader solution.

Accordingly, our policy recommendations include both a proposal to revamp the NZIA and a vision for an EU green industrial policy beyond the NZIA.

2 Key elements of the NZIA

The proposed NZIA is an industrial policy to promote cleantech manufacturing, organised in four steps. First, it lists net zero technologies considered to be 'strategic'. These include solar photovoltaic and solar thermal, onshore wind and offshore renewables, batteries and storage, heat pumps and geothermal energy, electrolysers and fuel cells, sustainable biogas and biomethane, carbon capture and storage (CCS) and grid technologies.

Second, it would set an overall benchmark target for EU domestic manufacturing in these technologies to meet at least 40 percent of the EU's annual deployment needs by 2030. The NZIA also proposes a target for an annual injection capacity in CO₂ storage of 50 megatonnes (Mt) CO₂ by 2030, to spur the development of CCS.

Third, it outlines a governance system based on the identification of Net Zero Strategic Projects (NZSPs) by member states, with a minimal check by the European Commission. NZSPs must contribute to CO₂ reductions, competitiveness and security of supply, and should involve technologies close to commercialisation³.

This approach represents a break with what has been done so far: support focused on earlier stages of technology development, including research, early-stage development and prototyping.

Fourth, the NZIA outlines a set of policy instruments, mostly at national level, to support the selected NZIA projects:

1. Acceleration of permitting and related administrative procedures, within time limits pre-set by the EU, including by identifying a one-stop-shop national authority in charge of these projects.
2. Coordination of private funding. The Commission estimates that meeting the headline 40 percent target by 2030 will require €92 billion in investment, with the bulk (around 80 percent) coming from the private sector, to be facilitated by a 'Net Zero Europe Platform fostering contacts and making use of existing industry alliances'.
3. Limited public subsidies, mainly at national level (see below). Support for NZSPs is to be prioritised in national and EU budgets. However, the NZIA proposal does not allocate new EU-level funding, and neither is such funding being allocated in parallel⁴.
4. Public procurement procedures and auctions, which are to include 'sustainability and resilience criteria, which can be given a weight of up to 15-30 percent. At the same time, bids that propose the use of equipment for which a non-EU country of origin provides at least 65 percent of EU supply are to be disadvantaged.

The NZIA proposal also mentions other areas, including regulatory sandboxes and the skills agenda, but without implementation details. Although the Commission acknowledges skills shortages as a major barrier (an estimated shortfall of 180,000 skilled workers in hydrogen and 66,000 in solar PV in 2030, for example), the NZIA does not

develop a strategy to tackle this problem, limiting itself to coordinating initiatives, such as Net Zero Industry Academies, through the Net Zero Europe Platform.

Since EU countries are assigned the role of main provider of public funds for NZSPs, it is important to read the NZIA in parallel with the Temporary Crisis and Transition Framework (TCTF), modified by the European Commission in early March 2023 in response to the IRA (European Commission, 2023c).

The TCTF outlines conditions under which the Commission will approve 'aid accelerated investments in sectors strategic for the transition towards a net zero economy', defined as batteries, solar panels, wind turbines, heat pumps, electrolysers and carbon capture usage and storage, as well as the production and recycling of priority components and critical raw materials⁵. Specifically, EU countries are allowed to:

1. Provide more support to cleantech production located in disadvantaged regions, capped at a certain percentage of the investment costs and nominal amounts, depending on the location of the investment and the size of the beneficiary;
2. Grant higher percentages of the investment costs if the aid is provided via tax advantages, loans or guarantees. This implies that state aid is not limited to funding capital expenditures but that operating expenditures (OPEX) can also be covered, up to the identified funding gap. This approach is novel for Europe as it has been only rarely adopted previously, most notably in the case of cohesion regions;
3. Provide matching aid, that is, the amount of support the beneficiary could receive for an equivalent investment in the alternative location, or the amount needed to incentivise the company to locate the investment in the EU. This part is perhaps the clearest revision of the state-aid guidelines as a reaction to the IRA.

This matching-aid option requires individual notification and must respect several safeguards: (i) investments must be in assisted areas, as defined in the applicable regional aid map; or (ii) crossborder investments involving projects located in at least three countries, with a significant part of the overall investment taking place in at least two assisted areas, one of which is an 'a' area (outermost regions or regions where the GDP per capita is below or equal to 75 percent of the EU average).

Furthermore, the beneficiary should use state-of-the-art production technology from an environmental emissions perspective. Finally, the aid cannot trigger relocation of investment between EU members.

3 Problems with the current proposal

Taking the scope of the NZIA as given, five issues are problematic.

3.1 Technological scope is overly selective

First, the NZIA adopts a top-down approach in which policymakers seek to promote a pre-defined set of technologies, and within these, specific projects considered 'strategic' for the transition to net zero. This can lead to two problems: policymakers may end up backing the wrong technology, and this backing may generate unnecessary and damaging costs.

While the list of NZIA technologies contains most of the major technologies currently in use or close to commercialisation, it excludes others. For example, while the proposal recognises that 'advanced technologies to produce energy from nuclear processes with minimal waste from the fuel cycle, small modular reactors, and related best-in-class fuels' are net zero technologies, it does not include them in the list of strategic net zero technologies, thus preventing them from becoming NZSPs.

The same is true for technologies for improving energy efficiency, early-stage technologies such as near-zero materials or direct air capture, and – obviously – technologies not yet on the public radar.

Because of the high path-dependencies in green technologies and the high degree of uncertainty intrinsic to technological innovation, industrial policy that seeks to promote a pre-defined set of green technologies can lead to inferior outcomes. It would have been better to adopt a technology-neutral approach, open to any project and technology that can contribute to lower emissions and greater competitiveness and resilience.

An additional concern applies even when the selected technology is in fact the right one. The proposed NZIA asks EU countries to promote projects based solely on their propensity to advance or commercialise that technology. However, many such projects may not need public support. In rare cases, such support could be costless (for example, if it consists of waiving a bureaucratic requirement that has no merit in the first place).

Mostly, however, support involves a cost, whether in the form of public money, lighter environmental checks or a distortion of competition (tilting the playing field against projects and companies that are not selected). As a result, NZIA promotion may, in some cases, do more harm than good.

In sum, the procedure for determining NZSPs seems unlikely to properly balance the risk of government failure against the market failures it is trying to address. In the presence of technological path-dependency, it may even exacerbate market failures.

3.2 The 40 percent benchmark is problematic

Second, the NZIA adopts a 40 percent self-sufficiency benchmark for domestic manufacturing as the only relevant indicator of 'strategic autonomy'. This is problematic for several reasons.

1. It disregards the costs of promoting self-sufficiency in particular technologies, compared to the use of cheaper imports. As a result, it is unclear whether meeting such a target would accelerate or slow EU decarbonisation and whether it would in fact advance resilience, which is more closely related to the concentration of imports than their overall volumes (Welslau and Zachmann, 2023). No impact assessment, whether on cost, emissions reductions or resilience objectives, was performed to justify the 40 percent domestic manufacturing target.
2. Even if an import substitution target is viewed as necessary for achieving strategic autonomy, it is unclear why this benchmark should apply across all NZIA technologies, which differ in many ways: in terms of their current domestic manufacturing capacity (see Sgaravatti *et al* 2023), the costs of expanding domestic manufacturing in the EU compared to alternatives, and the lead times for expanding production.
3. The extent to which the target applies to component parts of the identified net zero technologies is also unclear. Several of these components are very important and represent a major bottleneck for domestic manufacturing in Europe.

3.3 The focus on fast-track permitting is misplaced

Third, a major focus of the proposal is the fast-tracking of permitting procedures for NZIA technologies. While improving permitting procedures is always a good idea (not only for strategic projects), its relevance as a determinant of investment in this context is not clear.

Permitting times represent a significant drag on the deployment of renewable energy, CCS projects and mining projects, but not normally for the manufacturing industry. In the EU, the principal obstacles to manufacturing production and investment tend to be skills and access to funding (see EIB, 2022).

Thus, it is unlikely that fast-tracking of permitting and administrative procedures will provide a significant boost to cleantech investment in Europe.

3.4 Strategic use of public procurement is irrelevant in practice

Fourth, while the NZIA emphasises more strategic use of public procurement, its actual proposals risk being irrelevant in practice. The 'sustainability and resilience' award criteria introduced by the NZIA can be ignored if applying them results in a 'disproportionate cost' for an EU country, defined as a cost gap between the domestic technology and foreign technology of more than 10 percent.

Considering that European domestic manufacturing of certain clean technologies – most notably those in which Europe is lagging, like solar panels – remains considerably more expensive than in Asia, such cost gaps may be common and the NZIA criteria are unlikely to be much applied.

3.5 Governance is light

Fifth, the governance of the NZIA looks light. EU-level oversight of national decisions is envisaged to be minimal, although projects supported by member states will generally receive preferential treatment (whether financial or non-financial).

European Commission monitoring is supposed to focus on whether manufacturing capacity in the EU grows in line with the 40 percent self-sufficiency target. There is no mechanism to check the selection of NZIA projects by EU countries with respect to their effectiveness in meeting climate or resilience targets, their proportionality and their impact on the level playing field.

The proposal mentions the Net Zero Europe Platform as a governance tool, but its purpose seems to be the coordination of public instruments and links to private investment sources, not to ensure that the right projects are selected and that the NZIA meets its ultimate objectives at an acceptable cost.

In terms of monitoring progress and evaluating impact, the proposal mentions that an evaluation will be done by the European Commission after three years and then regularly thereafter. But it is unclear how this process will be organised and implemented, running the risk that it will be little more than a nominal exercise. And it remains unclear what will happen if the EU is not on track on certain technologies.

It is also worth mentioning that, as in the case of other recent legislative proposals, such as the March 2023 Electricity Market Design reform proposal⁶, the NZIA proposal did not pass through the usual ex-ante exercise done by the European Commission services to assess the likely impact of the proposal compared to alternatives. It was only followed-up by a working document discussing NZIA investment needs and funding options (European Commission, 2023a).

4 What is missing from the NZIA

The NZIA's premise is that cleantech in the EU can and should be promoted by improving the business environment specifically for cleantech. However, cleantech investors face many of the same barriers that constrain other categories of private investment in Europe, including lack of access to finance, high energy costs, policy fragmentation and scarcity of critical skills.

Addressing these barriers may be more useful, even from the narrow perspective of promoting cleantech, than giving preferential treatment to cleantech projects.

Reducing these obstacles would require much more comprehensive reforms than proposed in the NZIA. These include a more integrated European electricity market that would help to lower energy costs structurally, an EU-wide strategy to develop and improve (green) tech skills, and the creation of a banking and capital markets union to overcome Europe's highly bank-dominated and fragmented financial system and mobilise private capital for cleantech (Kleimann *et al* 2023).

Furthermore, those reforms would promote not only cleantech investment, but would foster growth and competitiveness in the EU more broadly.

The proposed NZIA is also too narrow in that it does not tackle the central problem plaguing EU green industrial policymaking: lack of coordination. Europe has a multitude of green industrial policy initiatives at EU level, adding to the multitude of policy initiatives at national and regional levels (Tagliapietra and Veugelers, 2021).

These initiatives are generally not coordinated and may even conflict. Uncoordinated industrial policies fail to capitalise on EU economies and synergies scale and could undermine the level playing field across Europe.

While the NZIA proposes a Net Zero Europe Platform to coordinate the preferential treatment of projects selected, this does little to address the fragmented state of cleantech industrial policymaking in the EU and risks worsening this fragmentation further.

In recent years, the EU has tried to foster an industrial policy aimed at creating European ecosystems for the manufacturing of batteries and electrolysers, via European Alliances and related Important Projects of Common European Interest (IPCEIs).

Although the IPCEIs are financed by EU countries, they require crossborder EU cooperation and their formation and selection are coordinated by the European Commission and assessed for compatibility with state aid guidelines.

While it is too early to assess their effectiveness, they are designed to capitalise on EU scale and protect the single market. By focusing almost exclusively on the promotion of individual projects at national level, the NZIA takes a step in the wrong direction.

Finally, and related to the need for a consistent EU-wide industrial policy, the proposed NZIA lacks a solid EU-level funding instrument. A Strategic Technologies for Europe Platform (STEP) proposed by the EU on 20 June 2023, does not provide new fresh EU resources but rather repackages existing ones.

This initiative also has a much broader scope than NZIA, covering all sorts of 'strategic technologies', including clean, digital and biotechnologies⁷.

Public financial support for cleantech would thus need to come mainly from EU countries' regular budgets, which risks jeopardising the single market's level playing field. This risk might materialise quickly if countries with more fiscal space decide to create their own green industrial policy packages.

For instance, if Germany goes ahead with a large subsidy scheme to lower electricity costs in energy-intensive industries in general, and cleantech manufacturers in particular⁸, it will likely trigger a backlash from other member states, as seen after Germany's adoption of the €200 billion 'economic defence shield' to counter rising energy prices (Tagliapietra *et al* 2022). The same goes for France's plan to adopt a 'green industry bill', including generous tax credits for national cleantech manufacturers⁹.

There is a case for public subsidies, for early stage, high-risk clean technology in particular, but also for the early deployment of more mature technologies. Delivering these subsidies at EU level would avoid fragmenting the single market and better exploit the scale of the EU by harnessing EU-wide synergies, internalising knowledge spillovers and improving cost and risk sharing.

The NZIA could have been an opportunity to streamline and unify EU funding tools that could be used for cleantech manufacturing, to create a new EU funding instrument if needed and to better coordinate with and between national funding tools.

5 Recommendations for NZIA 2.0 and a broader EU green industrial policy strategy

As proposed, the NZIA is unlikely to achieve its aims, while likely generating unintended costs. It also falls well short of a comprehensive green industrial policy for Europe. To promote cleantech manufacturing, two steps should be taken.

First, in the legislative process, the NZIA should be rebooted, to make sure that at least some specific areas of intervention are dealt with efficiently and that the risk of unintended consequences is minimised.

Second, the EU needs to move beyond the scope of the NZIA and start working on the development of a broader EU green industrial policy strategy.

5.1 Rebooting the NZIA

5.1.1 Refocus the objectives

- Drop the 40 percent domestic manufacturing target and replace it with key performance indicators (KPIs) that capture the trend and resilience effects of cleantech investment.

The success of the NZIA should be measured on the basis of whether it can mobilise the massive private investments required to meet Europe's cleantech needs, and whether these make Europe more competitive and more resilient. Such KPIs should replace the ad-hoc 40 percent domestic manufacturing target.

- Adopt a technology-neutral approach instead of cherry-picking specific technologies, in order to include all technologies that today and in the future could contribute to reaching Europe's climate, competitiveness and resilience goals.

5.1.2 Sharpen the instruments

- Make sure the NZIA delivers on its key goal of streamlining permitting. While permitting is not necessarily the most important barrier to the development of cleantech manufacturing in Europe, it is – and will realistically remain – a useful NZIA instrument.

At this point, it is important to ensure that the NZIA delivers on this item. This will not necessarily be easy, considering member states' competence in this area, but it will require stronger governance than what is currently envisaged.

- Be bolder on strategic public procurement. NZIA takes a first step towards more strategic utilisation of public procurement. This is good news, as public procurement has so far been a neglected instrument in the European Green Deal toolbox (Sapir *et al* 2022).

However, the 10 percent cost-gap safeguard included in the proposal (allowing the procuring authority to choose the cheaper bid, even if it has a lower sustainability score, if the cost gap exceeds 10 percent) will likely make this step irrelevant.

One way of making it more effective while limiting the cost for procuring authorities might could involve: (i) linking the cost-gap safeguard threshold to the sustainability and resilience score of a bid, up to some maximum (for example, for projects that do very well on sustainability and resilience it could be as high as 30 percent); (ii) partly subsidise, using EU funds, the difference between the costs of the winning bid (taking account of the resilience and sustainability score) and the lowest-cost bid (see discussion of financial incentives below).

5.1.3 To ensure implementation, strengthen governance and offer financial incentives

To make sure these instruments are used effectively, the NZIA 2.0 requires both strong governance and the right financial incentives.

- Strong governance is needed to address the key challenge in developing an EU green industrial policy: coordination. Alignment of different stakeholders, policy competences and instruments must be steered to achieve the stated objectives.

The NZIA proposal does not tackle this central point, referring only to the establishment of a Net Zero Europe Platform, which seems to be conceived as a forum to share best practices rather than a real steering and coordination body.

NZIA 2.0 needs to ensure that the European Commission plays a meaningful coordination role, starting with closer coordination between the main relevant Commission directorates for the NZIA: internal market, competition, energy, growth and trade.

Strong governance is also required to monitor and evaluate which NZIA policy interventions work and which do not, measured against the KPI of growing private cleantech investment. This will help learn fast and adapt policymaking fast, if needed.

- As the EU has limited tools to foster national action and steer coordination, it must be able to offer some incentives. Limited EU resources should be used to part-pay for projects that involve pan-European collaboration.

When it comes to strategic procurement, EU funds (including the EU Innovation Fund, REPowerEU or Cohesion Funds) could be used to part-fund national public procurement of innovative clean technologies, to encourage the roll-out of clean technologies at EU scale without creating excessive costs for the government entities undertaking the procurement.

5.2 Developing a broader EU green industrial policy strategy

To develop a full-fledged green industrial policy, the EU needs to leverage its greatest asset: the single market. Only a well-functioning, globally linked EU market will be able to achieve a similar scale to the domestic markets of the United States and China.

Fragmented national measures will not lead to private investments in cleantech ecosystems at the scale that Europe needs to become a globally competitive, resilient, cleantech powerhouse. To achieve this, the EU needs to foster and deepen its single market for goods, services, components, energy, capital, people and ideas.

Without such 'horizontal' policies, targeted 'vertical' policies (including NZIA instruments such as permitting, public procurement and skills) will not deliver results at the needed scale.

Take the example of skills. This is a major bottleneck for the development of cleantech manufacturing in Europe, more than permitting. While the EU has limited competence in this field, providing the right incentives to member states could catalyse national action.

At the same time, single market reforms require a new push, including capital markets union, electricity market design and alignment of EU cleantech regulations. To be a forceful lever for private cleantech manufacturing investment, the single market must be open and competitive.

The EU needs to preserve the power of its competition policy toolbox to avoid incumbency, protectionist and rent-seeking traps. EU trade policy should not fall into a reciprocal protectionist trap: it needs to remain open to allow the EU to import intermediate goods and natural resources that it cannot competitively produce itself, and to help keep export markets open.

Most of these horizontal framework conditions have been essential for EU competitiveness in the past and are now more important than ever.

To promote a broad and strong green industrial policy, the EU needs to take a step further on governance. The EU should reinforce governance by creating a competent and empowered body, which is sufficiently politically independent – or detached from political pressures – yet accountable for its achievements with a set of clear, realistic milestones and targets.

The US experience can be inspiring in this regard. After the approval of the Inflation Reduction Act, President Biden appointed John Podesta as Senior Advisor to the President for Clean Energy Innovation and Implementation and Chair of the President's National Climate Task Force, with a mandate to oversee the implementation of the IRA's clean energy and climate provisions.

A similar move by the European Commission might make sense, to ensure top-level coordination and political steering of the overall process – which is vital for the longer-term socio-economic and political sustainability of the

European Green Deal and its aim of being Europe's new growth strategy. An EU counterpart to Podesta might also pave the way for better EU-US coordination of cleantech industrial policy, to avoid spiralling subsidy wars.

A broad and solid EU green industrial policy also requires a new EU-level funding strategy. To accompany the implementation of a broader green industrial policy, the EU will need a new funding strategy.

Otherwise, public incentives to spur private investment in cleantech would come from national state aid, which would create risks of single-market fragmentation and fan political tensions between EU countries.

A new EU strategy in the field should:

1. focus on supporting the development and scaling-up of pan-European public-private ecosystems;
2. support the whole innovation cycle of cleantech in an integrated manner, from disruptive innovation to deployment at scale;
3. prioritise areas in which market, network and transition failures are most likely and government selection failures least likely, ensuring additionality and leveraging of other (member state) public and private funding;
4. fit within a portfolio of funding instruments, which is well balanced between top-down and bottom-up solicited projects.

To achieve these goals, the EU could consider the creation of an EU version of the US Advanced Research Projects Agency, with an emphasis on Energy and Climate ('ARPA-EC'), aimed at fostering high-risk, early-stage development projects for new cleantech manufacturing technologies¹⁰.

An EU ARPA-EC could also issue competitive tenders for new technological alternatives to critical components, products or services when there are supply concerns in existing green technologies, thus addressing the EU's demand for resilience and autonomy by calling on the EU's science and innovation capacity.

ARPA-EC should connect to complementary funding schemes, both at national and at EU level, including the European Research Council (ERC) and European Innovation Council (EIC). The ERC and EIC should maintain their focus on supporting bottom-up ideas, thus balancing the top-down cleantech NZIA programmes.

It is important to stress that an ARPA-style approach requires more than just importing a label. To ensure the unique character of an ARPA-EC as risk-taking public funder for energy and climate, sufficient funding will be required, to allow it to take a portfolio approach and make multiple high-risk bets.

Equally important is to design it properly for success, most notably, by giving autonomy and organisational flexibility, especially flexibility to recruit and accommodate the venture-capital entrepreneur type of policy programmers and officers.

Calls must have clear quantifiable goals and trackable metrics, so that policy officers can be given high levels of autonomy, together with clear mandates and accountability.

The EU could also fund the creation of support schemes designed to top-up national and other EU funding in projects that demonstrate pan-European collaboration or coordination, contributing to the creation of cleantech ecosystems at EU scale.

A particular line of action to address the critical lack of skills for green investments, would be the funding of programmes to stimulate the intra- and extra- EU mobility of cleantech skills¹¹. These could be targeted specifically at fostering intra-EU mobility between upstream and downstream parts of European cleantech ecosystems.

6 Conclusion

The US Inflation Reduction Act has revived Europe's deep-seated fears of de-industrialisation and of missing out on the growth opportunities of cleantech manufacturing. Such a reaction should not be surprising: turning brown jobs into green jobs represents an essential condition for Europe to maintain and strengthen its socio-economic model – and welfare state – while meeting its decarbonisation goals.

This is the fundamental reason why the EU has adopted the European Green Deal as its growth strategy. At the same time, the EU's recent experience with overreliance on Russian gas has made the security of clean-energy supply, and more generally resilience to trade disruptions, a central policy objective.

The NZIA as proposed by the European Commission is a partial and poorly designed green industrial policy that is unlikely to deliver meaningful results in relation to the triple objective of EU decarbonisation, competitiveness and resilience.

The European Parliament and EU members in the Council of the EU must reboot the NZIA and make sure it both delivers on its limited scope of action and minimises the risk of unintended consequences.

In parallel, the EU needs to advance a much broader and stronger green industrial policy strategy, resting on three pillars: horizontal single-market reforms, an upgraded steering and co-ordination body at the EU level, and a strong,

central advanced research funding agency in the mould of ARPA. Delivering on this strategy should be a priority goal of the new EU institutional cycle from 2024. ■

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Endnotes

1. See European Commission press release of 16 March 2023, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1661.
2. For an assessment of the Critical Raw Materials Act see Le Mouel and Poitiers (2023).
3. TRL (technology readiness level) classifies technologies by their stage of development. NZIA targets TRL 8 indicating technologies that have been tested and 'flight qualified' and are ready for implementation into an existing technology.
4. An EU-level 'Sovereignty Fund', which might include clean-tech support, mentioned in speeches by Commission President Ursula von der Leyen in spring 2023, has not materialised. Instead, on 20 June, the Commission proposed a repackaging of existing EU funds under a so-called Strategic Technologies for Europe Platform (STEP), introducing a "sovereignty seal" as an "EU quality label for sovereignty projects" and a "sovereignty portal" for accessing funding opportunities under STEP. See European Commission press release of 20 June 2023, https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_3347.
5. See https://competition-policy.ec.europa.eu/system/files/2023-03/overview_of_TCTF_section_2.8_schemes.pdf.
6. See European Commission press release of 14 March 2023, https://ec.europa.eu/commission/presscorner/detail/en/IP_23_1591.
7. See European Commission press release of 20 June 2023, https://ec.europa.eu/commission/presscorner/detail/en/qanda_23_3347.
8. As proposed by Germany's economy minister. See Federal Ministry of Economic Affairs and Climate Action press release of 5 May 2023, <https://www.bmwk.de/Redaktion/DE/Pressemitteilungen/2023/05/20230505-habeck-legt-arbeitspapier-zum-industriestrompreis-vor.html>.
9. See Élysée press release of 11 May 2023, <https://www.elysee.fr/emmanuel-macron/2023/05/11/accelerer-notre-reindustrialisation-le-president-presente-sa-strategie>.
10. The Advanced Research Projects Agency–Energy (ARPA-E) programme, established shortly before the 2007-08

financial crisis, has around \$350 million in annual funding and aims, like its Defense Advanced Research Projects Agency sister, to nurture new strategic energy technologies to achieve rapid deployment of radical technologies with high market potential.

11. For example, through dedicated NZIA Erasmus and Marie Curie fellowships, or mobility top-ups to Horizon Europe or other funded projects.

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Tax for climate finance should start with shipping

Pascal Saint-Amans argues that emissions from international shipping are the most realistic target for taxes to pay for climate spending in developing countries

The Bridgetown initiative, a climate finance plan for developing countries launched by Barbados prime minister Mia Mottley in 2022, inspired the [Summit for a New Global Financial Pact](#), held in Paris on 22-23 June. The more than 40 leaders in attendance, including German Chancellor Scholtz, Chinese Premier Li Qiang and Brazilian President Lula, revived discussions on financing the energy transition in the South together with the fight against poverty.

They [confirmed](#) the reallocation of \$100 billion of International Monetary Fund Special Drawing Rights and agreed on the need for multilateral development bank reform to mobilise more public and private funds. There was also agreement on the need to work further on international tax.

What could sound like a vague commitment on tax might actually deliver a concrete outcome if a few conditions are met. To all economists, carbon taxation is the first-best candidate for an international tax to finance the energy transition. With only 40% of global carbon emissions priced, at an average worldwide price below €5 per tonne, a global carbon tax is long overdue.

However, the political economy of the reform makes it impossible in the current circumstances (France's *gilets jaunes* movement is the poster child of the opposition to carbon pricing). The Paris summit also floated briefly the idea of moving carbon taxation upstream to the point of fossil-fuel production, before rejecting it as a no-go.

One carbon tax might work, however. It was discussed in preparation for the summit but not mentioned explicitly in the outcome statement: a tax on carbon emissions from the shipping industry. Countries should give it a chance for three reasons.

First, global shipping is a crossborder activity that has both benefited from and contributed to globalisation, and is a significant contributor to overall emissions, representing almost 3% of global emissions, while all of Africa contributes 4%.

Second, this industry currently pays no tax on its carbon emissions. The fuel is completely tax free. No excise duties, no carbon tax. Moreover, shipping companies are not subject to regular corporate income tax anywhere in the world at a time when their profits have reached unprecedented levels.

The design should ensure impact even if not all countries implement. The 15% global minimum tax does not require all countries to implement; rather only a critical mass is required for it to have an impact

Third, very little progress has been made on improving the carbon efficiency of shipping fuel and shipping is in fact falling behind its own commitments. The International Maritime Organisation's net zero ambitions are not aligned with the Paris Agreement, and negotiations at the IMO on the path towards carbon neutrality by 2050 are stalled.

If properly orchestrated, global agreement on an international tax can happen, as shown by the deal reached by 137 countries in October 2021 establishing an effective 15% global minimum tax (even though the shipping industry is the only one carved out from this agreement). A tax on carbon emissions from shipping could follow the same path, with a few essential steps.

There should be a top-down approach, in the form of a message from leaders to their delegates at the IMO to empower them to deliver meaningful progress. The Paris [statement of outcomes](#) could have been more explicit but it is not too late. The design should ensure impact even if not all countries implement.

The 15% global minimum tax does not require all countries to implement; rather only a critical mass is required for it to have an impact. This pushes the slow movers, so that it is not just the first movers that accrue the revenues.

A first step has already been taken with the European Union including shipping emissions in its emissions trading system (ETS). In 2026, half of the emissions related to shipping to and from Europe will be in scope of the ETS.

The EU should seek allies to build a critical mass of countries, or of subnational governments where the large ports are located. It might be easier to convince the states of New York and California, than negotiating with the US as a whole.

Negotiations at the IMO will soon resume. The EU coalition to build out taxation of shipping emissions should start with small island states, like the Marshall Islands, under threat of disappearance because of rising sea levels. Together, they could open up a new route for international taxation. ■

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The Russian war economy: macroeconomic performance

The Russian economy has performed better than many expected since the war in Ukraine started. Marek Dabrowski argues that the financial burden will be felt for some time

When Russia started its full-scale invasion of Ukraine on 24 February 2022, the United States, European Union, several other G7 economies and their allies responded with an unprecedented package of economic, financial, diplomatic and other sanctions, which were continuously amended in the subsequent months¹.

Many expected that the economic price for Russia of the aggression and sanctions would be immediate and painful². The European Bank for Reconstruction and Development in March 2022 (EBRD, 2022) forecasted a real GDP decline of 10 percent in 2022, while the International Monetary Fund in April 2022 (IMF, 2022) projected a decrease of 8.5 percent.

Also, according to the IMF (2022), Russia's inflation would amount to 24 percent in December 2022 and the unemployment rate to 9.3 percent of the total labour force. Even the Bank of Russia at the end of April 2022 expected a real GDP decline of 8-10 percent in 2022³.

But the actual figures for 2022 were better (Table 1). According to the IMF, Russia's real GDP declined by 2.1 percent in 2022. The Federal State Statistics Service (Rosstat) agreed⁴. The largest GDP decline was recorded in the second quarter of 2022, by 4.5 percent compared to the second quarter of 2021⁵. In the subsequent quarters, GDP has recovered slowly but steadily.

There were no significant changes in the sectoral structure of gross value added compared to 2021, except for mineral production, the share of which increased from 13.1 percent in 2021 to 14 percent in 2022.

The volume of goods and services exports decreased by 8.7 percent year-on-year, while imports diminished even more (by 15 percent y/y). A smaller decline in GDP means the Russian economy became more closed to the external world.

Table 1. Russia: selected macroeconomic indicators, 2018-2023

Item	2018	2019	2020	2021	2022	2023
GDP, constant prices, % change	2.80	2.20	-2.70	5.60	-2.10	0.70
Total investment, % of GDP	21.90	22.70	23.50	23.20	22.70	23.20
Gross national savings, % of GDP	28.90	26.50	25.80	29.90	33.00	26.90
Unemployment rate, % of total labour force	4.80	4.60	5.80	4.80	3.90	3.60
Inflation, end of period, CPI, %	4.30	3.00	4.90	8.40	12.40	6.30
GG revenue, % of GDP	35.50	35.70	35.20	35.60	34.30	31.20
GG total expenditure, % of GDP	32.60	33.80	39.20	34.80	36.60	37.40
GG net lending/borrowing, % of GDP	2.90	1.90	-4.00	0.80	-2.20	-6.20
GG gross debt, % of GDP	13.60	13.70	19.20	16.50	19.60	24.90
Volume of imports of goods and services, % change	2.70	2.80	-11.80	16.70	-15.00	8.30
Volume of exports of goods and services, % change	5.10	-3.30	-4.40	0.60	-8.70	0.20
Current account balance, USD billion	115.70	65.70	35.40	122.30	227.40	75.10
Current account balance, % of GDP	7.00	3.90	2.40	6.70	10.30	3.60

Note: Red font indicates IMF staff estimates and forecasts.

Source: IMF World Economic Outlook database, April 2023.

The unemployment rate reached the lowest level in the post-Soviet era, 3.9 percent (Table 1). Mobilisation of more than 300,000 men to the army from September 2022, and emigration of 300,000-600,000 people in 2022, led to a reduction in the labour force of 1.0-1.5 percent year-on-year (Abramov *et al* 2023). As a result, the labour market situation became more tense for employers.

While the economic burden of the war and decoupling with the EU and other advanced economies will harm the growth prospects of the Russian economy in the medium-to-long term, they have not been lethal yet

The real disposable money income of the population in 2022 decreased by 1 percent compared to 2021, ie. less than during the previous crisis episodes (2008-2009, 2014-2015, 2020).

Better-than-expected results in 2022 can be attributed to several factors including conservative monetary and fiscal policies before February 2022 (Dabrowski, 2023), a well-calibrated monetary and fiscal policy reaction to the new situation, high global hydrocarbon prices and late and incomplete geographical adoption of oil sanctions.

Macroeconomic management

The beginning of the aggression against Ukraine and the first wave of financial sanctions which immobilised approximately half of Russia's international reserves (around \$300 billion) and which cut off part of the Russian banking sector from the SWIFT⁶, generated a mass capital outflow.

The ruble plummeted to the lowest level in its history (120 RUB for \$1) on 11 March 2022 (Figure 1). The Russian government and the Bank of Russia introduced capital and current account transaction restrictions to stop the panic (Astrov *et al* 2022). Simultaneously, the Bank of Russia hiked its key policy interest rate to 20 percent (Figure 2).

These measures helped to stabilise the situation in the forex market. The official exchange rate of the ruble recovered very quickly (Figure 1) to 51 rubles to the dollar at the end of June 2022. The market exchange rate also strengthened, although it was less favourable than the official rate because of convertibility restrictions.

Quick stabilisation of the ruble allowed for the arresting of the potential inflationary impact of exchange-rate depreciation. According to IMF estimates, annual inflation increased to 12.4 percent in December 2023 (Table 1).

Looking at the monthly figures of the Bank of Russia (which differ from the IMF estimates), 12-month inflation peaked at 17.8 percent in April 2022 (as a result of the ruble depreciation in February and March 2022)⁷. Then it decreased gradually to 11.9 percent in December 2022 and a record-low level of 2.3 percent in April 2023.

The stabilisation of exchange rates also allowed for a gradual decrease in the Bank of Russia's interest rate (Figure 2) and a relaxation of convertibility restrictions, especially for Russian residents and non-residents of the so-called friendly countries (those that have not adopted sanctions against Russia).

However, convertibility restrictions did not stop capital outflows in 2022. Although the Bank of Russia has discontinued publication of net private capital flows statistics, some trends can be deduced from the available balance-of-payments statistics⁸. The net capital outflow in 2022 amounted to \$230.3 billion, of which \$26.9 billion can be attributed to direct investment, \$23.2 billion to portfolio investment, and \$190.9 to other investments (but 72.6 percent of this amount left Russia in the first half of 2022).

A negative capital account balance was also indirectly confirmed by the decreasing international reserves of the Bank of Russia (Figure 3).

Hydrocarbon boom and its macroeconomic consequences

Another factor contributing to better-than-expected results in 2022 was high hydrocarbon prices. Oil prices have increased since April 2020, when they reached their COVID-19-related bottom (below \$20 per barrel). In June 2021, they crossed \$60 per barrel.

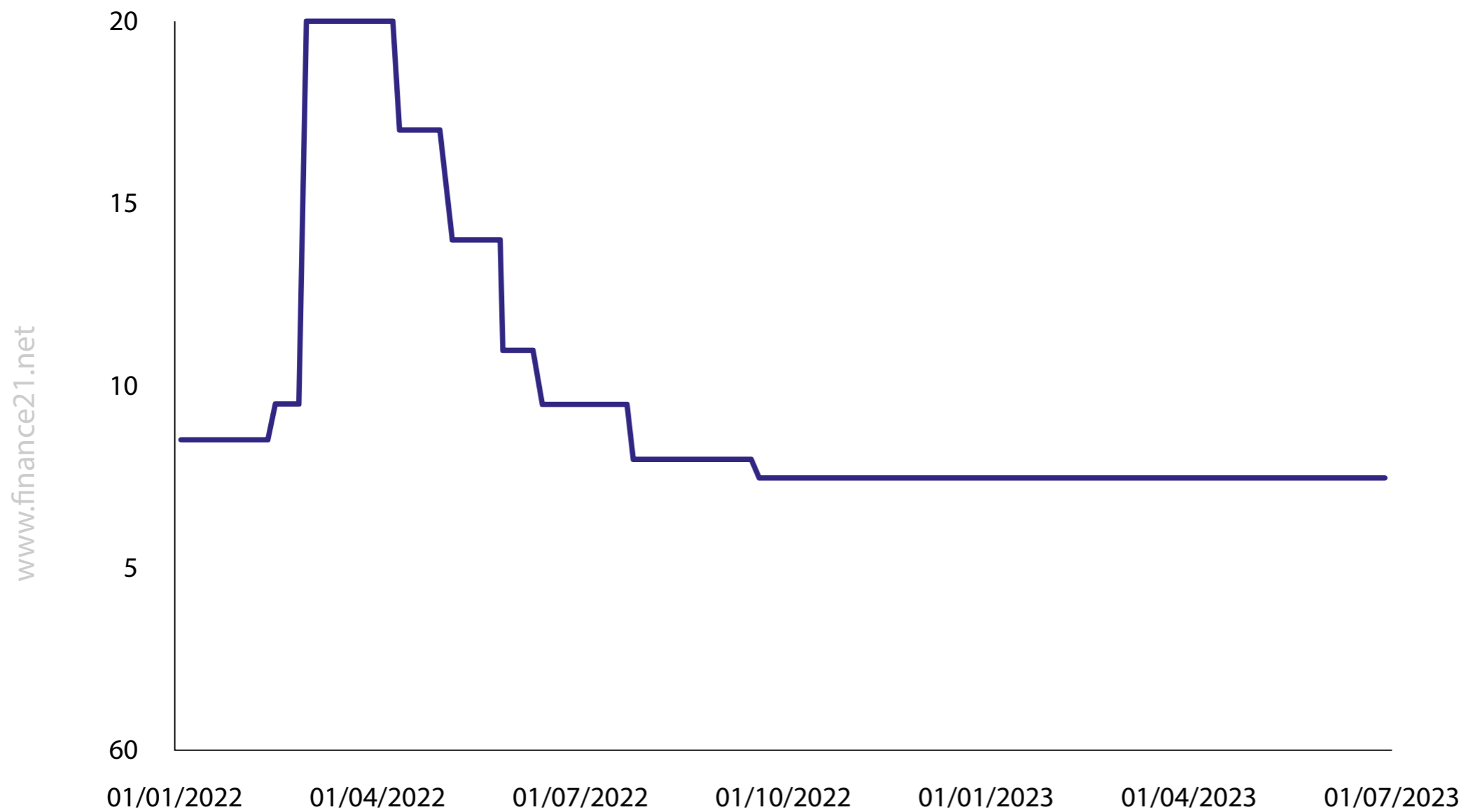
The post-pandemic global recovery and overheating of the world economy pushed oil prices further up. The Russian invasion of Ukraine added to this trend due to a higher perception of security risks and expectations of the

Figure 1. Exchange rate set by the Bank of Russia, RUB/1 USD, 01.01.2022 – 28.06.2023



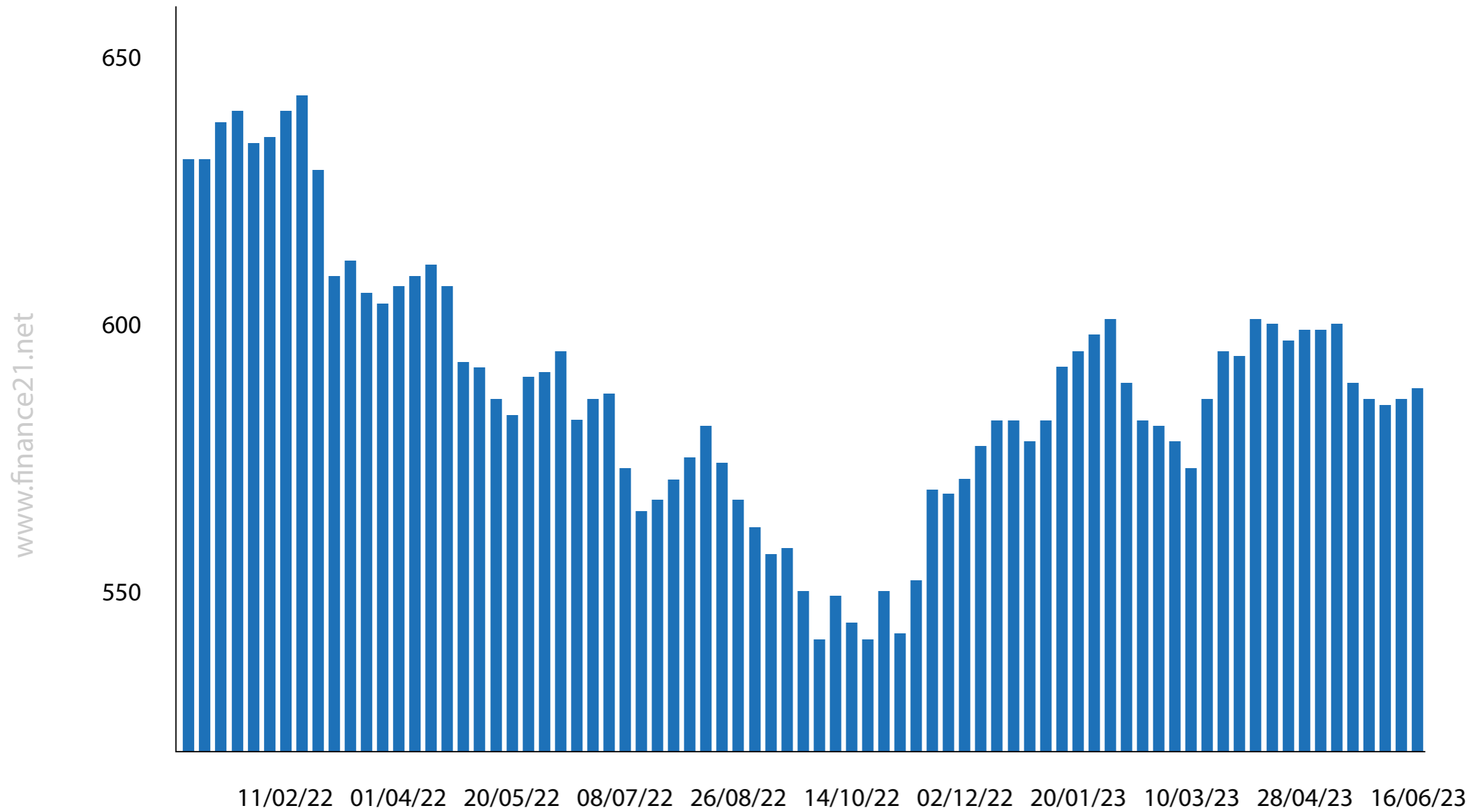
Source: Bank of Russia.

Figure 2: Key policy interest rate of the Bank of Russia, in %, 01.01.2022 – 28.06.2023



Source: Bank of Russia.

Figure 3. Bank of Russia's international reserves, USD billion, 31.12.2021 – 16.06.2023



Source: Bank of Russia.

Western sanctions against Russia. Unsurprisingly, Brent oil prices peaked on 28 February 2022 (over \$110 per barrel) and again (close to \$120) on 8 June 2022.

Russia benefited from this situation. The record high current account surplus in 2022 (Table 1), particularly in the year's first half, resulted primarily from favourable oil prices. Drastic import reductions (see above) also had an impact, partly neutralising the negative effect of freezing half of the Russian international reserves.

The increase in natural gas prices, another essential Russian export item, was even more rapid (Figure 5). However, Russia drastically reduced the volume of exported natural gas to the EU as a retaliatory measure for its support to Ukraine⁹.

The attempts to redirect natural gas exports to Asia brought only partial results because of the limited capacity of gas pipelines and LNG exports. Therefore, it was a self-inflicted wound caused by Russia's counter-sanctions policy.

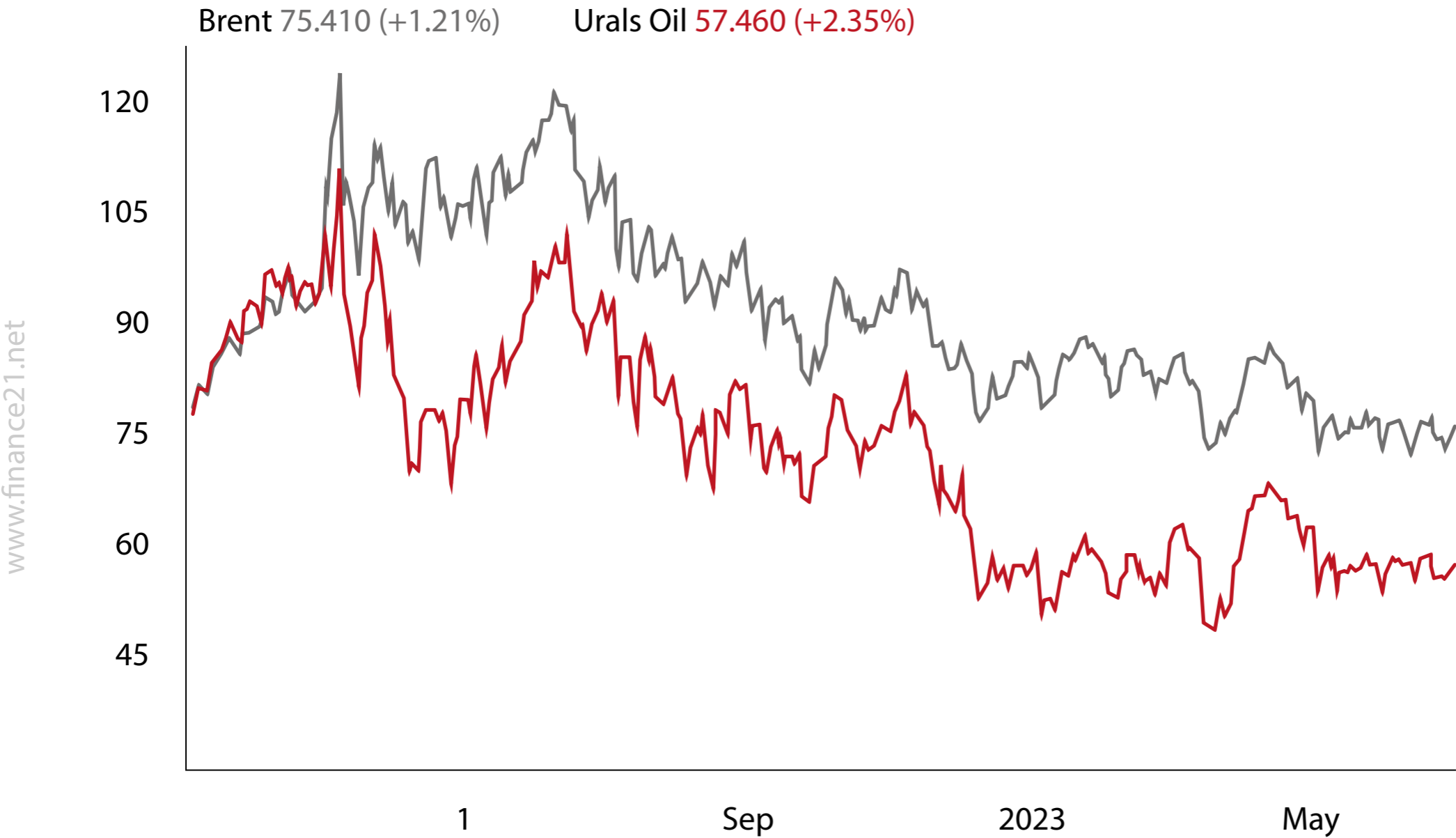
Late and incomplete sanctions

Macroeconomically, the most critical sanctions against Russia concerned its access to the global oil market. The United States banned imports of Russian oil immediately after the beginning of the Russian aggression.

However, this ban had a limited economic impact due to the small volumes of Russian crude imported by the US. The EU, a much bigger importer, banned imports of Russian crude oil transported by sea routes only from 5 December 2022, and refined oil products from 5 February 2023.

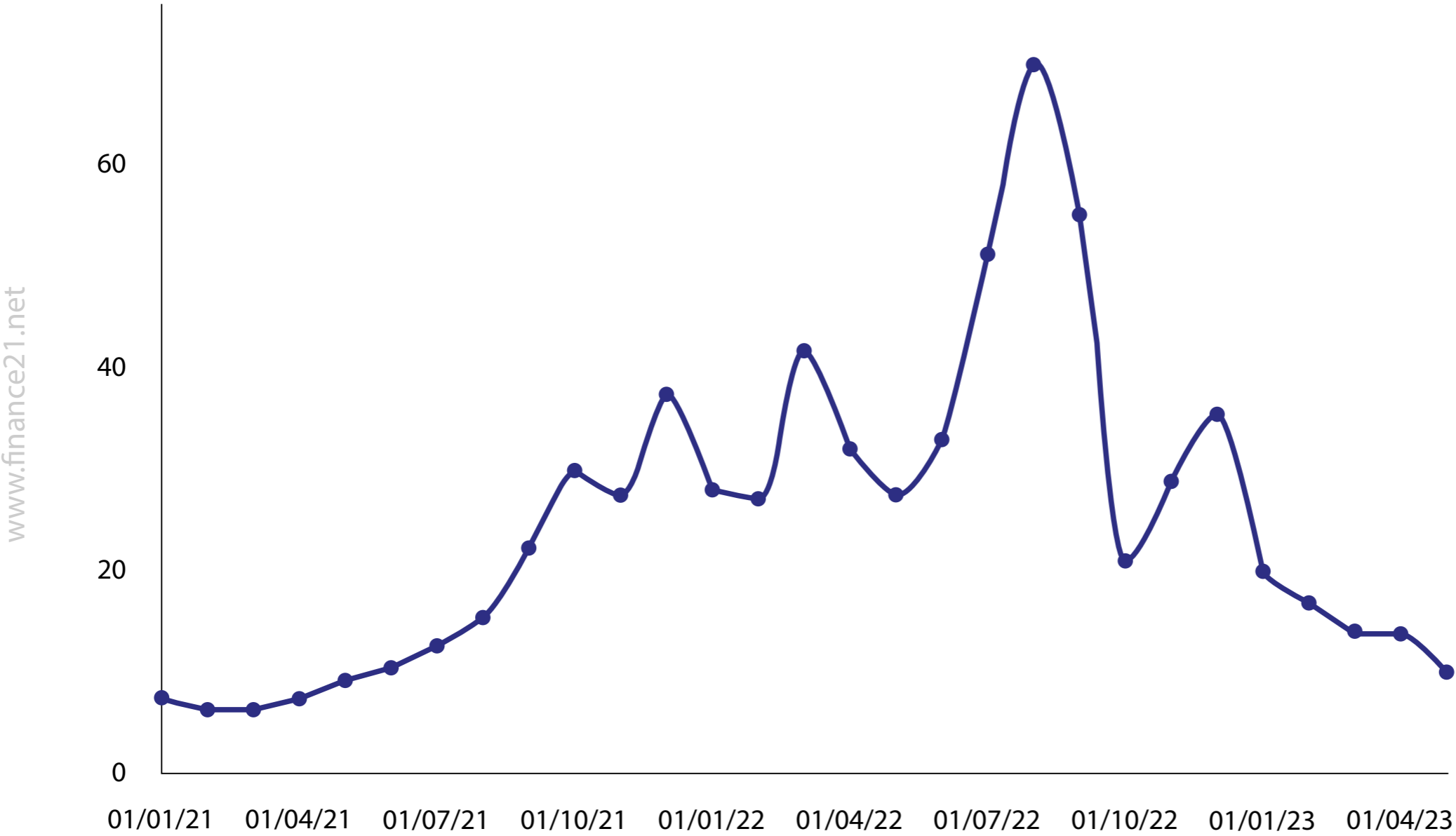
Furthermore, several large emerging-market economies (for example, China, India, Indonesia, Turkey, Brazil and South Africa) did not join Western sanctions against Russia at all, including sanctions related to oil imports. Therefore, Russia can easily circumvent oil sanctions by just redirection of oil export destinations.

Figure 4. Brent and Urals oil prices, in \$ per barrel, 01 January 2022 to 30 June 2023



Source: Trading Economics.

Figure 5. Global price of natural gas, EU, USD per million metric British Thermal Unit, monthly, not seasonally adjusted



Source: IMF Primary Commodity Prices, retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/PNGASEUUSD>, 2 July 2023.

The OPEC+ cartel and its leader Saudi Arabia were reluctant to expand oil-export quotas during the highest oil prices and cut them when global oil prices started declining.

Despite the geographical incomplete nature of sanctions and their late introduction, there has been a discount in the range of \$15 to \$30 per barrel for the Urals oil price (as compared to Brent), a phenomenon not observed before the full-scale war started. It limited the balance-of-payments surplus and federal budget proceeds from the oil exports. However, this discount has diminished since May 2023, which can suggest erosion of sanctions.

A more difficult 2023

Russia's surprisingly good macroeconomic situation in 2022 has started to deteriorate in 2023, especially on the fiscal front. While in 2022 general government deficit (net borrowing) amounted to a moderate 2.2 percent of GDP, in 2023, it may amount to 6.2 percent of GDP (Table 1).

Russian finance ministry preliminary fiscal data for the first half of 2023¹⁰ confirms a deteriorating trend driven by declining global oil and natural gas prices and increasing costs of the war. Compared to the same period in 2022, federal budget revenue decreased by 11.7 percent.

Hydrocarbon revenue declined by 47 percent, while non-hydrocarbon revenue increased by 17.8 percent. Federal expenditure increased by 19.5 percent, of which state procurement (which most likely includes purchases of military hardware and other army supplies) increased by 50.6 percent.

Still, Russia has relatively low public debt (Table 1), but its access to the international debt market has been closed by sanctions. The two remaining sources of deficit financing are the National Welfare Fund (NFW), which cumulated part of oil- and gas-related revenue in the surplus years along with Treasury bonds purchased mainly by state-

owned banks. On 1 June 2023, the total NFW assets amounted to \$153 billion (8.2 percent of the forecasted GDP in 2023)¹¹.

However, the liquid assets were slightly more than half of this amount. Part of the NFW assets was immobilised due to Western sanctions (together with the Bank of Russia's international reserves); another part was invested earlier in the shares of Russian companies such as Sberbank and Aeroflot. Most of the liquid assets are held now in Chinese yuan and gold.

Deteriorating terms of trade are also seen in the balance of payments statistics. While a current account balance remains positive, its surplus is much smaller than in 2022 (Table 1).

It has impacted the ruble's exchange rate, which has depreciated since October 2022 (Figure 1). At the beginning of July 2023, it exceeded 90 ruble to the dollar. A weaker ruble may boost inflation from the current low level.

The short-term prospects (the next 12 months) for the federal budget and balance of payments will depend on oil prices that Russian exporters can effectively obtain in the international (mainly Asian) markets.

Conclusions

While the economic burden of the war and decoupling with the EU and other advanced economies will harm the growth prospects of the Russian economy in the medium-to-long term (Ribakova, 2023), adding to other negative factors including shrinking population and its ageing, the poor business climate and increasing government interventionism, they have not been lethal yet.

Russia has avoided macroeconomic and financial destabilisation, minimised output losses and retained resources to continue its aggression against Ukraine.

Better-than-expected macroeconomic performance in 2022 and the first half of 2023 can be attributed to the situation on the global hydrocarbon market, favourable macroeconomic performance before the war, well-calibrated macroeconomic policy and regulatory response to sanctions, and the geographical incompleteness of those sanctions.

Russia also took several preparatory steps ahead of the confrontation with the West in 2014-2022, including building an independent payment system, import substitution, developing trade relations with China and conducting conservative macroeconomic policies (Dabrowski and Avdasheva, 2023) that increased the resilience of the Russian economy to Western sanctions.

On the other hand, Russian counter-sanctions against 'unfriendly' countries, especially those stopping natural gas exports to Europe, were self-damaging while missing their geopolitical goal of weaken the support for Ukraine provided by the EU and G7 countries. ■

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Endnotes

1. For a summary see Richard Martin, *'Sanctions against Russia – a timeline'*, S&P Global Market Intelligence, 5 July 2023.
2. See for example Brian O'Toole, Daniel Fried and Edward Fishman, *'For Biden, wreaking havoc on Russia's economy is the least bad option'*, New Atlanticist, 8 February 2022.
3. See http://www.cbr.ru/collection/collection/file/40964/forecast_220429.pdf
4. See https://rosstat.gov.ru/storage/mediabank/VVP_god_s_1995-2022.xls. We use data published by Rosstat, Bank of Russia, Russia's finance ministry and the IMF, along with independent estimates. So far, official Russian statistics, although less detailed than those before February 2022, remains broadly in line with independent and external estimates. Instances of data discrepancy or information gaps are noted in the text.
5. See https://rosstat.gov.ru/storage/mediabank/VDS_kvartal_OKVED2_s2011.xlsx
6. Véron and Kirschenbaum (2022). In the subsequent sanction packages, the number of sanctioned banks increased.
7. See http://www.cbr.ru/hd_base/infl/
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10. See (in Russian) https://minfin.gov.ru/ru/press-center/?id_4=38583-predvaritelnaya_otsenka_ispolneniya_federalnogo_byudzheta_za_yanvar-iyun_2023_goda
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Acknowledgements

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Are we witnessing the end of Erdoğanomics?

Is the tide finally turning for Turkey? Cem Soner argues that avoiding a financial crisis is only the first step forward

Is the tide finally turning for Turkey? Three months after the re-election of Recep Tayyip Erdoğan for his third term as president, which **many feared** would lead to economic chaos, ratings agency Moody's **has indicated** that Turkey's credit rating is on course for an upgrade. Since the election, Erdoğan has **installed** a new economic team with a commitment to reintroduce conventional monetary policies after years of a more singular approach.

This has yielded some early positive results, with June recording the first **current account surplus** in 18 months – meaning more money came into the country than went out (mostly due to tourism and lower energy imports).

Meanwhile, Turkey's **stock market** has been attracting surging interest from foreign investors, and the **cost of insuring** against the risk of the government defaulting on its debts has sharply declined. So what's going on?

The mess

When Erdoğan won the May election, **contrary to the opinion polls**, he extended his tenure as prime minister and then president to almost 20 years. This five-year term is likely to be his last, due to his deteriorating health and constitutional constraints. Thanks to the economic debacle that he created himself, it is also likely to be his most challenging.

There are two pillars to Erdoğanomics: the 'unorthodox' view that high interest rates cause inflation rather than the other way around, and a fixation on keeping rates as low as possible. It became much easier for him to implement after becoming **executive president in 2018**, which gave him much more power.

Central bank governors who have disagreed with Erdoğan's agenda **have been** shown the door, most notably Naci Ağbal, who was sacked in March in 2021 after only four months in office. It was the next governor, Şahap Kavcıoğlu,

a former MP in the ruling party and columnist in a pro-Erdoğan newspaper, who put Erdoğanomics into overdrive. Turkey experimented with aggressively cutting rates at a time when inflation was already close to 20% and most central banks were tightening.

The bigger question is whether we're really seeing the end of Erdoğanomics or just a lull. We can't rule out a repeat of 2021, when Ağbal was installed as central bank governor despite his orthodox economic views, then removed shortly after

Official inflation skyrocketed to over 80% and the lira plummeted, forcing the central bank to sell substantial [foreign exchange reserves](#) to try and shore up the currency. The current account deficit widened to a [record level](#) in January and the [earthquake](#) in February further worsened the situation.

This all happened despite the fact that the authorities struggled to impose their interest rate cuts on the wider economy. Whereas normally high-street interest rates move in line with the central bank rate, Turkish banks responded to the central-bank rate cut by increasing rates on consumer and business loans and savings accounts, signalling they didn't think the central bank's policy was sustainable. Loan rates for businesses only later came down after the [state-owned banks received](#) a capital boost in the run-up to the election.

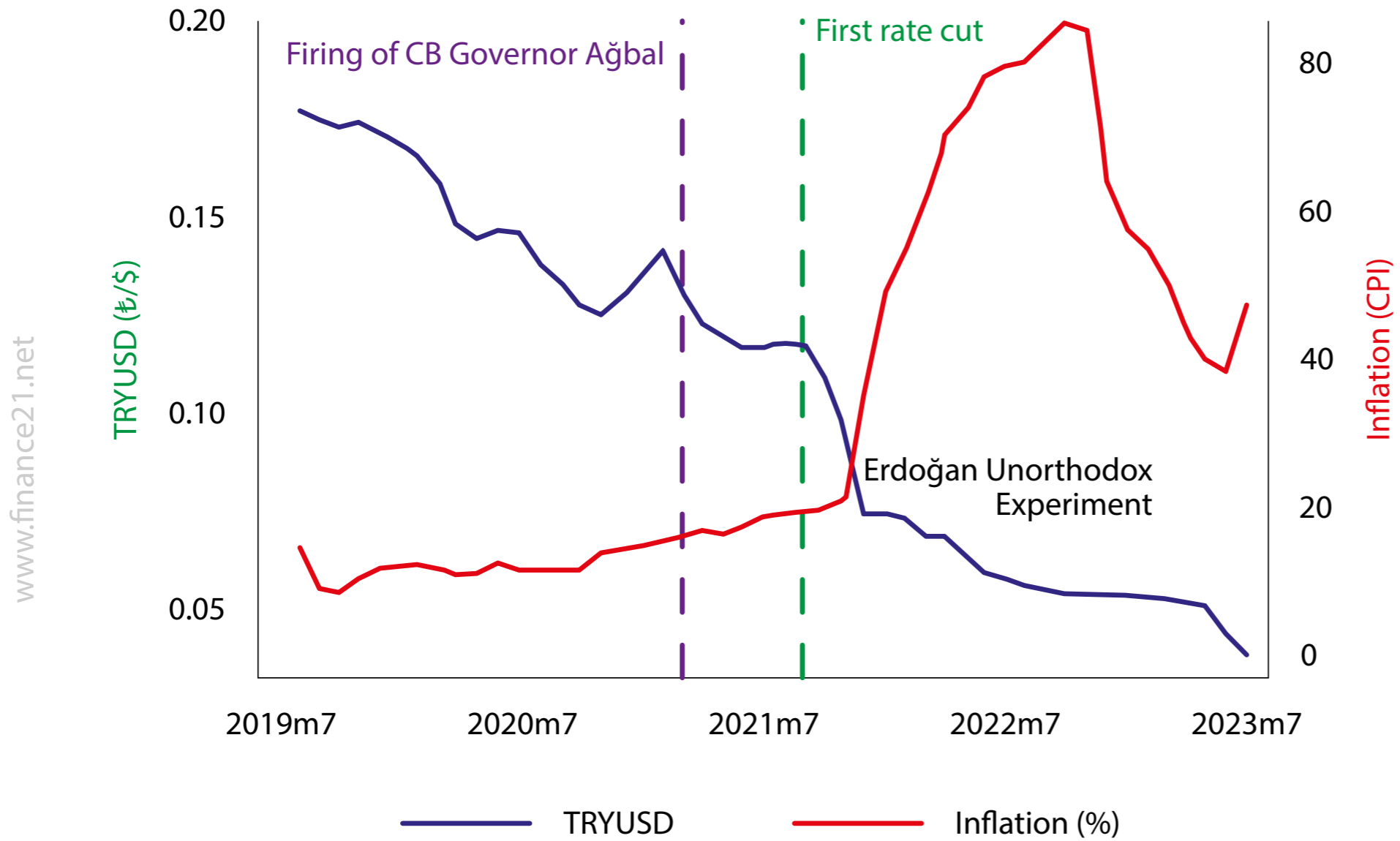
A new approach?

The president has now taken a different path. He has appointed former investment banker [Mehmet Şimşek](#) as finance minister. Şimşek is respected by the markets due to a previous [successful stint](#) managing Turkey's economy between 2007 and 2018. He has vowed to return to [rational economic policies](#), announcing: *"We will prioritise macro financial stability."*

Another reversal signal has been the appointment of [Hafize Gaye Erkan](#) as the first female governor of Turkey's central bank. She too comes from investment banking, having formerly been managing director at Goldman Sachs and co-CEO of First Republic Bank in the US.

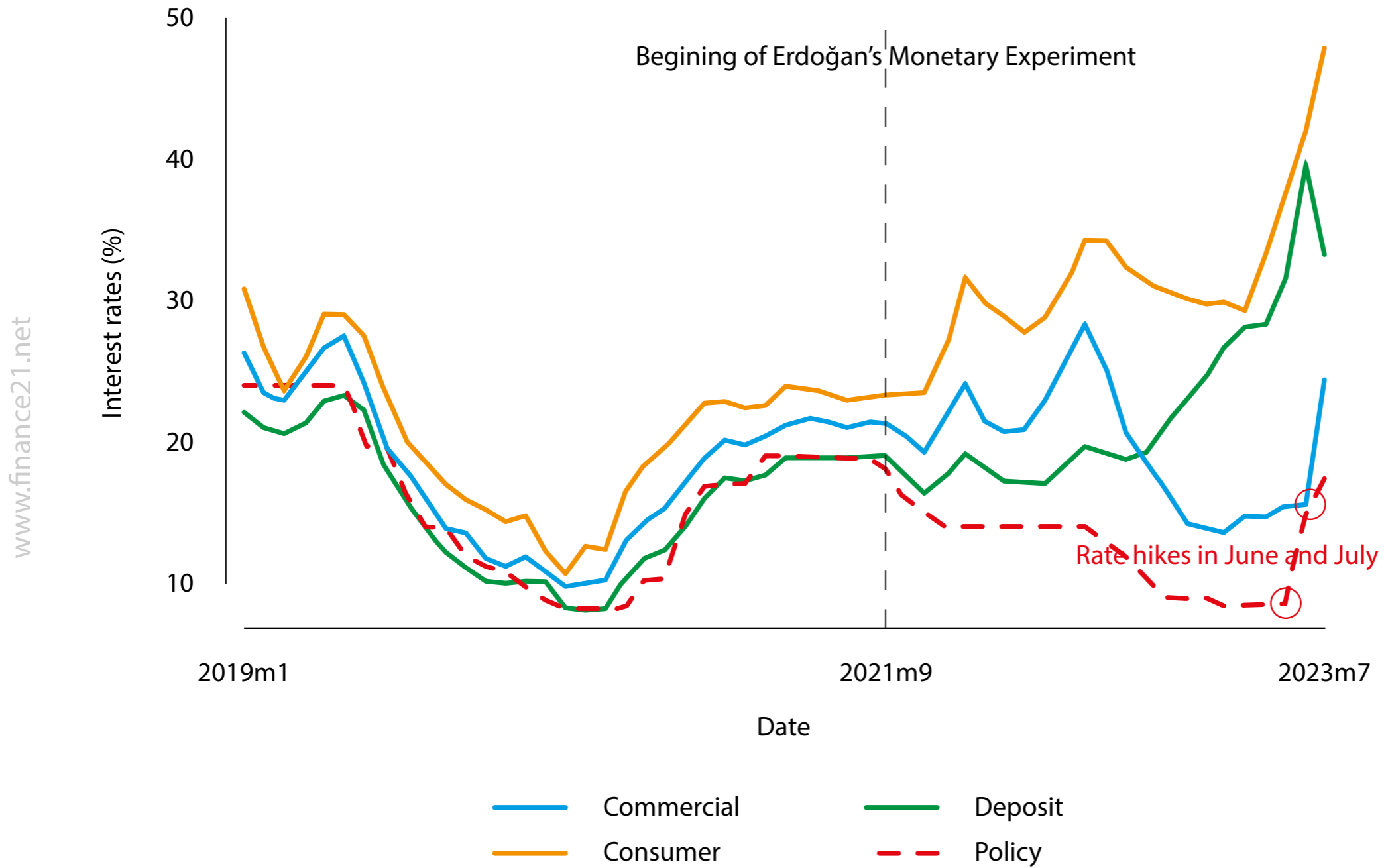
She has no central banking experience, but markets nonetheless [welcomed](#) her appointment. She has an outstanding resume compared to her predecessor, Kavcıoğlu.

Figure 1. Turkish inflation and the falling lira



Source: Author provided.

Figure 2. The interest rate divergence



Source: Author provided.

Erkan **hiked rates** on June 22 from 8.5% to 15%, the highest in nearly two years. The accompanying **press release** expressed a clear view that this is the way to reduce inflation.

The lira has nevertheless **kept losing value**, while annual **inflation** rose from 38% to 48% in July. But along with the other improvements I mentioned at the beginning, there has also been a **slight improvement** in foreign exchange reserves, indicating that the central bank is under less pressure to defend the currency.

In July, the markets were further reassured by the appointments of high-profile economists as **new deputy governors** for the central bank. This further decreased Turkey's **credit risk**. On July 20, the bank **hiked** interest rates again, to 17.5%.

What next?

Raising interest rates may have side effects. Turkey has one of the world's highest percentages of '**zombie firms**' that have only been able to stay afloat because of low borrowing costs, so there could well be bankruptcies. Also, we know from the recent US banking failures that rate hikes **inflict significant stress** on banks by reducing the value of their bond portfolios.

Turkey's banks are obviously not new to life under Erdoğan. They have some **fine management teams** and effective risk-management practices that are used to weathering the country's economic storms.

All the same, they look vulnerable because they hold low-yielding **government bonds** that could be impaired by aggressive rate hikes – particularly since they are denominated in lira, which creates exposure to further currency collapses. The government could alleviate this concern by swapping these bonds in exchange for new high-yielding ones.

The bigger question is whether we're really seeing the end of Erdoğanomics or just a lull. We can't rule out a repeat of 2021, when Ağbal was installed as central bank governor despite his orthodox economic views, then **removed** shortly after. Erdoğan has already put Şahap Kavcıoğlu, his biddable governor from 2021-23, in charge of Turkey's banking watchdog, which doesn't suggest a total break from the past and has confused markets.

The danger is that Erdoğan won't allow interest rate hikes in the run-up to the local elections in March 2024. On the other hand, voters in cities such as Istanbul and Ankara have been severely affected by inflation. They **overwhelmingly voted** against Erdoğan in the presidential election, having already handed metropolitan control to the opposition in 2019.

To regain these cities, **Erdoğan must** tame inflation and alleviate the cost-of-living crisis. He may also be motivated by a desire to hand a better economy to his preferred successor (likely to be either his son or son-in-law), who might not enjoy his levels of popularity.

Whatever happens, much damage has already been done. The nation's **current GDP per capita** is US\$10,616 (£8,335), well below its peak of US\$12,508 in 2013 (albeit it has grown for the past couple of years). Turkey has lost significant numbers of **skilled workers** to other countries.

Halting this brain drain, or even reversing it, will be crucial for future economic growth. This **seems unlikely** under Erdoğan's leadership. Avoiding a financial crisis is only the first step forward. ■

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Can Chinese growth defy gravity?

Alicia García-Herrero discusses China's growth potential, identifying the main challenges and the factors that could mitigate China's structural deceleration

Executive summary

Chinese growth, astounding since the beginning of the reform era, has slowed in the last decade. We offer a baseline estimate (based on the current trend) of China's medium-term growth rate, which we project to fall to 2.4 percent by 2035.

Several factors create uncertainty around this baseline. China's rapid aging is already incorporated into our long-term growth scenario, but its impact on growth will depend on how China's remaining urbanisation process spreads over time, how the shrinking labour supply affects labour productivity and whether the decline in total factor productivity growth, reflecting the lack of reform during the last decade and possibly the rising role of the state, can be reversed.

Investment in China, for decades the largest factor in China's growth, is expected to contribute less to growth given the increasingly low return on assets, particularly on state-led investment. The rapid piling up of public debt is also becoming a heavy burden for the Chinese economy. Finally, the COVID-19 pandemic may have left significant scarring effects, such as structurally high youth unemployment and low investment confidence.

On the upside for China, the rise in human capital and research and development expenditure may support innovation and growth, but the magnitude of this effect is uncertain, because it is unclear if higher innovation will translate into higher total factor productivity, and because of the United States's push to contain China technologically.

1 Introduction

China has become a crucial supplier of traded goods to the world market and a sizable consumer market for global companies. China's role in the global economy has increased relentlessly in the last few years, but the rate of this growth has been decelerating since 2010, although the rate remains higher than most of China's peers. Overall, China has contributed about a quarter of global growth in the last two decades.

In this context, understanding the extent of, and the reasons behind, China's structural deceleration is clearly important for both China and the world. This paper discusses China's growth potential for the next two decades, identifying the main challenges and the factors that could mitigate China's structural deceleration.

In section 2, we introduce our baseline scenario for Chinese economic growth up to 2035, the year by which China's GDP should double compared to 2020, according to the so-called long-range objectives for 2035 that were included in China's 14th Five-Year Plan for 2020-25¹.

We, then, compare China's expected economic performance to that of other countries when their level of economic development (measured in GDP per capita terms) was similar to that of China today. Such comparison of convergence paths offers a generally favourable prognosis for China's ability to escape the middle-income trap.

However, estimating long-term growth based on convergence theory is just a baseline. Outcomes can be very different depending on how other factors evolve.

In the second part of this paper, we look into the key factors explaining potential growth based on growth accounting and assess whether they are likely to push China's potential growth down or up. Factors weighing on

growth will include an aging population, over-investment which has pushed down the return on assets, the piling up of debt, and potential COVID-19-related scarring. On the positive side is China's massive bet on innovation.

Finally, we offer an overview of how much innovation may already be mitigating China's structural deceleration in terms of the evolution of total factor productivity.

The world is gravitating towards two independent technology ecosystems, one centred on the US and the other centred on China. Both powers are attempting to build the largest possible cohesive bloc, a process that will lead to increased technological bifurcation

2 China's growth story: a recap

Over the last two decades, China's economic growth has been close to miraculous compared to the rest of the world, especially given China's huge population. Figures 1 and 2 show the distribution of 10-year average GDP per capita growth rates for countries reaching per-capita incomes of \$1,000 and \$5,000 after 1960.

Countries in the ninetieth percentile of the distribution achieved annualised growth rates of 7.1 percent and 4.4 percent in the 10 years after crossing the \$1,000 and \$5,000 per capita income thresholds, respectively. China was in the highest percentile, achieving 9.9 percent and 6.3 percent, respectively.

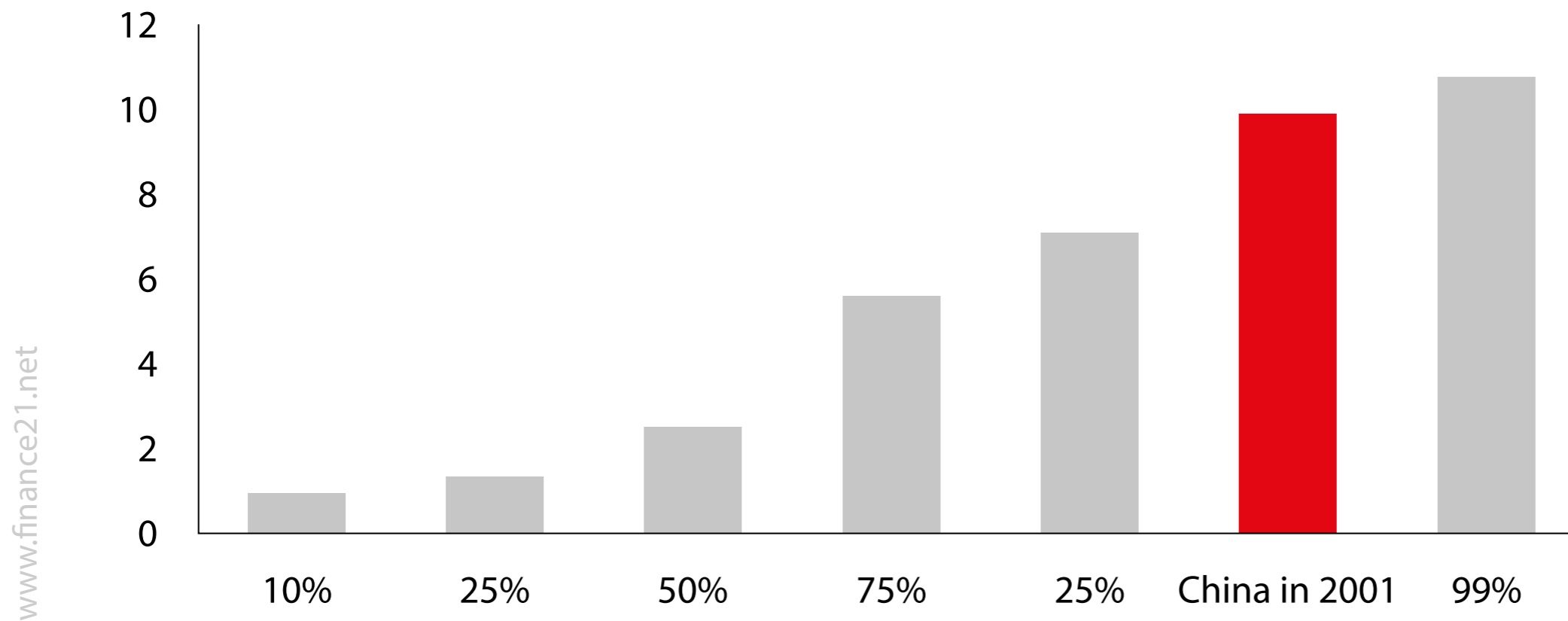
In 2019, China crossed the \$10,000 per-capita income threshold. COVID-19 hit China hard with a growth rate of only 2.2 percent in 2020, but the economy rebounded to 8.1 percent in 2021 thanks to the containment of the virus with harsh restrictive measures.

However, the Omicron variety of the virus, with much more rapid transmission, reached China in early 2022. China's decision to continue to apply zero-COVID-19 policies resulted a rather low GDP growth rate of barely 3 percent in 2022. For 2023, the official growth target is 5%, in the context of the reopening of the economy. The question now is what will China's growth rate be beyond 2023.

3 Will the Chinese economy stay on the same convergence path as in the past?

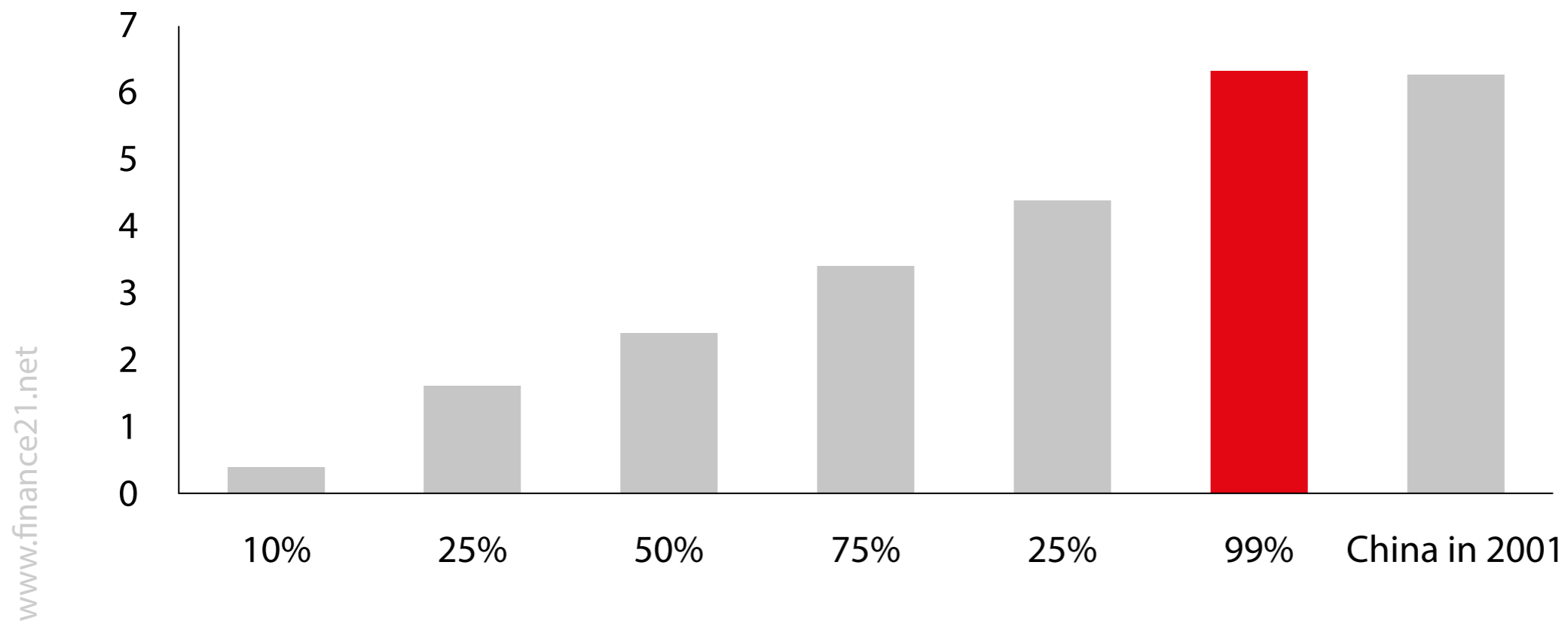
To gauge China's potential growth rate, we use Solow's convergence theory, which is based on the assumption that poorer countries grow relatively faster than richer countries and that growth rates will converge in the long run (Solow, 1956).

Figure 1. Chinese growth in a global context (post \$1,000 GDP per capita).



*Note: Average real GDP per capita growth rate for the 10 years after an economy reaches \$1,000 per capita (ranked by percentile, based on world GDP from 1960 to 2020).
Source: Bruegel based on Natixis, World Bank WDI.*

Figure 2. Chinese growth in a global context (post \$5,000 GDP per capita).



*Note: Average real GDP per capita growth rate for the 10 years after an economy reaches \$5,000 per capita (ranked by percentile, based on world GDP from 1960 to 2020).
Source: Bruegel based on Natixis, World Bank WDI.*

Many studies make use of this framework, and many have pointed to a slowing growth trajectory for China. For example, the World Bank (2019) expected China's average annual growth rate to decline to 4 percent from 2021 to 2030 in a scenario of continued limited reform. The World Bank considered different growth projections based on different assumptions about China's future economic reforms to deal with the economic bottlenecks.

Similarly, Albert *et al* (2015) suggested that China will continue its deceleration path over the next decade, but will remain at a growth rate above 4 percent in 2030. However, some economists think that China can defy growth-rate 'gravity' by continuing to grow very rapidly.

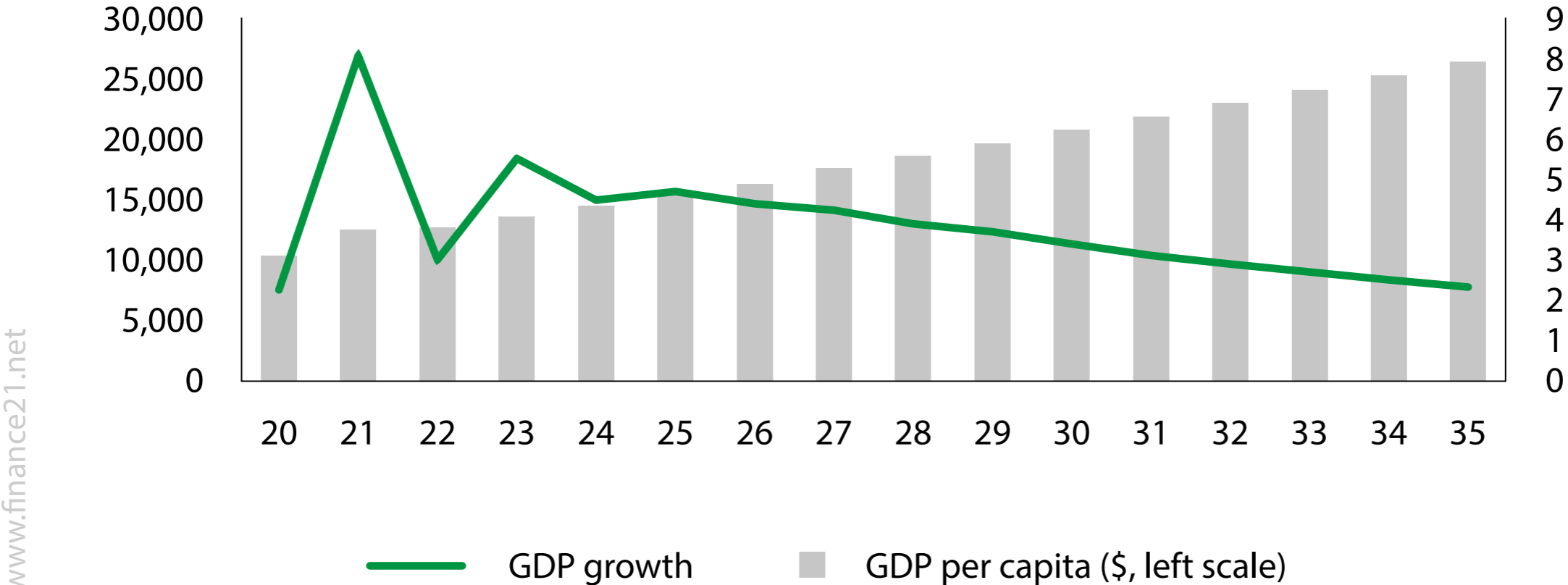
For example, Bai and Zhang (2017) estimated that China's growth rate will be about 4.8 percent between 2026 and 2030. Yifu and Wang (2021) argued that *"China still has the potential to continue growing at over 8% per annum at least the next decade."*

For our predictions of Chinese growth up to 2035, we follow the methodology in Gordon (2014) and implement a convergence-style estimation for labour productivity based on estimates of convergence of labour productivity growth and labour supply from United Nations' population forecasts (Table 1).

We rely on the pre-pandemic data for our extrapolation since it is too early to know whether pandemic-related impacts on labour productivity are here to stay. We find that China's average growth rate should stand at 4.9 percent from 2021 to 2025, and at 3.6 percent from 2026 to 2030 (Figure 3 and technical details in the appendix).

As a way to offer a comparative judgement on the speed of China's deceleration, Figure 4 compares our baseline average growth rate for China in the 10 years after reaching an income level of \$10,000 per capita to the average growth rates of other countries in the 10 years after they reached the same GDP per capita threshold.

Figure 3. China, GDP per capita growth projection.



Source: Bruegel based on Natixis, World Bank WDI.

Table 1. Forecasting China's potential GDP growth rate (%) based on the convergence model

	Output	Labour productivity	Employment rate	Labour participation rate	Adult population growth rate
2021-2025	4.9	4.9	-0.1	-0.3	0.4
2026-2030	3.6	3.8	-0.1	-0.5	0.4
2030-2035	2.4	3.0	-0.1	-0.7	0.2

Source: Bruegel.

Only two countries were able to continue growing at a rate of at least 4 percent after surpassing \$10,000 per capita: South Korea, with 5.5 percent average GDP growth from 1994 to 2004, and Japan with 4 percent average GDP growth during the 1980s.

The average growth rates of all other countries in the ten years after they surpassed \$10,000 per capita was much lower, with Poland (3.6 percent) closest to Japan's rate.

Against such a backdrop, as South Korea, Japan and Poland have escaped the middle-income trap, it is to be expected that China will do the same. In fact, based on the reasonable growth rate estimates, China should reach \$20,000 per capita in 2030 (ten years after it reached \$10,000 per capita).

The above long-term forecasts of China's GDP growth rate and estimates of its GDP deflator can be used to gauge whether China's GDP will surpass that of the United States in the foreseeable future. The results show that China's economy will amount to about 200 trillion renminbi (in current prices) in 2035, which approximately doubles the current level. Using the average exchange rate of the past few years (6.5 renminbi to the dollar) 200 trillion renminbi will translate into \$30.1 trillion.

Because the US economy was \$23 trillion in 2021 and is already at the frontier of the global economy, we assume an average 2 percent real growth rate for the next 15 years for the US, bringing US GDP to about \$30 trillion in 2035.

Based on these assumptions, Chinese GDP would converge with that of the US in the next 15 years, but would not surpass it substantially. From 2035, growth rates for China and the US will be similar, meaning that neither of the two economies would significantly overtake the other.

4 Structural factors affecting China's long-term growth

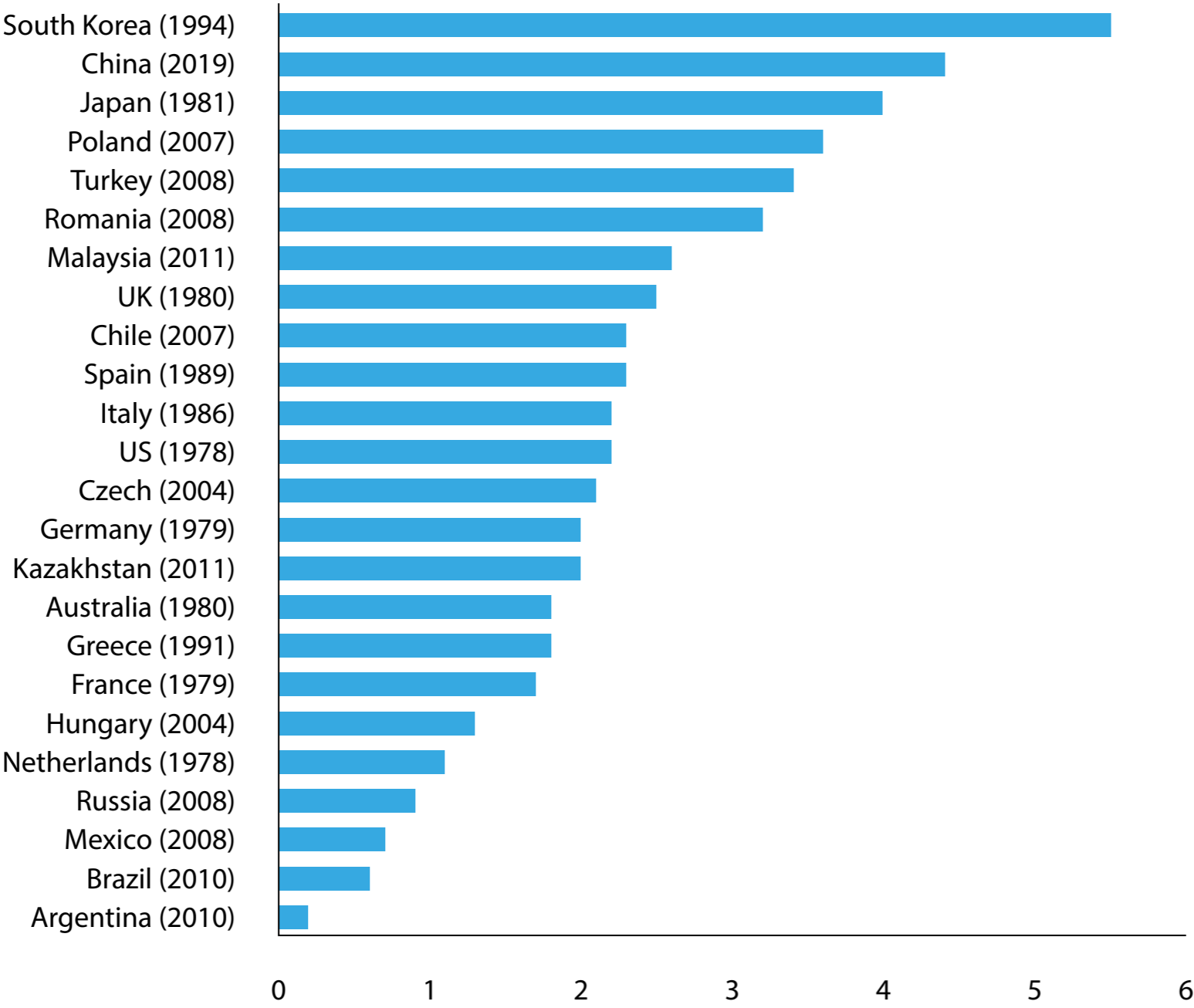
Moving beyond convergence theory and reflecting on the main factors behind potential growth in a growth accounting framework, several structural factors need to be analysed. While not aiming at estimating the downward or upward bias of each of these factors, we assess the direction of the bias in order to conclude whether the risks to China's long-term growth are mostly on the downside or the upside.

4.1 Population aging

One of most widely discussed supporting factors for Chinese growth in the past was the 'population dividend'. At the beginning of the Reform and Opening-up era in the 1980s, China experienced a surge in the working-age population relative to the total population (Figures 4 and 5). This kept labour costs in China low for a long period, which helped China remain competitive for a long period.

Figure 4. Average growth rates in the 10 years after crossing the \$10,000 GDP per capita threshold

www.finance21.net



*Note: dates in brackets show the year of crossing the threshold.
Source: United Nations.*

The main reason for this was the steady increase in urbanisation, moving people from the low-productivity agriculture sector to the higher-productivity manufacturing sector in the cities.

Now, China's population is aging, with the birth rate declining even further since 2017. Interestingly though, aging will hardly be a factor in explaining growth deceleration up to 2035 thanks to the remaining scope for urbanisation in China.

From 2035 onwards, aging will contribute much more intensively to further deceleration of China's growth rate, as urbanisation will have been completed and because the recent further decrease in the birth rate which started in 2017 will start to bite. From 2035 onwards, aging should cut 1 percentage point annually from the growth rate (see García-Herrero and Xu, 2023, for further details).

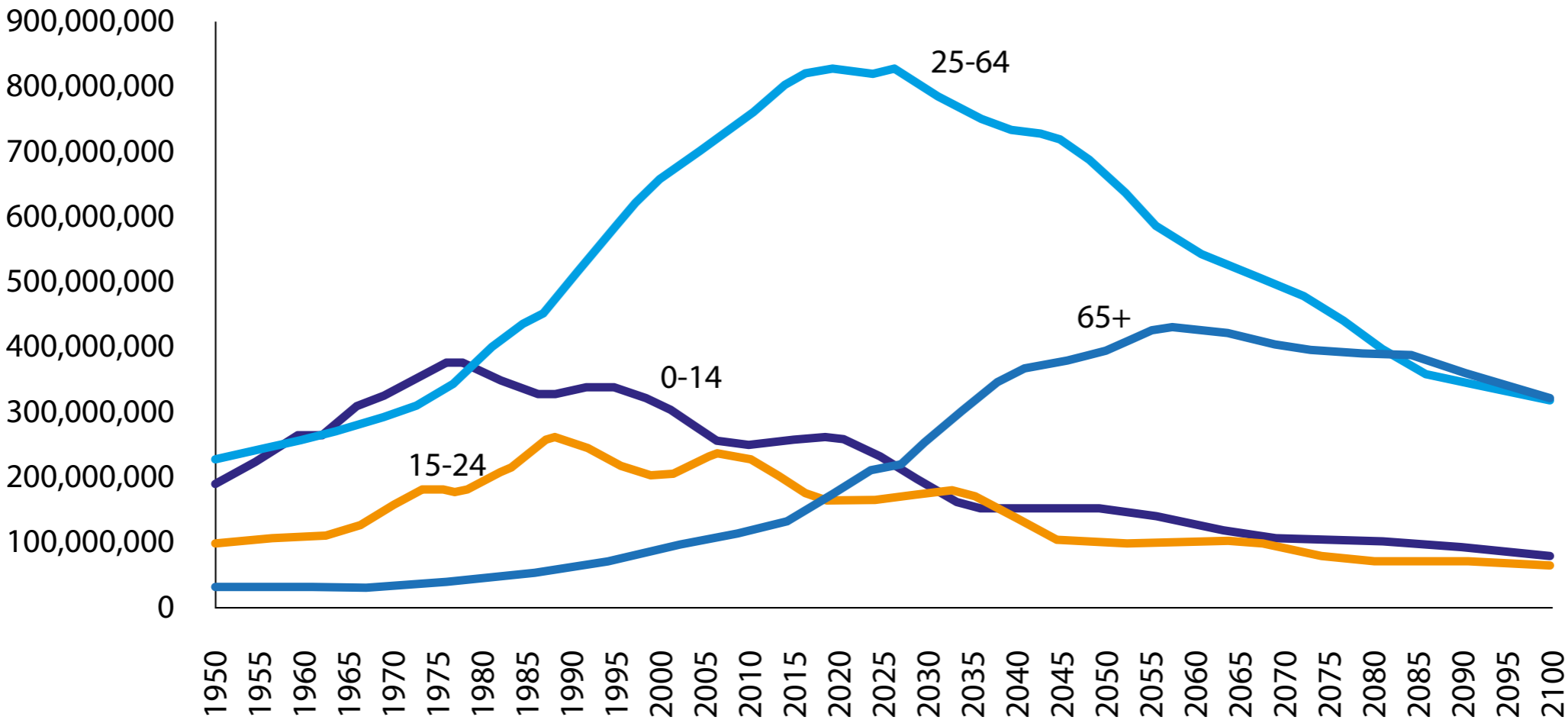
The Chinese government has started to take bolder measures to mitigate the decline in the fertility rate and its impact on China's labour supply, including a potential increase in the retirement age and continuing promotion of urbanisation.

Finally, a key question, which remains open, is how aging will impact productivity, especially labour productivity. China has a number of options to try to lift productivity, most of which focus on lifting the fertility rate, but there is also the potential to move to more capital-intensive fixed-asset investment, in artificial intelligence and automation, for example, while pushing for further human capital upgrading.

In sum, population aging presents considerable challenges for China's economy, especially from 2035. However, there may be a window of opportunity stemming from fertility policies and capital-intensive investment (Figure 6).

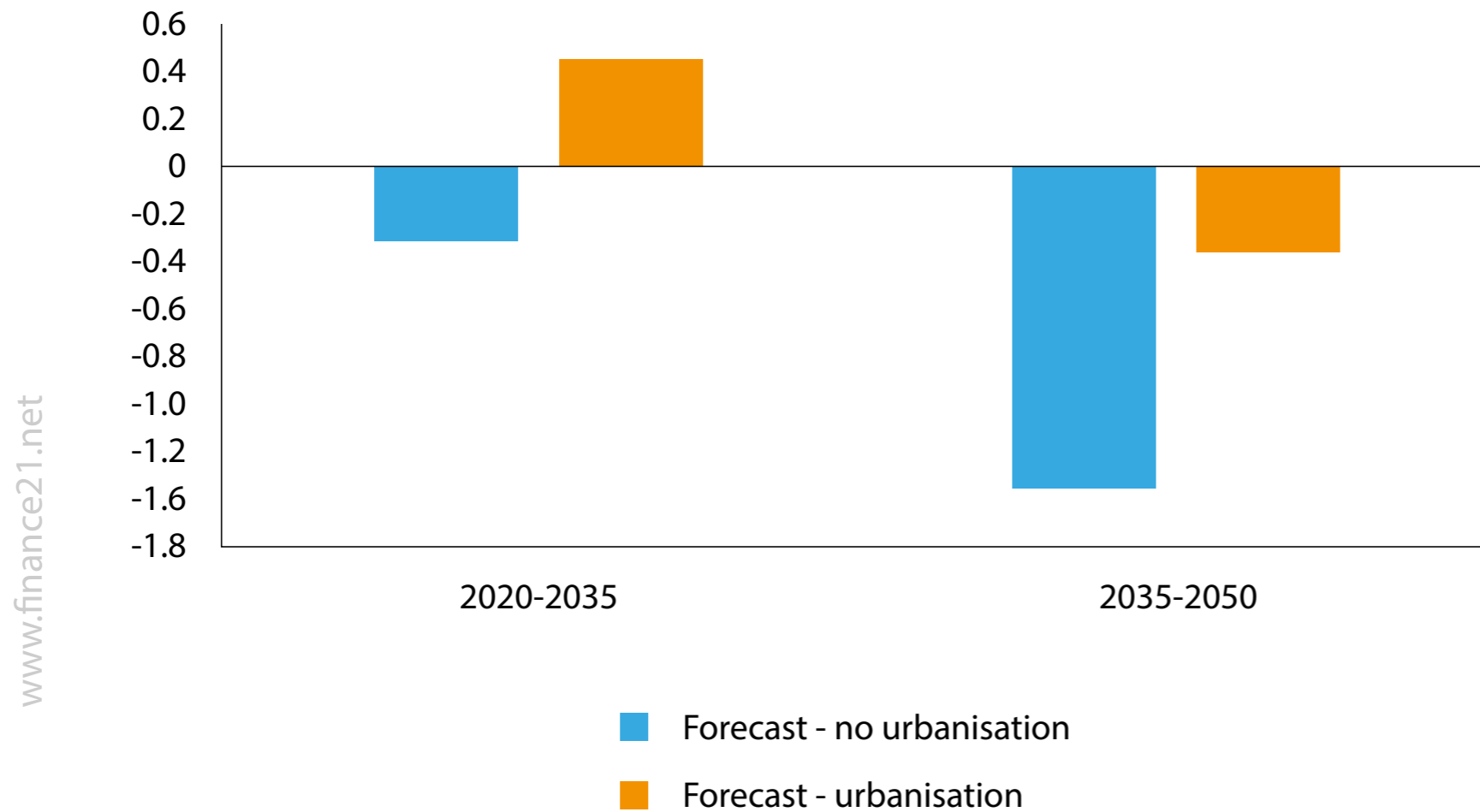
Figure 5. Chinese population by broad age group

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Source: United Nations.

Figure 6. Forecast impact of aging on China's GDP growth rate (percentage-point change)



*Note: only labour supply is considered; no change in labour productivity is assumed.
Source: United Nations.*

4.2 Decreasing returns to investment

In line with the convergence theory, capital accumulation has also been a key element in China's growth story, but its contribution to GDP has diminished in the last decade. Figure 7 shows that the investment contribution to China's GDP, along with other factors, has been trending downward significantly for the past decade.

At the same time, China has one of the world's highest investment-to-GDP ratios (more than 40 percent), nearly double that of the US or the UK (Figure 8). This seems to indicate that the room for China to grow further based on investment acceleration may be limited.

Furthermore, China's high level of investment clearly points to overinvestment. The return on assets continues to fall, especially for state-led investment according to our calculation of the return on assets of state-owned enterprises (SOEs) versus privately-owned enterprises (POEs) (Figure 9).

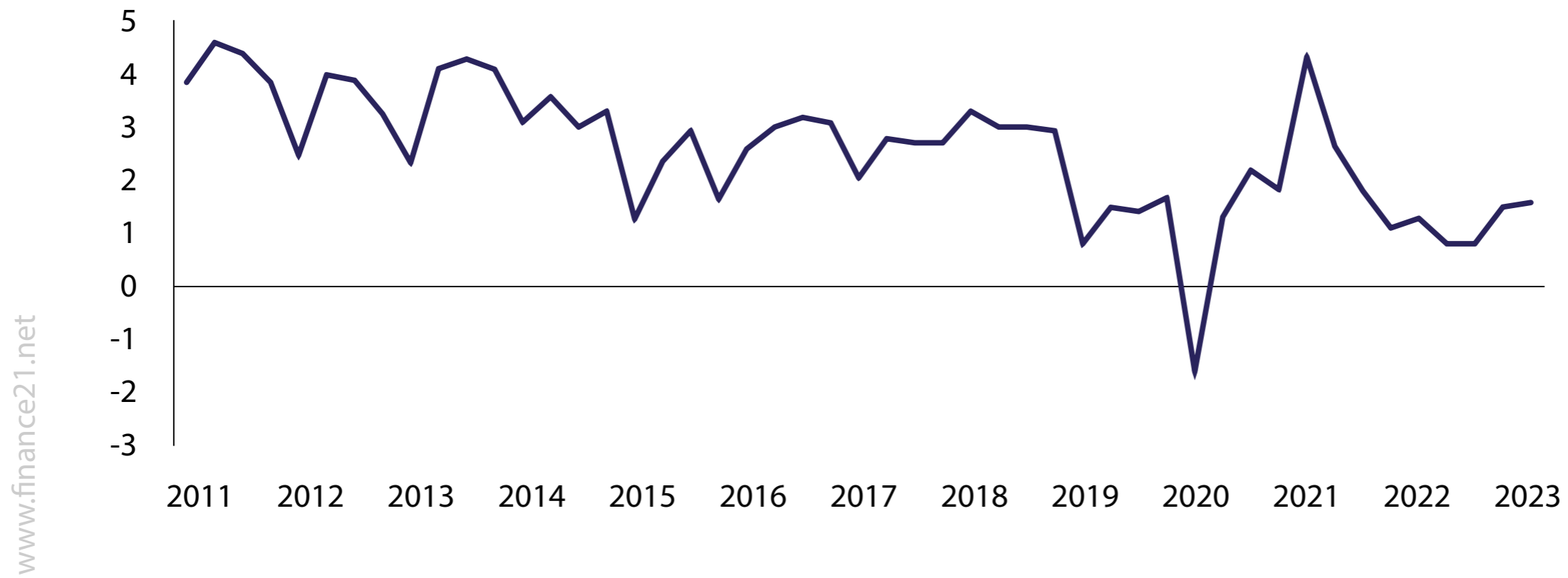
4.3 Fast-growing public debt

The rapid pile-up of China's debt, especially in the public sector since the pandemic, has raised concerns about China's debt sustainability and the impact of debt on potential growth. China's public debt has grown particularly fast because of borrowing by local government financial vehicles (LGFVs), which now amounts to double the combined debts of the central government and official direct borrowing by local governments.

China's total public debt has reached 97 percent of GDP (Figure 10), which stands out for a country of China's income per capita, especially because data constraints mean the debt of SOEs is not included in this calculation.

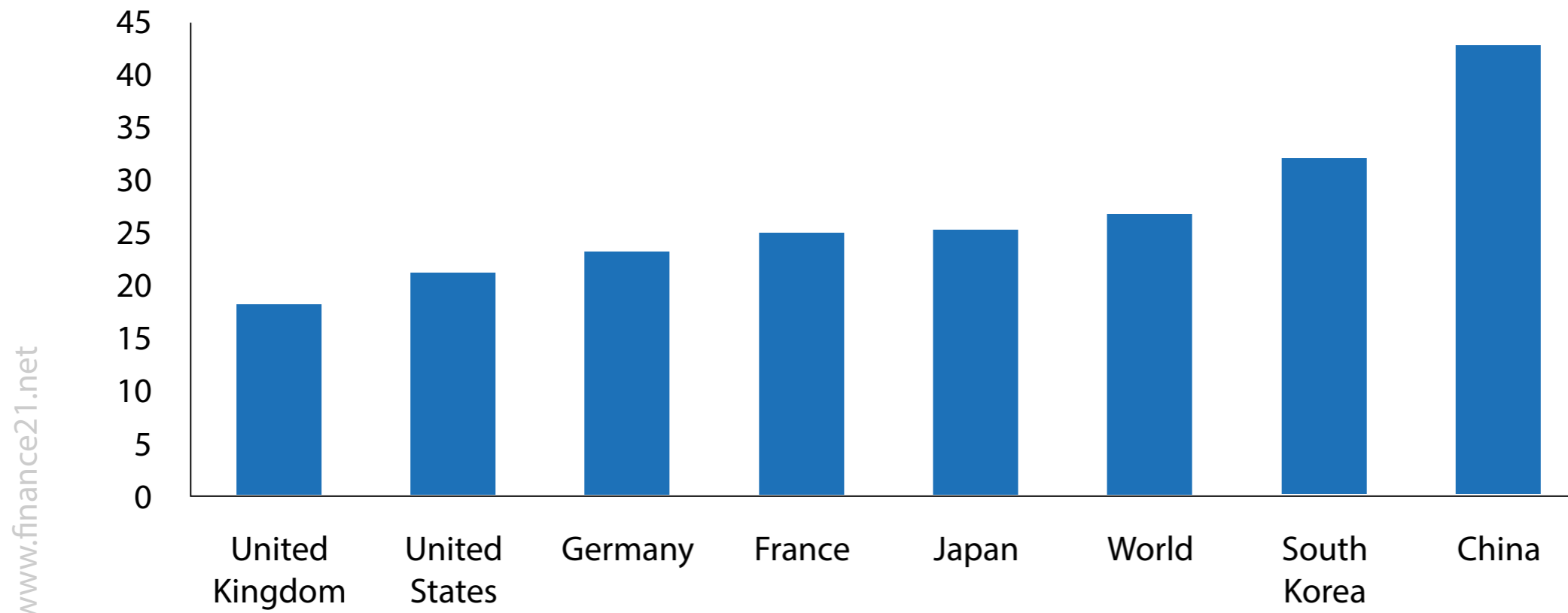
It should be noted that the piling up of public debt does not need to harm potential growth as it depends on how the money is spent. Given that LGFVs finance most of the investment carried out by local government, one could imagine that their return on assets should be higher than for other public debt.

Figure 7. Gross capital formation contribution to GDP growth (%)



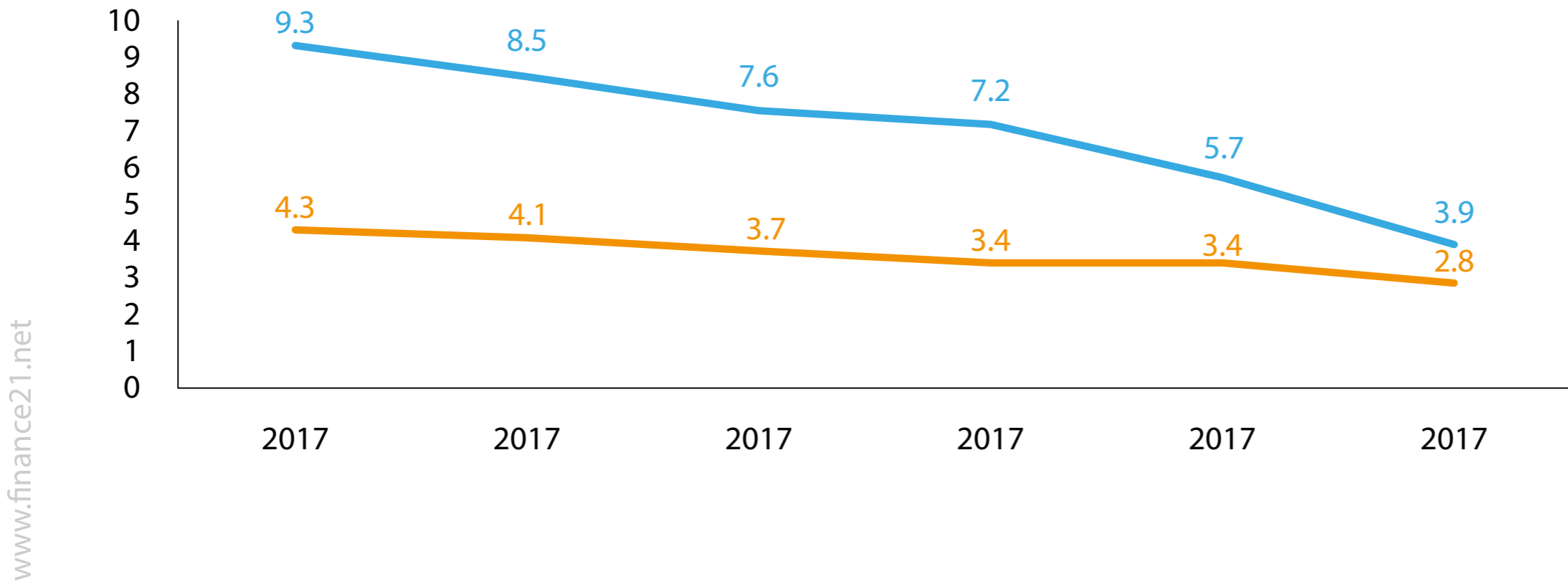
Source: Bruegel based on Natixis, NBS.

Figure 8. Investment as a % of GDP



Source: World Bank WDI.

Figure 9. Chinese corporations, average return on assets (%)



Note: Calculations are based on bond-issuing companies using WIND's BDE and BSC functions. The average return on assets is defined as the simple average of the ratio of gross return over total assets for all sampled SOEs and POEs (excluding financial companies and local government financing vehicles).

Source: Bruegel based on Natixis, Wind.

However, the average return of LGFV projects has declined to a very low level and is decreasing, especially in the context of China's average interest rates in the last few years. The average rate of return on assets of the LGFVs was 1.8 percent in 2017 but dropped to 1.3 percent in 2022 (Figure 11). This is a clear sign of the low efficiency of public investment, at least at local level.

4.4 Scarring effects from the COVID-19 pandemic

An increasing number of studies is investigating the pandemic's scarring effects or, in other words, its long-term consequences and how these might affect growth.

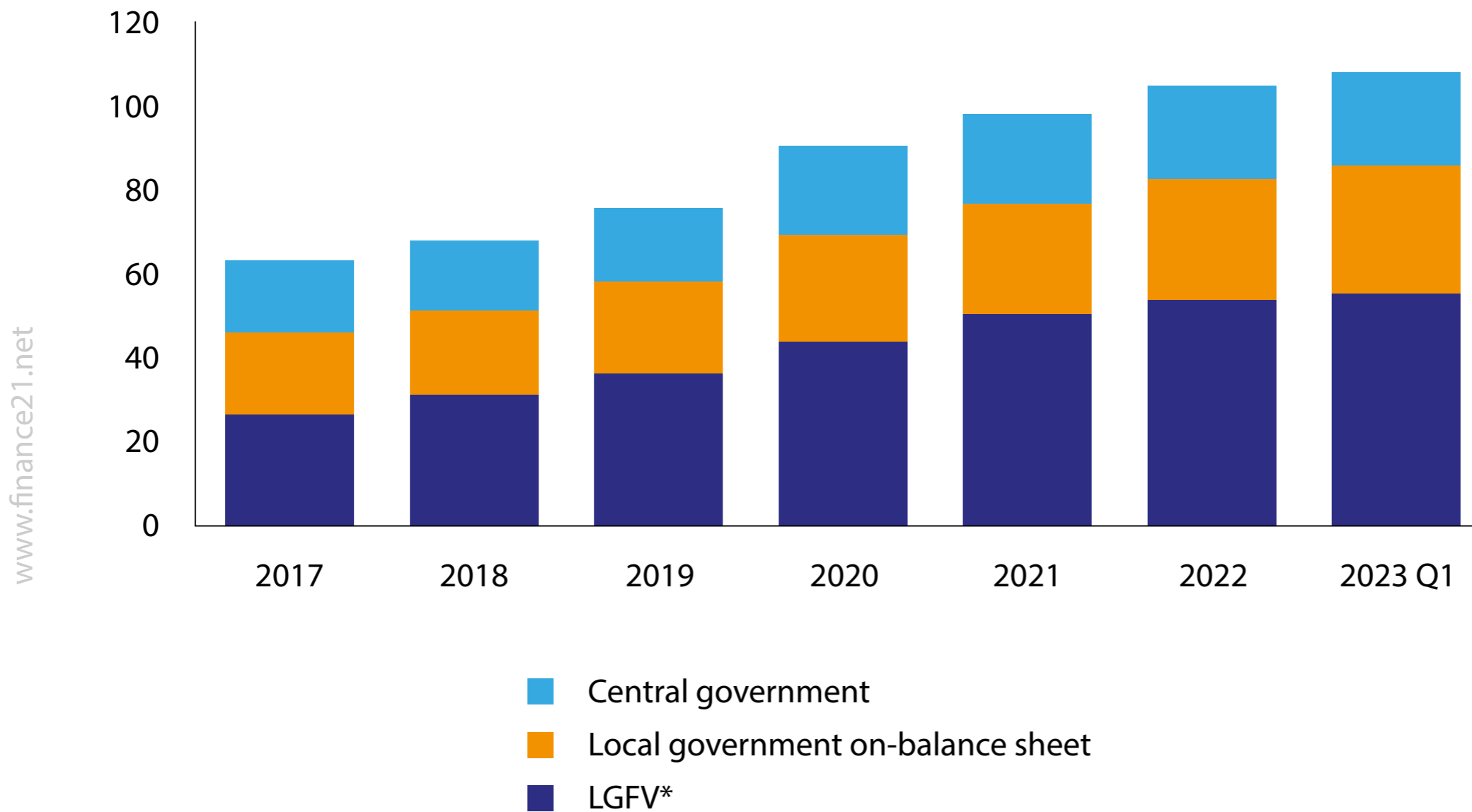
This phenomenon is visible when individuals are 'scarred' by the negative experience of short-term unemployment to the extent that they become indifferent to the prospects of employment (Clark *et al* 2001). This leads eventually to a permanent reduction in the labour-force participation rate and potential output.

Knabe and Rätzel (2009) suggested that this negative effect on wellbeing stems largely from the fear of future unemployment. Low job security for the employed and unfavourable re-employment opportunities for the unemployed are harmful to subjective wellbeing.

Kozlowski *et al* (2020) used the word 'scarring' in a rather macroeconomic context. Scarring is a persistent change in beliefs about the probability of an extreme, negative event.

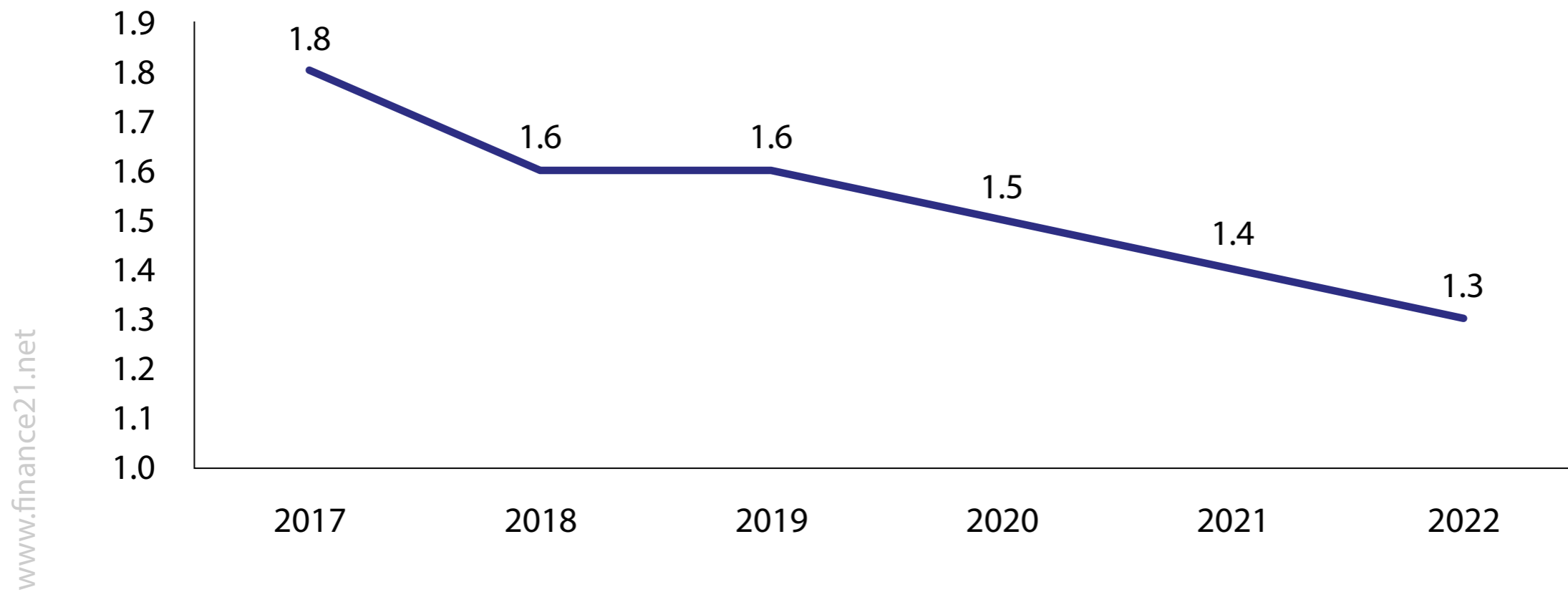
There has been much less of a systematic discussion of the scarring effect of COVID-19 on the Chinese economy. But as China has been implementing COVID-19 restrictions for longer than the rest of the world, the expected scarring effect could possibly be stronger than elsewhere.

Figure 10. China, outstanding government debt (% GDP)



*Note: 2023 Q1 central government outstanding debt is estimated. * LGFV = local government financing vehicle.
Source: Bruegel based on Natixis, China Ministry of Finance, China National Bureau of Statistics, CEIC, Wind.*

Figure 11. Chinese local government financing vehicles, average return on assets (%)



Note: Calculations are based on bond-issuing companies using Wind's BDE and BSC functions. The average return on assets is defined as the simple average of the ratio of gross return over total assets for all the sampled local government financing vehicles.

Source: Bruegel based on Natixis, Wind.

Some signals are already visible. The unemployment rate for the youngest cohort (16-24 years), increased to a record 20 percent in June 2022 (Figure 12), and even higher as recently as April 2023. This has been accompanied by a considerable increase in the demand for civil service jobs in 2022 (Figure 13) compared to jobs in the private sector.

This can be read as a sign of increased uncertainty, indicating the search for security among younger Chinese cohorts. The scarring from the COVID-19 pandemic may also have a negative impact on business confidence and, with it, investment. Both effects could eventually add to the downward pressure on the economy.

The scarring from the COVID-19 pandemic may also have a negative impact on business confidence and, with it, investment. Uncertainty in the geopolitical environment will only fuel this trend.

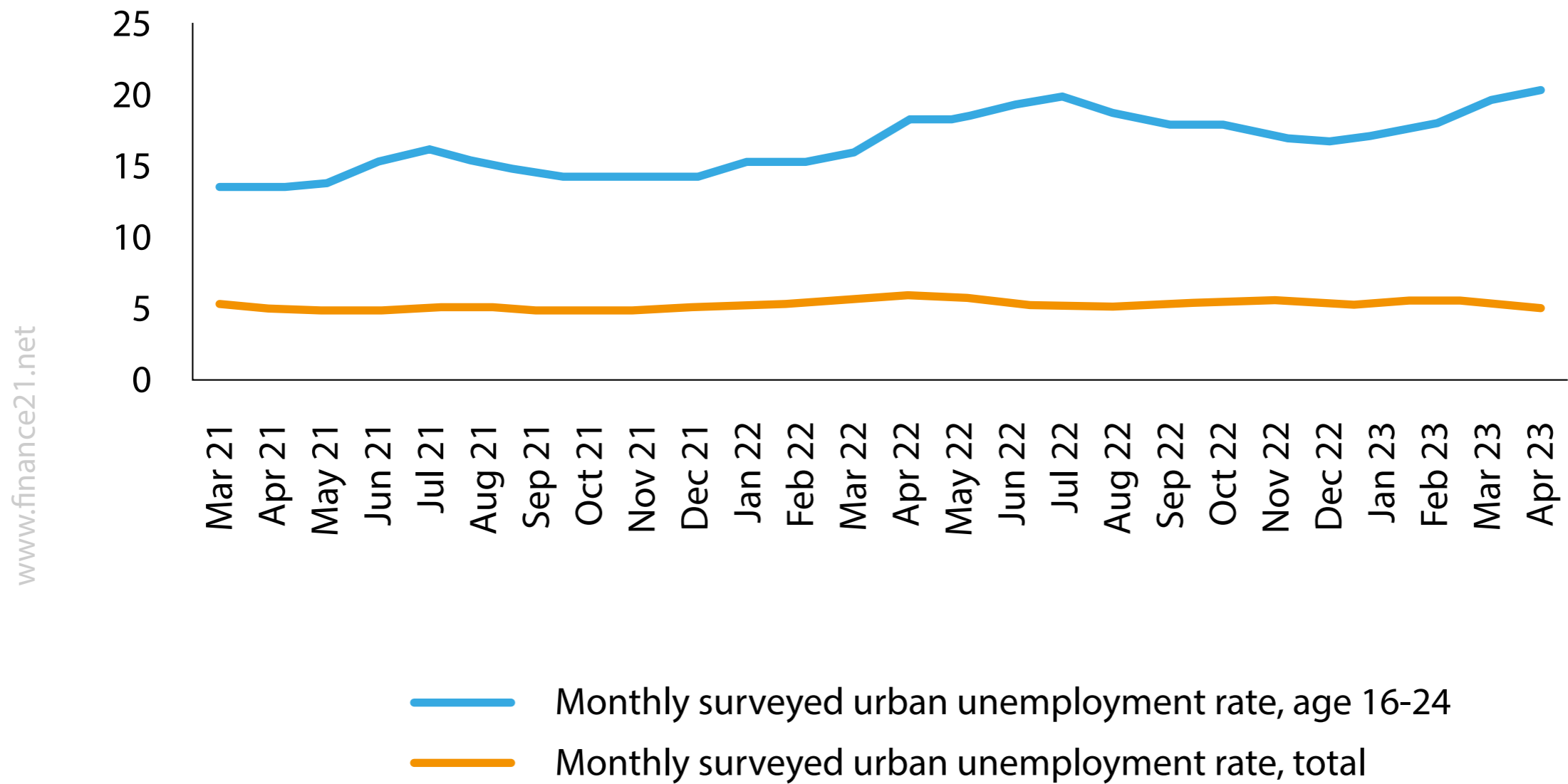
4.5 Geopolitical uncertainties

In contrast to the last two decades, China faces a more volatile and in many aspects less favourable geopolitical environment. Trade tensions between the US and China started with the Trump Administration in early 2018, but soon moved into technological containment, which has continued and has even been strengthened further under the Biden Administration.

Figure 14 shows that China has become the biggest target for harmful intervention measures. Most have been targeted at trade in goods with China (Figure 15). Since the outbreak of the pandemic in 2020, events have moved even quicker.

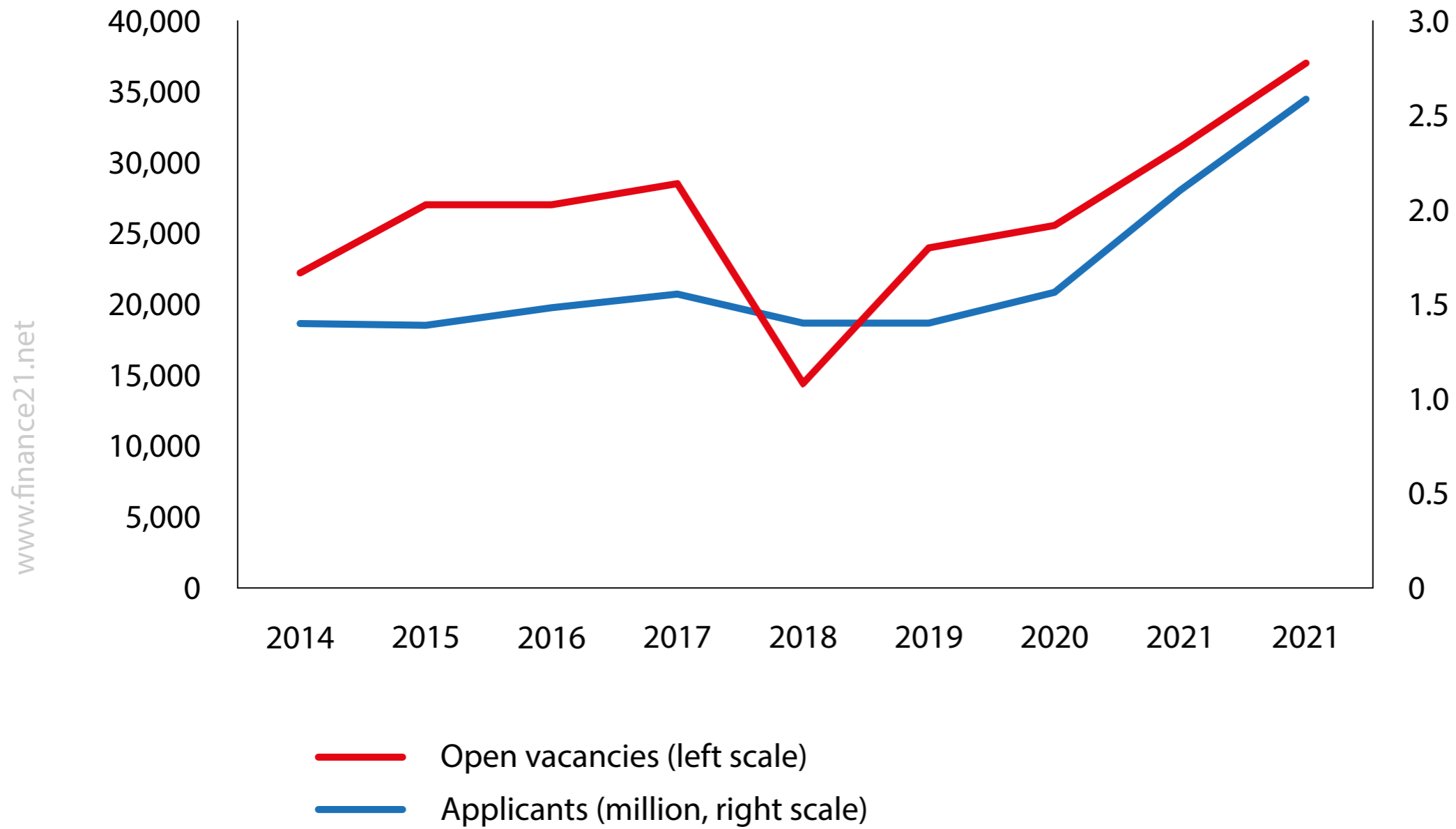
In the context of supply shortages during pandemic lockdowns, and with European countries losing their gas supplies from Russia since the invasion of Ukraine, both the EU and US are reassessing their economic dependencies.

Figure 12. Unemployment in China (%)



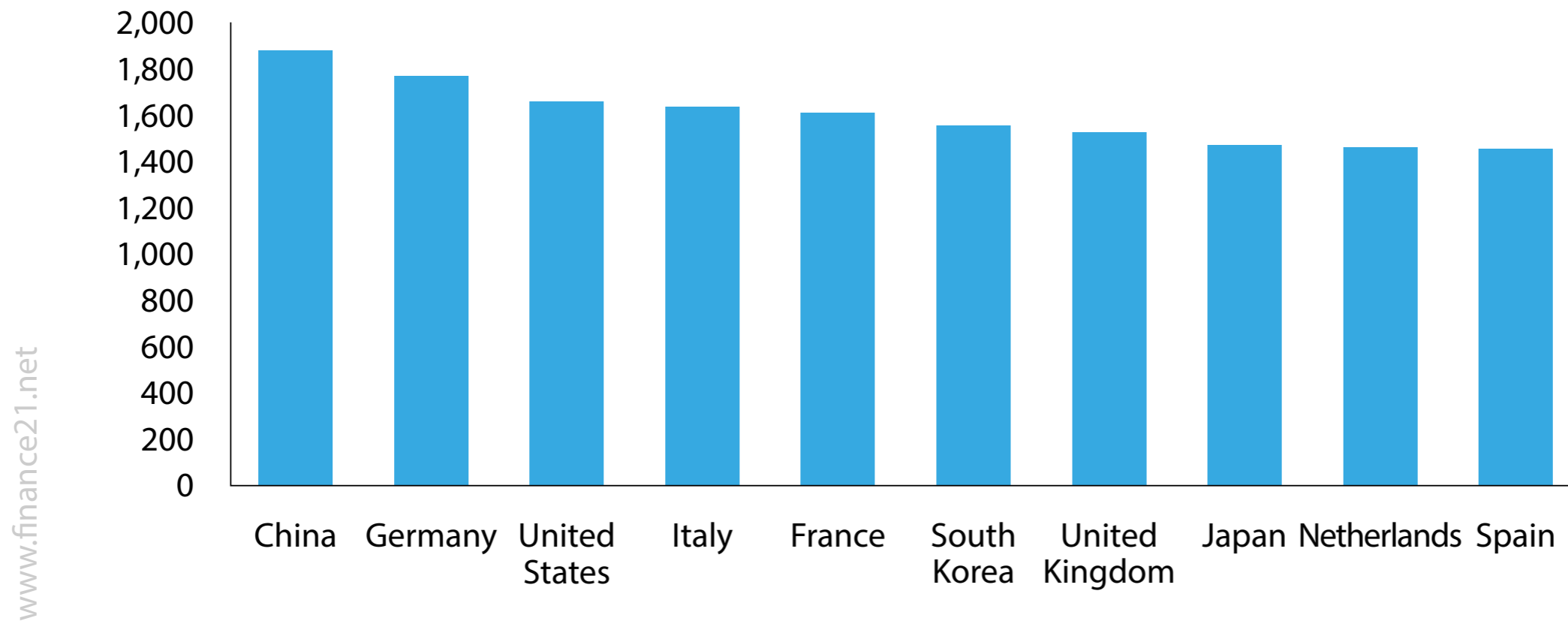
Source: National Bureau of Statistics of China.

Figure 13. Rise in the demand for civil service jobs



Source: South China Morning Post.

Figure 14. Number of harmful interventions, cumulative until 2020



Source: Global Trade Alert.

Figure 15. Number of harmful interventions against China, new cases per year



Source: Global Trade Alert.

Significant future technologies, including permanent magnets used in wind turbines and electric-vehicle batteries, rely on raw materials sourced from and processed predominantly in China. The geopolitical risks related to this were demonstrated in 2010 when China imposed an export ban on several raw materials used in hybrid cars, wind turbines and guided missiles, as part of a maritime dispute with Japan.

More recently, the Chinese leadership has also considered similar bans on exports to the US². Excessive dependencies have also been visible in clean technology manufacturing, in which China dominates wind, EV batteries and solar panels.

Both the US Inflation Reduction Act and the EU's proposed Critical Raw Materials Act are targeted at home-shoring some of the production and reducing these dependencies (Le Mouel and Poitiers, 2023).

The United States has implemented a comprehensive set of policies aimed at restricting the access of Chinese firms to critical technologies, most prominently semiconductors. The most important escalation happened in October 2022, with the implementation of export controls on semiconductor manufacturing equipment to China.

This was reinforced by a trilateral agreement on export restrictions between the US, Japan and the Netherlands, the latter two being home to firms providing crucial equipment for advanced chip manufacturing. This multilateral alliance was formalised in May 2023 with the establishment of the G7 initiated Cooperation Platform on Economic Coercion.

These developments have led to a situation in which the world is gravitating towards two independent technology ecosystems, one centred on the US and the other centred on China. Both powers are attempting to build the largest possible cohesive bloc, a process that will lead to increased technological bifurcation.

The West's attempts to diversify and imposition of export controls will make it harder for China to access critical technologies, while reducing the geopolitical leverage it has over Western economies. So far, China has been unable to replicate the chip ecosystem domestically, despite decisive financial efforts.

4.6 Innovation as the chance to prevent a slowdown

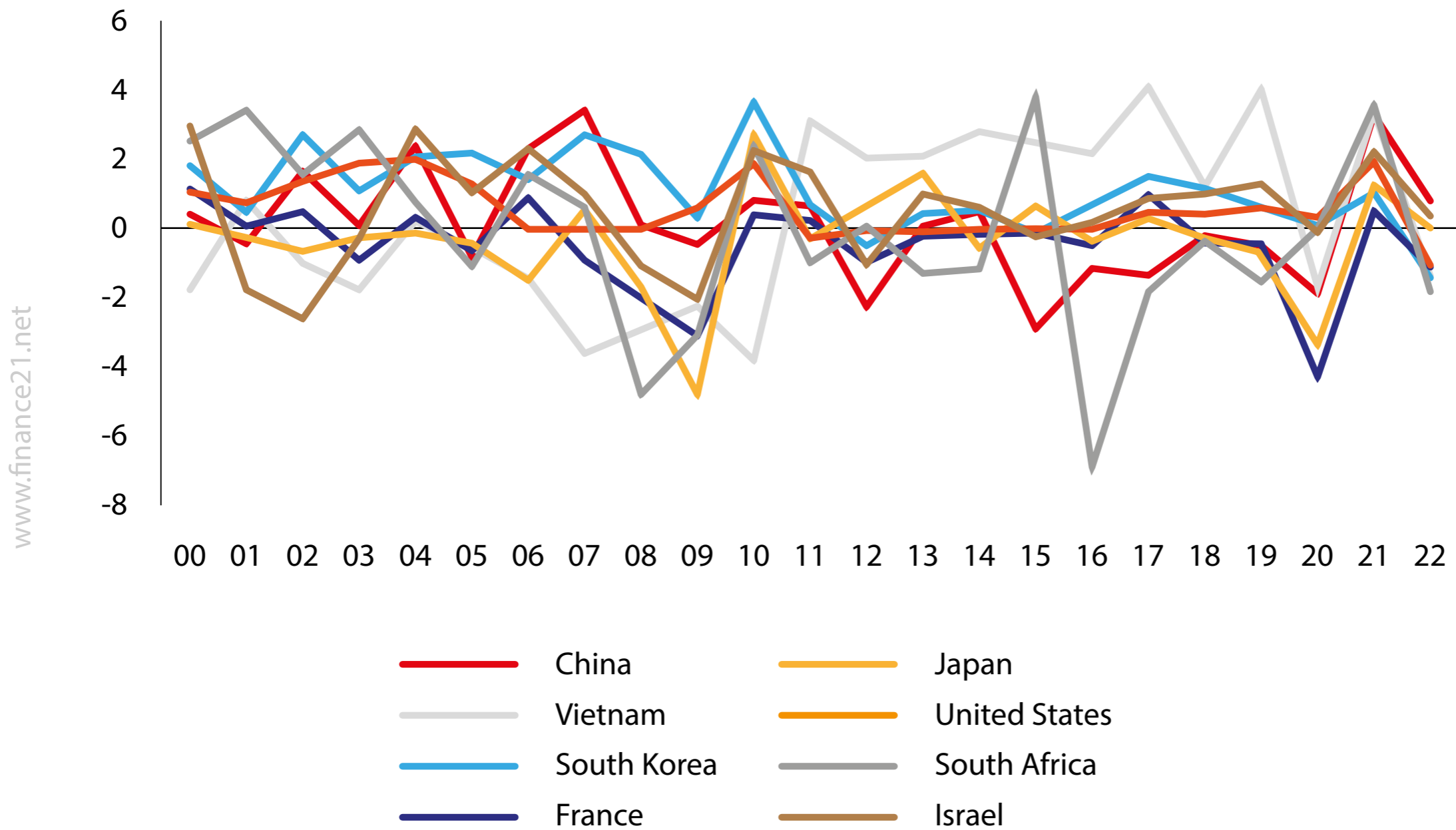
Our baseline forecast (section 3) relies on a linear projection of productivity convergence based on past experience. However, modern growth theory argues that productivity growth is endogenous, and depends on the endowment of human capital and research efforts to push up total factor productivity (TFP).

TFP has for a long time been a key engine for China's growth (Figure 16), but its growth rate has dropped significantly since the global financial crisis, even more than global productivity. Whether China's innovation efforts are providing enough tailwind to mitigate the structural deceleration of the economy will be the crucial question for the medium-term future.

China's leadership knows this and has made innovation policy its top priority. Under different slogans, whether 'Made in China 2025' or the party's 'Innovation-driven development', reaching and expanding the technology frontier in major industries has become the goal of economic policy.

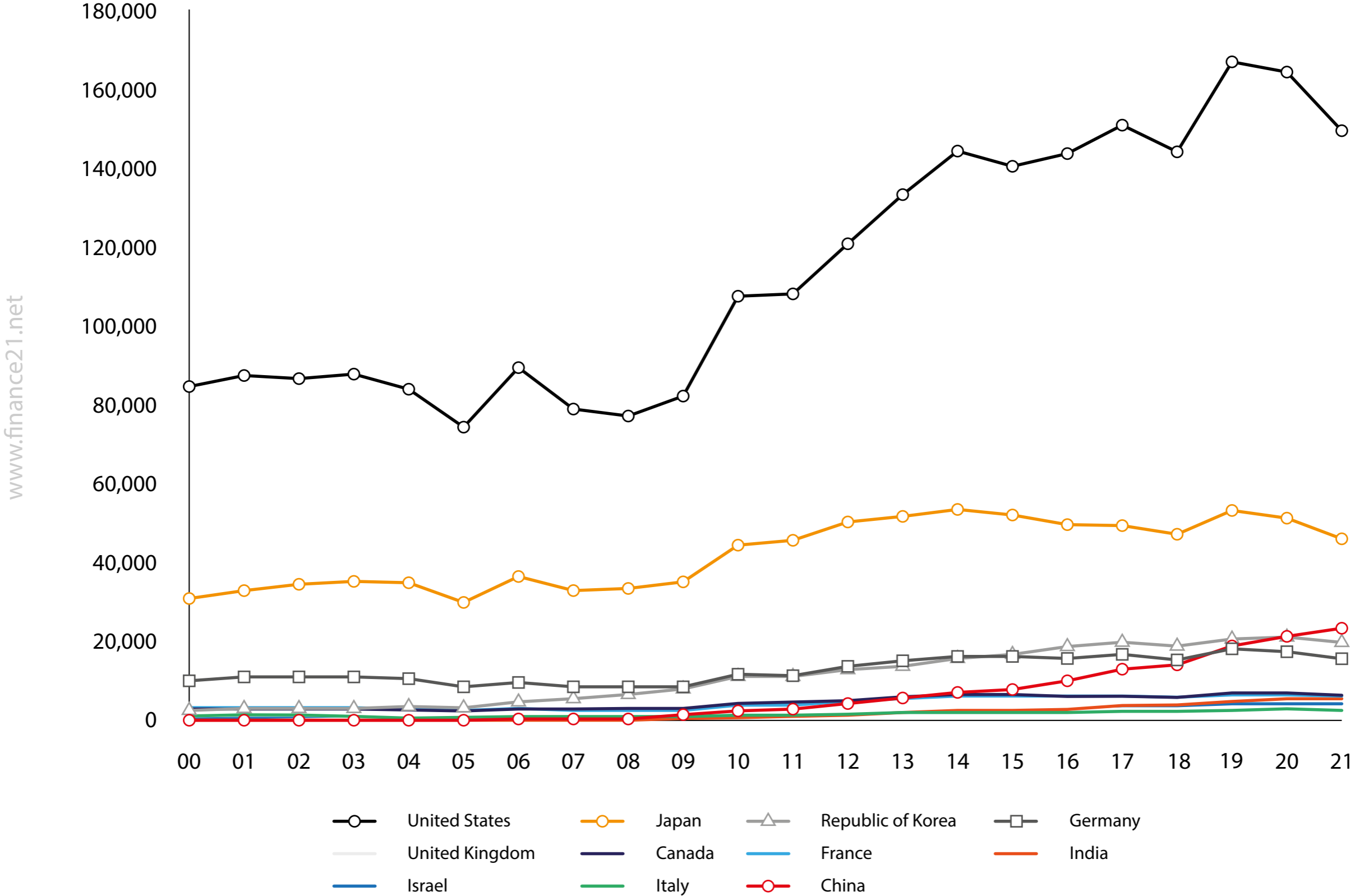
In an overview of China's progress on innovation and its impact on growth, García-Herrero and Schindowski (2023) found that China's performance in terms of increasing the inputs to innovation, R&D and educational attainment is clearly favourable and so are the intermediate outcomes, such as the number of patents and scientific publications (Figures 17 and 18).

Figure 16. Growth in total factor productivity (%)



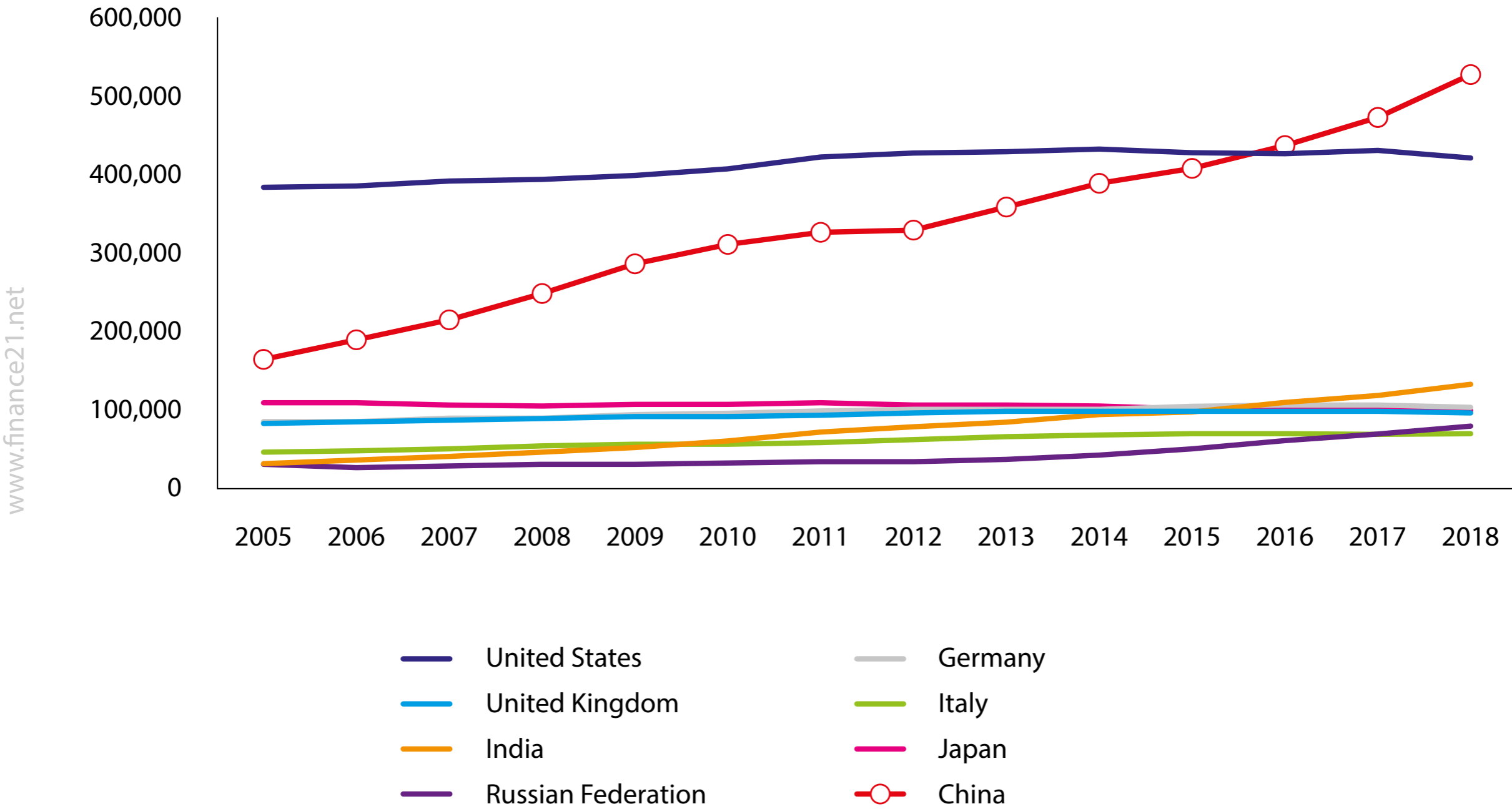
Source: Bruegel.

Figure 17. USPTO total patent grants (PCT and direct), selected countries



Note: USPTO = United States Patent and Trademark Office; PCT = Patent Cooperation Treaty.
 Source: WIPO.
 Finance21 Autumn 2023

Figure 18. Articles published in scientific and technical journals, by country of institution of author



*Note: Articles are classified by year of publication and assigned to country on the basis of institutional address(es) listed on the article. Articles can count for more than one country depending on the affiliations of the authors.
Source: World Bank, National Science Foundation.*

However, providing resources is a necessary but not sufficient condition for boosting productivity. Making best use of the factors such as human capital and R&D inputs requires efficient allocation of resources to the best productivity-enhancing firms.

For example, Brandt *et al* (2020) showed that barriers to market entry and exit and the channelling of resources towards less-productive firms and sectors, contributed to a slowdown in manufacturing TFP growth from 2008 to 2013.

In this respect, China faces several obstacles, many of which are connected to the uncertainty factors discussed above. First, local business dynamism is stifled by excessive involvement of the government in the economy. Subsidies and venture capital funds are allocated selectively, often to politically connected firms. Local governments still rely on off-balance funds, including revenue from fines and land-transfer fees, to fill budgetary gaps.

Second, the US CHIPS and Science Act³ and subsequent enforcement measures have stripped Chinese innovators of their most important enabling technology, which is slowing China's progress in important areas, including AI and quantum computing.

While Chinese firms might be able to source semiconductors from third parties, they do so under increasing risk of being added to the US Department of Commerce's entity list, which includes foreign entities subject to US license requirements for the export or transfer of specific items.

Third, youth unemployment and the COVID-19 pandemic could generate widespread discouragement among China's young people, all of whom are potential innovators.

5 Conclusions

China has been a success story for decades in terms of its economic growth. However, the deceleration that has taken place since 2012 is likely to continue, for reasons beyond the cyclical factors related to COVID-19 restrictions.

Based on convergence theory (poorer countries tend to enjoy higher growth rates than the richer countries), China's growth rate should continue to slow to 2.4 percent by 2035. Notwithstanding such deceleration, China should be able to escape the middle-income trap as its income per capita should exceed \$20,000 by a large margin.

It seems unlikely, however, that China will surpass the US in terms of the size of its GDP in dollar terms. China should equal the US size by 2035, but will stop converging thereafter. This means that both economies would be about the same size from 2035.

Against this backdrop, a number of uncertain factors could affect Chinese potential growth. Much attention has been paid to China's aging, but our calculations show that its impact on growth will be limited until 2035, partially thanks to continued urbanisation.

A second drag could be the increasingly low return on assets, which seems difficult to reverse. This is especially true for the public sector, which continues to pile up debt.

Finally, the scarring effects from COVID-19 are not included in our growth estimates but have the potential to weigh further on growth. There is hope that innovation can lift total factor productivity, but there is not yet supporting evidence for this, notwithstanding massive Chinese investment in innovation, as shown by the rapid increase in R&D and higher educational attainment.

A more meaningful step would be for China to reduce its apparent misallocation of innovation resources by levelling the playing field for firms of all ownership types. Beyond the misallocation of resources, US-China strategic competition and the US technological containment strategy is another worrying sign for China, potentially hobbling its attempts to mitigate structural deceleration through higher TFP stemming from innovation. ■

Alicia García-Herrero is a Senior Fellow at Bruegel

Appendix

We can decompose China's GDP into the following components:

$$Y = \left(\frac{Y}{L}\right) \left(\frac{L}{L}\right) \left(\frac{E}{N}\right) N$$

Taking log-difference on both sides of the equation yields, GDP growth rate

= labour productivity growth rate
+ employment ratio growth rate + labour participation growth rate
+ the growth rate of the population older than age 15

To calculate the long-term growth rate for China, we estimated the convergence speed of China's labour productivity by using Chinese historical data after 2008 with an AR(1) specification, adopting the population forecast from the United Nations and then assuming a stable employment rate and a slight decline in the labour-force participation rate.

Endnotes

1. See <https://english.www.gov.cn/w/14thfiveyearplan/>
2. Sun Yu and Demetri Sevastopulo, 'China targets rare earth export curbs to hobble US defence industry', *Financial Times*, 16 February 2021, <https://www.ft.com/content/d3ed83f4-19bc-4d16-b510-415749c032c1>
3. See <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/>

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Global action to enhance crossborder payments



Victoria Cleland discusses the difference to people and economies worldwide that enhancing crossborder payments would make

Almost three years ago the Committee for Payments and Market Infrastructures (CPMI) published the 19 building blocks¹ to enhance crossborder payments. The building blocks were the foundation for a clear action plan endorsed by the G20 – the Roadmap². This set out a vision and steps to achieve it, bringing together central banks, public authorities, standard-setting bodies and the private sector around the world.

And to provide measurable focus, the G20 endorsed clear and ambitious targets for 2027³ to unite everyone around the same vision: to make crossborder payments faster, cheaper, more transparent, and more accessible.

These enhancements could reduce barriers to trade: cutting transaction costs on international trade just by one percentage point would save firms \$13 billion in Africa alone. And with a focus on remittances as well as wholesale and retail payments, ultimately improve financial inclusion and help to alleviate poverty. That is what I call a worthwhile vision!

Enhancing crossborder payments has been an objective for many decades. What is different now is that we have a clear vision, targets and a holistic approach on how to address the disparate set of underlying frictions. And the work is taking place at a time of rapid innovation in the payments industry and national payment systems, creating an opportunity to build on existing change programmes.

Crossborder payments are high on the agenda for public policymakers and financial institutions. A lot has been achieved recently through the collaborative effort of authorities worldwide, including of many of you here today. We have developed frameworks on operating hours and access policies to support public authorities to enhance their domestic systems and increase interoperability.

We have consulted on harmonisation requirements to ensure that the new ISO20022 standards are used consistently around the globe. We have identified specific regulatory and legal barriers to seamless payment processing and proposed solutions.

We have achieved a lot already but there is still more to do, and much more to gain. We have built the foundations and a framework to support a holistic set of changes. Now we need to act and there is a role for everyone

CPMI has recently published a set of recommendations⁴ to improve adoption of risk-free PvP settlement in foreign exchange markets. Central banks and the private sector have successfully tested cutting-edge technologies for crossborder payments through BIS Innovation Hubs.

And alongside the Roadmap actions per se, there have been tangible changes that are already paying dividends. Nearly three quarters of payment system operators surveyed by CPMI have either implemented or have concrete plans to implement the latest financial message standard (ISO 20022) by 2025⁵. The Bank of England joined that club by moving CHAPS, our high value payment system, to ISO20022.

Several jurisdictions have extended the operating hours of their high-value payment systems to near 24/7, including countries as far apart as India, Mexico, Switzerland and indeed South Africa. Over the last two years, several countries have expanded access to their payment systems to new types of financial institution: including Japan, Switzerland and Singapore.

Others, such as United States, have developed new guidelines for more transparent and risk-based assessment of account requests. And recent figures⁶ show that two-thirds of crossborder transactions that take place via the Swift network reach end beneficiaries within one hour.

The private sector is also investing in better infrastructure: almost \$19 billion was invested in paytech start-ups last year⁷. Recent survey suggested that 94% of financial institutions are planning to invest in their payment technology in the next 3 years⁸.

Africa has a place among the leaders in payments innovation, from new mobile payment technologies with M-Pesa to CBDC with eNaira in Nigeria. The Pan African Payment and Settlement System (PAPSS), launched last

year, is expanding rapidly: it has nine central banks and 41 commercial banks live on the system. It recently agreed a strategic partnership with the African Stock Exchanges Association (ASEA) to promote improved crossborder payments for capital market trades⁹.

Three years on, I want to celebrate what has been achieved, and to garner support for the journey ahead. I will explain the updated priorities for the roadmap, those actions that will deliver the greatest impact, and how you can play a role.

I will bring the issues to life through examples from the Bank of England's own active work programme to enhance crossborder payments through the renewal of our Real Time Gross Settlement service: learning from each other's experience is an important element of delivering the roadmap.

From analysis to practical implementation

Enhancing crossborder payments is a complex problem that requires multi-faceted solutions. I spoke last year¹⁰ about the need for cooperative solutions, with central banks, public authorities, and the private sector rowing in unison.

We have made great progress in developing the foundational policies and guidance, to support a wide range of stakeholders to improve crossborder payments. An ambitious programme of technology and further policy changes is needed to deliver real change to consumers and businesses worldwide. Some of this will continue to be at a global level, but increasingly investment and changes will need to be made domestically and within individual institutions.

The FSB announced in October 2022 three priority themes for future work: bringing together the actions that would help to deliver the targets most quickly. They will build strong foundations, which will support the existing ecosystem (including the correspondent banking model) as well as future initiatives such as Central Bank Digital Currencies (CBDCs) and multilateral payment systems.

The priority themes are:

- Payment system interoperability and extension focused on modernising and aligning the payment rails across jurisdictions and improving competition.
- Crossborder data exchange and message standards focused on developing common payment message and API standards.
- Legal, regulatory, and supervisory frameworks focused on harmonising regulation in areas such as financial crime controls and oversight of financial institutions.

To support delivery of the critical actions, two new industry taskforces¹¹. (outlined below) have recently been established, with fantastic representation from many different continents and industry sectors.

CPMI has established a Community of Practice for central banks (COPS) to exchange best practice and learnings. COPS, chaired by Carlos Conesa from Banco de España, will enable central banks to benchmark national approaches and share insights, for example, from their national reviews of access and operating hours.

There are nearly 30 institutions participating from developed and emerging economies: and I would encourage other central banks to join. It is also important to monitor progress against the Roadmap actions: something that we will oversee through the FSB's new crossborder payments Delivery Group, which I chair.

Payment system interoperability and extension

Most crossborder payments currently rely on the correspondent banking network¹². They involve multiple parties, multiple currencies and multiple national payment systems. The capabilities of each payment system determine how firms can process payments. Limitation on who can access the payment system and inconsistent operating hours can add extra links and delays into the end-to-end transaction chain.

The ambition is for payment systems to be open for longer and available to more payment service providers. These steps should make national payment rails more interoperable and reduce frictions for existing payment firms. They could also make the market more competitive: ultimately improving the experience for consumers and businesses.

In the UK, we led the way in 2017 by becoming one of the first central banks to expand access to non-bank Payment Service Providers. Along with a number of other central banks, this year we are undertaking a further review of our access approach, benefitting from the CPMI self-assessment framework¹³.

The review will help the Bank to determine whether the current direct access requirements remain proportionate in light of our objectives and new trends in the payments landscape. Around the end of this year, we aim to publish a discussion paper presenting our initial findings and inviting industry input.

Alongside reviewing our formal access requirements, we continue to develop our renewed RTGS service to reduce the technical or operational barriers to joining and enable a wider range of participants to join.

And we are considering longer operating hours as part of our forward looking [RTGS roadmap beyond 2024](#): again benefiting from the framework published by the CPMI¹⁴. Longer and better aligned hours of operation could speed up crossborder payments, reduce settlement risk and simplify liquidity management, and the Bank's renewed service will have the capability to offer longer hours.

But we need to carefully weigh the benefits against the potential cost. These include the costs of opening systems for longer and implementing novel approaches to technology upgrades when the concept of 'out of hours' disappears.

We also need to consider how it would affect other markets, established market conventions and monetary policy transmission. It will be essential to work closely with the private sector to assess how, and over what timescale, RTGS operating hours could be extended.

Changes in hours and access could also support some of the more recent ideas around directly interlinking national payment systems. This would enable payments to be settled directly between two providers, further cutting down the transaction chain.

Projects to interlink payment systems are gathering momentum around the globe, building on pioneering experiments through Project Nexus and IXB. In July, the CPMI in cooperation with the Indian G20 Presidency will host an event on interlinking arrangements.

The existing projects have shown that interlinking is feasible on a technical level. An arguably tougher challenge is to find the right governance, risk management and oversight models to support a crossborder interlinking

arrangement that is robust, resilient and inclusive. The CPMI is preparing an interim report for the G20 on this topic later in the year.

While many of these initiatives are driven by the public sector, their benefits will only materialise if the private sector use them. And it is important that the private sector can shape them. The new Industry Taskforce on Payment System Interoperability and Extension, chaired by Ulrich Bindseil from the ECB, will provide a valuable forum to discuss and shape implementation and market practices.

Crossborder data exchange and message standards

Message standards are crucial to the continued evolution of payment services. Currently, the data-carrying capacity in payments messages can be limited by the network technology developed in the last century. When developing the message formats a generation ago, each local infrastructure focussed on delivering the best solution for their own market.

Over time, the type and structure of information transmitted has diverged, both between jurisdictions and across infrastructures. And the amount of data has not increased to meet the demands of this data-hungry world.

Adopting ISO20022 worldwide will be a gamechanger. It is a common, global, non-proprietary standard. And if widely adopted it can enable payments to include a much richer set of information (for example the purpose of the payment, tax information, and an address of the house being bought).

That can improve efficiency: by helping process more payments without the need for manual intervention and harmonising data transmitted through international payment systems and ultimately avoid unnecessary delays and costs in the crossborder payment journey.

ISO20022 can also support regulatory compliance and enhance financial crime and fraud detection. Banks worldwide spend over \$200 billion a year on financial crime compliance: enriched data is an important ingredient in getting this number to drop.

ISO 20022 provides a common language for financial transactions that allows for richer and more structured data. However, making the most of it requires consistent adoption across jurisdictions and using it to transmit a wider set of information than legacy payment messages. Limited or inconsistent uptake could lead to fragmentation. There is no point for me to include a code for the purpose of my payment if my South African counterpart was using a different set of codes.

To establish a basic level of consistency, the Joint Task Force of the CPMI and Payments Market Practice Group have consulted on harmonising requirements for enhancing crossborder payments¹⁵. They received an excellent response and will be announcing the results in the autumn.

Another important dimension is the harmonisation of Application Programming Interfaces (APIs). Almost two-thirds of the payment systems surveyed by CPMI¹⁶ already offer APIs to their participants. In the UK, our renewed RTGS has this month enabled its first API, with a full-fledged suite of APIs due to be delivered next year.

APIs make it easier for payment systems and their participants to exchange data. The number of potential applications is vast. But to deliver real benefits these potential use cases rely on harmonised API standards. The CPMI is convening an industry panel of API Experts (APEX) from private and public sectors, to develop recommendations on the strategic direction for the industry.

The standardisation of messaging and APIs can enable quicker, cheaper and safer payments. But implementing the technical changes is only the first step. Common practices and usage guidelines are essential in helping financial institutions operate across borders.

Importantly, the industry panel will not seek to add another competing standard. Rather, it will evaluate existing API standards and develop recommendations for harmonisation based on current practices. It will also seek to develop lasting global governance forums to evolve and update the standards.

Legal, regulatory and supervisory frameworks

Diverging approaches to regulation and supervision are a major source of friction in crossborder payments, and an area where I increasingly hear calls for change from the private sector. Differences in how banks and non-banks are supervised can create opportunities for regulatory arbitrage.

There are very good reasons why nations adopt differing approaches to financial institution supervision, data protection and financial crime prevention. Nevertheless, international guidance and recommendations provide a strong principles-based framework for collaboration and interoperability between jurisdictions.

A key part of the existing international framework for combatting financial crime is The Financial Action Task Force (FATF) Recommendations¹⁷. To remain effective, they need to keep pace with market developments. Global adoption of ISO20022 standards also offers an opportunity to harness the benefits of improved data.

FATF will consider these issues as part of its planned review of Recommendation 16 on wire transfers, to improve consistency and usability of message data, and enable more effective AML/CFT checks. It will also continue efforts to promote consistent implementation of the Travel Rule for virtual assets.

The new FSB industry taskforce on Legal, Regulatory, and Supervisory matters, chaired by Carolyn Rogers from Bank of Canada, will help move the conversation forward in these areas. We hope to harness expert input from industry and provide guidance, working with national authorities and the international standard-setting bodies.

Continued collaboration

Improving the payments infrastructure will only be possible through successful collaboration. As policymakers and operators, we can improve the policies and core infrastructure to provide solid foundations for private innovation.

The private sector needs to build on this to help deliver cheaper, faster, more transparent, and more accessible services to their customers. The new industry taskforces will play an important role. But this needs to be complemented by strong dialogue and actions in individual jurisdictions: exploring improvements to the domestic payment infrastructure, using the globally agreed frameworks.

Firms will likely need to continue to invest in their payments technology to be ready for upgrades to payment systems: such as the move to ISO 20022. The industry taskforce on Payment System Interoperability and Extension are developing a handy checklist to support firms on this journey. And importantly, firms should consider how to make the most of these changes.

ISO 20022 will make a big difference to crossborder payments: but it also offers a wealth of other opportunities, which the individual firms can benefit from.

While the roadmap is a G20-led initiative, the targets are international, and our goal is to improve payments across all countries and payment corridors. Making progress therefore depends on sharing best practice widely and achieving change worldwide.

To that end, the World Bank and IMF, along with the G20 Central Banks, are developing a technical assistance programme available to countries wishing to enhance their national payments infrastructure or policies.

We have achieved a lot already but there is still more to do, and much more to gain. We have built the foundations and a framework to support a holistic set of changes. Now we need to act and there is a role for everyone.

I look forward to helping to smooth the path ahead in my role as a policymaker and a payment system operator. I hope that many of you will join and play your part in this exciting and transformational journey towards the shared vision that benefits companies, individuals and whole economies through enhanced crossborder payments. ■

Victoria Cleland is the Executive Director for Banking, Payments and Innovation at the Bank of England

Endnotes

1. See [Building blocks for a roadmap to enhance cross-border payments: letter to the G20](#)
2. See [Enhancing Cross-border Payments: Stage 3 roadmap](#)
3. See [Targets for addressing the four challenges of cross-border payments: Final report](#)
4. See [Facilitating increased adoption of payment versus payment \(PvP\)](#)
5. See [Harmonisation of ISO 20022: partnering with industry for faster, cheaper and more transparent cross-border payments](#)
6. See [Press release on SWIFT website](#)
7. See [Dealroom Fintech Q1 2023 report](#)
8. See [Payments modernization and technology in 2023](#)
9. See [PAPSS and ASEA forge strategic partnership to revolutionize cross-border payment of Stock Exchanges in Africa](#)
10. See [Rowing in unison to enhance cross-border payments speech by Victoria Cleland](#)
11. See [CPMI press release](#) and [FSB press release](#)
12. Recent [BIS figures](#) show that the number of active correspondents has gone down by 30% in the last decade.
13. See [Improving access to payment systems for cross-border payments: best practices for self-assessments](#)
14. See [Extending and aligning payment system operating hours for cross-border payments](#)
15. See [ISO 20022 harmonisation requirements for enhancing cross-border payments](#)
16. See [Interlinking payment systems and the role of application programming interfaces: a framework for cross-border payments](#)
17. See [FATF Recommendations](#)

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The role of IFCs in the changing world

Geographical barriers continue to tumble. Elise Donovan says IFCs will be crucial to uphold the pillars of international trade, investment, and business

The world of international commerce is currently spinning on an increasingly unpredictable axis. Mounting geopolitical tensions are remodelling globalisation and increasing barriers to trade. Despite the growing disruption, globalisation isn't dead; crossborder trade is deeply embedded in the DNA of countries across the globe even if its pace and trajectory have shifted.

International finance centres (IFCs), such as the British Virgin Islands (BVI), have an essential role to play in this shifting landscape; their experience and expertise will continue to ensure that crossborder investment and trade can take place with the minimum of holdups.

Their ability to create a neutral environment will also help drive collaboration, which will be especially useful for areas of emerging economic importance, such as the Caribbean and Latin America, in which growing sectors of green finance and digital assets are flourishing.

Developing scenarios

The *Beyond Globalisation: The British Virgin Islands' Contribution To Global Prosperity In An Uncertain World* report, commissioned by BVI Finance and developed by the UK-based research firm, Pragmatix Advisory, offers insights into these changes. It identifies three potential scenarios for the future of international trade:

1. **Weaker Internationalism:** A continuation of globalisation, albeit at a slower pace, with challenges to overcome.
2. **Bloc Economy:** Economic and regulatory integrations form based on varying geopolitical alliances.
3. **Economic Nationalism:** Countries could move away from globalisation, adopting more protectionist stances.

Regardless of the predominant scenario, IFCs, especially like the BVI, will be crucial to uphold the pillars of international trade, investment, and business.

Leadership in ESG

There is an increasing global realisation that it is impossible to consider the future of investment and finance trends without considering the challenges created by climate change, a view very much shared by the BVI.

Unquestionably, the new global challenges and opportunities of next-generation technologies and climate change make the role of IFCs even more vital

In addition, institutional investors and regulators around the world are increasingly focusing on environmental, social and governance (ESG) issues in terms of developing investment portfolios and designing corporate best practices. The good news is that BVI companies provide a flexible, internationally recognised corporate regime that supports ESG-related goals.

The incentive to tackle the damaging impact of climate change hits particularly close to home for the BVI. The small island state's delicate ecology is especially at risk from hurricanes, changes in tidal patterns, and heavy rainfall. Its tourism industry and the jobs that rely on the visitor economy are threatened by extreme weather events, erosion, and coral and sargassum bleaching.

This experience has helped the BVI, and other IFCs in the region, understand the role of green finance and the need to respond to the climate emergency, making them well-placed as a centre for environmental investment and green funds, both across the Caribbean and the globe.

Addressing this issue will require an investment of more than \$100 billion, equal to around a third of its annual economic output. In addition, with electricity largely generated using fossil fuels, energy prices in the Caribbean are among the highest in the world, highlighting the need for investment in lower-cost and lower-carbon emissions.

There's also a requirement for blue finance, which is where sustainability-linked loans or bonds directly finance projects and programmes that have positive impacts on the ocean economy, an essential part of the Caribbean's commercial activities.

Just prior to COP27, President Macron hosted a summit in Paris to discuss reform of the world's multilateral finance institutions in the face of climate change and other development challenges. A key topic of discussion was a

suggestion from a group of developing countries, led by Barbados, dubbed the 'Bridgetown Initiative', which called for the creation of new instruments and reform of existing institutions to finance climate resilience and the Sustainable Development Goals (SDGs).

The Caribbean region has the ability and motivation to become a true global leader in this area, working collaboratively across jurisdictions to make real change.

For example, the BVI has established one of the first Climate Change Trust Funds in the Caribbean, allowing it to receive funding for climate-related projects and to explore how it can maximise the impact of funding. This demonstrates how knowledge and experience in international finance and investment in the region can be harnessed to enable progress in the sector.

Developing digital assets

The BVI is not only ideally situated to cater to financial markets aimed at sustainability, it is also well-placed to serve new and developing digital assets. The total addressable market for digital assets is expected to be worth between \$8 trillion and \$13 trillion by 2030, while the value of the global sustainable fund market could be almost fifty times greater by the end of the decade.

Keeping pace with these developments has meant that the BVI evolved and innovated in order to maintain its relevance and position in global markets. This remains an ongoing task as developments in technology and digital assets continue to evolve.

Measures are therefore being taken to welcome, regulate and support new technologies and the opportunities they bring, while legislation has been implemented to both encourage and manage the growth of digital asset holdings in the jurisdiction.

The introduction of the VASP (Virtual Asset Service Providers) legislation earlier this year showcases the jurisdiction's commitment to evolving digital finance needs, emphasising both innovation and regulatory robustness.

Pan-global trends

Digital assets aren't geographically anchored; part of a trend in investment that helps characterise the current period of globalisation. The BVI is an integral part of this movement because of its ability to facilitate crossborder investment – a key characteristic of its global approach. Also, by keeping up-to-speed with technological advances, the BVI aims to maximise its standing as a viable international business and finance centre.

Also, as a result of the ongoing expansion of digital connectivity and remote ways of working, geographical barriers continue to tumble. This makes the BVI's financial services industry and the facilities it provides, accessible to clients all around the world. As investors in developing markets look to expand their portfolios across borders, the BVI is ideally placed to meet those needs.

These developments are also changing how and where people work, many kickstarted by the pandemic. This has created digital nomads; people who can work from almost anywhere in the world.

For those with no fixed base or non-geographical wealth, it makes sense to choose a location with neutral taxation in which to hold their assets. As a tax-neutral jurisdiction used for crossborder operations, the BVI is perfectly placed to meet the needs of digital nomads.

Private wealth management

The services offered by the BVI attract the business of expatriates and internationally mobile individuals with a high net worth who see the BVI as a suitable location to hold and manage assets, as it provides benefits and optionality unavailable in many other IFCs.

As a result, the BVI is one of the world's leading destinations for private trust companies, the most comprehensive and sophisticated succession planning vehicles, with over a thousand on its register.

The jurisdiction's long-established reputation as a safe and secure location to domicile personal wealth and assets is highly significant as we will soon see the greatest ever generational wealth transfer; US households are expected to pass \$68 trillion in assets to their children over the next 30 years.

This presents a challenge for wealth managers, as just 13% of younger investors retain the same financial advisors as their parents. The BVI's standing will help to ensure that it will remain attractive to inheriting millennials.

Looking to the future

Research from the *Beyond Globalisation* report found there are currently over 370,000 active BVI Business Companies, holding assets with a combined estimated value of US\$1.4 trillion.

Furthermore, these companies generate an estimated \$14 billion each year in taxes for governments worldwide and support around 2.3 million jobs globally.

To maintain this trajectory, the BVI must be nimble, continuously adapting to global nuances.

A key part of this will be understanding how deglobalisation and fragmentation will affect access to markets during a period of uncertainty and demonstrating how IFCs can contribute to this new landscape.

Although the future is uncertain – it is presently unclear which, if any, of the three international trade scenarios will become dominant – it is clear that the role and value of IFCs will continue beyond the current turbulence.

Unquestionably, the new global challenges and opportunities of next-generation technologies and climate change make the role of IFCs even more vital. ■

Elise Donovan is the CEO of BVI Finance



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The contribution of capital flows to sustainable growth in emerging markets

Lesetja Kganyago argues that capital flows should be welcomed, and we should control risks and nurture institutions that can deliver productive investment choices

want to start with a problem that has often bothered me. As the South African central bank Governor, I regularly meet with global investors to discuss economic conditions and policy settings in my country. The fundamental goal of these engagements is to encourage investment.

Then I return from these meetings, and we have policy sessions where staff want to talk about the dangers of capital flows. But the investors I just met are the people who are responsible for the capital flowing. So, I wonder – which part of my time am I wasting? Do we want these capital flows or not?

This is a global discussion, and one that has evolved significantly over my time working in macroeconomic policy.

20 or 30 years ago, the mainstream view was that financial globalisation was good. Global markets could provide more financing, at lower rates, than countries could achieve by relying on their own resources. They would allow for better risk sharing, and they would create better incentives to get policy right.

The standard policy recommendation was that controls on capital flows should therefore be liberalised, and where they were being applied, this was probably to cover for some other policy error¹.

Nowadays, the mainstream view has shifted. The IMF encourages policymakers to keep capital flow measures in their toolkits, both for pre-emptive purposes and to address capital flow surges². The guidance is nuanced, and there is still appreciation for the benefits of capital flows – but as Christine Lagarde put it a few years back, “[This] is not your grandmother’s IMF”³, and there has clearly been a big shift in the policy advice⁴.

Outside of the IMF, attitudes to capital flows have been more bluntly critical. One part of this is unhappiness with spillovers from United States monetary policy, sometimes when the stance is loose, as in the ‘currency wars’ era after

the global financial crisis, and sometimes when financial conditions tighten, as they did in the 2013 taper tantrum and as they have been doing during the current period.

Another is the geopolitical tensions that have made 'deglobalisation' a buzzword. There have also been shifts in the realm of ideas, with even some mainstream economists condemning most forms of capital flows. For instance, in October 2022, Arvind Subramanian published an op-ed arguing that, "*capitalism must be saved from its financial rentiers, and financial deglobalisation is a good place to start.*"⁵

I do not think we should jump from diagnosing bad consequences to urging a prohibitionist approach to capital flows and giving up on the benefits

Altogether, the reputation of capital flows is at a low ebb.

We should, nonetheless, respect the enormous opportunity presented by access to a global financial system. Indeed, taking a blue-sky approach, capital flows look much too small.

There are studies of optimal current account deficits for small economies, and they yield extraordinary estimates, for instance that it would be optimal to run annual current account deficits up to 60% of gross domestic product (GDP)⁶.

Relatedly, if you think about it, it is strange that interest rates in developing countries are not orders of magnitude above those in rich countries. Even in middle-income countries, capital stocks are typically less than a third of those in the United States, on a per capita basis⁷.

It would make sense to pay radically higher rates to attract more investment, which would then raise the productivity of labour⁸. Yet real rates are not so far removed from advanced country levels: over the past two decades, real policy rates in rich countries have averaged about -1%, compared to just under +1%, on average, for middle-income countries⁹.

Obviously, these observations are not policy recommendations. They do not pass reality checks. But they can help us approach the question of capital flows and financial integration with a more open mind.

Considering the empirical cases, critics of capital flows often point to the successes of Asian countries, most recently China. These fast-growing economies were typically capital exporters, despite starting off poorer and with smaller

capital stocks than the economies in which they invested their surplus savings. These countries also suffered crises when they opened to financial flows in the 1990s, disrupting their remarkable development trajectories.

Where are the poster children for proponents of capital flows?

There are countries that have enviable growth records, and which have relied for many years on capital inflows. These include the United States, Canada, New Zealand, and perhaps the clearest case of all, Australia¹⁰.

As one study from the Reserve Bank of Australia pointed out, *“Sizeable current account deficits have been recorded in Australia in almost every decade for at least 150 years.”*¹¹ These large and sustained capital inflows have allowed for a higher level of investment than could have been achieved with only local savings. And the success of the economic model is hard to dispute.

Australia’s living standards have ranked among the highest in the world since the middle of the 19th century, and towards the start of the 20th century they were probably the highest of any country¹². It is highly unlikely that Australia would have performed better in the absence of capital flows.

Of course, we cannot read Australian economic history as one long vindication of free capital movements. Both the depression of the 1890s and the economic crisis of the 1920s had symptoms familiar from modern emerging market crises, including balance of payments pressures and foreign debt stress.

We also cannot say Australia has always been happy with large current account deficits. In the late 1970s and early 1980s, these deficits were a major concern for policymakers, especially because they were being driven by fiscal policy and were draining foreign exchange reserves.

However, significant current account deficits persisted even after the floating of the Australian dollar and fiscal consolidation¹³. This gave rise to the so-called ‘consenting adults’ thesis, that current account deficits produced by private sector decisions could be optimal and sustainable, and policymakers would not have to worry about them.

Reflecting on other country experiences, the simple fact that deficits were privately contracted seems insufficient. We know private sector flows can be dangerous: clear recent examples are Spain and Ireland’s experiences during the euro area crisis. It therefore seems relevant that foreign investors in Australia were willing to accumulate claims denominated in Australian dollars, and that the Australian dollar floated.

Another crucial fact appears to be a bedrock of investor confidence, based on credible macroeconomic policies – including a reasonable degree of price stability – and a resilient financial system.

One also senses some deeper mechanism here, which ensured capital was channelled into productive assets that generated good returns. Of course, this reflects more than the resource endowment, as we could name many countries with ample natural resources which have not absorbed capital flows productively. There has also been something else going on, since at least the 19th century, that has made capital in Australia productive, whereas that same capital deployed elsewhere would have produced boom-bust cycles and default.

Part of this is a story about the quality of institutions as well as the human capital available and empowered to run them¹⁴. Another theme is the development of local capital and financial markets, and their capacity to turn capital to productive purposes. As I will discuss below, these capacities intersect with policy choices, with capital flows supporting or weakening the productive potential of an economy.

On the whole, the Australian case teaches us that a country can absorb large capital flows over very long periods of time and use these to support high levels of prosperity. This contrasts starkly with the Asian examples, where a range of countries likewise achieved impressive gains in living standards, but mostly did so without foreign capital.

Most of the world's countries would be happy if they could be Asian tigers, and ecstatic if they could be Australia. But many of us have a long way to go. What attitude to capital flows would help us on our way?

In South Africa, we have long favoured the Australian option¹⁵.

Given ample investment opportunities and limited domestic savings, growth and capital inflows have typically been correlated. In 1985, when the apartheid government was hit with sanctions, access to capital flows was largely cut off¹⁶.

Of course, this was not a developmental policy for South Africa; it was a punishment. When sanctions were lifted at the end of apartheid, we looked forward to restoring access to global financial markets. We also appreciated that the end of sanctions did not mean the taps were open. Foreign investors all loved South Africa, but they would not invest based on warm feelings. And there was going to be a limit on how much investment we could attract, even with good policies.

With a low domestic savings rate, if the public and private sectors were both borrowing heavily, this meant we were going to hit a balance of payments constraint. Specifically, we anticipated an unsustainable current account deficit, which would weaken the rand and drive up inflation.

Interest rates would then have to rise to rebalance savings and investment, slowing growth. This was the core problem statement of the macroeconomic strategy adopted by the Mandela government in 1996. The goal was to attract more foreign savings, apply some fiscal discipline to improve the country's investment profile and reduce government's demands for savings, thereby permitting lower interest rates to allow more private sector investment.

In hindsight, I would say the strategy was mostly successful.

We experienced some of the downsides of openness to capital flows. These included a huge depreciation of the rand in 2001, which only loosely reflected fundamentals, as well as a phase of currency strength during the mid-2000s, which may have affected export competitiveness. The stronger currency and low interest rates also fed dramatic house price appreciation and risky mortgage growth - a dynamic arrested by the 2008 crisis.

Despite those blemishes, it was still a success. Indeed, as time has gone by, it looks more and more like a golden age of South African macroeconomic policy. Living standards were rising and growth was outpacing the global average¹⁷. Our investment rate rose from around 15% of GDP at the end of apartheid¹⁸, to around 20% of GDP, even as the domestic savings rate remained low at about 15%.

This naturally entailed significant net capital inflows, much of it through portfolio flows rather than foreign direct investment. These we de-risked, in large part, by committing to a free-floating currency and minimising foreign currency borrowing across the economy.

It seems extremely unlikely that we could have had better results by closing ourselves to global capital. What causes me great concern, by contrast, is what happened next.

The 15 years from 2009 onwards are almost a mirror image of the first 14 years of democracy. From 1994 onwards, we achieved steadily high investment and growth, interrupted by temporary setbacks; from 2009 onwards, we have had steadily lower investment and growth, punctuated by incomplete recoveries.

The IMF's projections have 2023 investment at 16% of GDP - far below the ratio needed for adequate growth. And yet even this level of investment is posing a serious funding challenge because the domestic savings rate is just 13% of GDP - the lowest level since at least 1980 - and the investment case for external investors has weakened significantly. Growth is projected at a mere 0.1%.

This is where the capital flow story comes in.

For much of the decade after the global financial crisis to date, South Africa had ample access to foreign capital, helped by ultra-low interest rates in major economies. The average current account deficit, until the onset of COVID-19, was over 3% of GDP. The financing for this deficit mainly came from portfolio flows, as it did before the global financial crisis.

However, the composition of investment for this period shifted markedly towards government debt, and away from private sector assets such as equities. During the boom of the 2000s, government and public corporations absorbed just 16% of portfolio flows. In the next decade, this rose to 78%¹⁹.

Recalling the Australian case discussed earlier, what we see is that South Africa moved away from a 'consenting adults' arrangement, where a stable fiscal position and a current account deficit were driven by private sector decisions, to a classic twin-deficit situation.

This had three destabilising implications.

First, the volumes of money available to South Africa after the global financial crisis undermined good policymaking. In the 1990s and 2000s financial markets helped with fiscal discipline; in the 2010s they enabled excess. The underlying problems were homegrown, but the ready availability of foreign savings after the global financial crisis made it harder to win policy battles.

Investor scrutiny is good for policy: it obliges everyone to double-check the figures and cut back on things you do not really need. But when you know the money is coming anyway, it becomes much harder to insist on policy rigour.

Second, these flows permitted the build-up of a large sovereign debt position. Debt, famously, is a troublesome form of financing because the lender shares relatively little risk with the borrower – unlike, say equity investments, where unsuccessful projects directly affect share prices and dividends²⁰.

Sovereign debt is particularly problematic, because declining government creditworthiness also spills over to the credit profiles of firms and households. With time, it leads to higher taxes and lower public sector investment to accommodate higher interest payments. An unsustainable fiscal position can therefore become a drag on the whole economy.

Third, capital flows eroded potential growth. We often talk about the importance of institutions to growth, but debt can be used to weaken institutions by funding systems of patronage and corruption, driving out skilled and diligent public servants. Many private sector firms will also follow the money, redirecting their efforts from productive enterprise.

Through these two channels, capital flows helped subvert the market incentives and competent bureaucracies that power modern economies. Our macro framework delivered resilience through a floating exchange rate, low foreign currency debt exposures, and careful regulation of the financial sector.

But resilience is not enough; if you are going to absorb capital flows, you also need to get allocation right. Huge non-resident flows into public sector debt can actually make this more difficult.

Today, we face the consequences. With too much borrowing, not much domestic saving and limited non-resident appetite for our assets, interest rates must rise to restore balance. The alternative is an inflationary balance of payments problem, which is plainly against the South African Reserve Bank's mandate. This does not make the Reserve Bank popular, but facts are facts. We have gotten ourselves back in the trap we escaped in the mid-1990s.

Reflecting on this whole experience, it is easy to sympathise with Daron Acemoglu's argument in a recent Project Syndicate piece, that South Africa shows how capital flows, instead of promoting good government and development, can 'facilitate' a *"hollowing out [of a] country's economy and institutions..."*²¹

Nonetheless, I do not think we should jump from diagnosing bad consequences to urging a prohibitionist approach to capital flows and giving up on the benefits. I would much prefer a risk management approach.

A source of inspiration here is the airline industry, where regulators and companies work together to fly as many planes as possible, as safely as possible, rather than responding to the occasional accident by adopting a zero-tolerance attitude to risk, which would sharply reduce the number of flights and blow up costs²². I think this is the right way to approach capital flows.

A great strength of the IMF's 'institutional view' is that it acknowledges the benefits of capital flows upfront and then moves on to risk control²³, using a toolkit of capital flow and macroprudential measures²⁴.

A shortcoming in using these tools, however, is their weakness where the problematic flows spill over into the public sector. And these cases are hardly outliers. Capital flows into sovereign debt have been a major source of crises since at least the 19th century²⁵. The ongoing African 'funding squeeze' is fundamentally about government borrowing²⁶.

Nonetheless, the IMF's 2022 review paper on capital flow measures says relatively little about fiscal policy. The word 'fiscal' appears only nine times in that document, compared to 119 instances of the word 'bank'. The policy advice is simply that if fiscal policy is the problem, it should be adjusted²⁷.

Fair enough, but what if that does not happen? Do we have additional policy tools to manage these risks?

One option is to adjust the regulatory treatment for government bond holdings, for instance by obliging banks to hold capital against them instead of treating them as riskless. But this would not directly affect non-resident investment decisions.

A second tool is developing a proper sovereign bankruptcy procedure²⁸. This would give lenders stronger incentives to scrutinise borrowers. Where debts become unsustainable, countries would also have a better option than prolonged debt distress which delivers restructuring only after years of misery²⁹.

Still, I have limited faith in the ability of lenders to exercise adequate caution in the boom phase of the cycle. And where government debt is an asset held throughout society, default is probably a cure worse than the disease.

A more benign tool is foreign exchange reserves. Standard accounts traditionally emphasise the role of reserves in meeting balance of payment needs³⁰, especially in the context of inflexible exchange rate arrangements. But foreign exchange reserves are arguably more important for risk management, especially now that floating exchange rates are normal practice. A new wave of research is now also making direct connections between foreign exchange reserves and sovereign debt vulnerability³¹.

With floating exchange rates and reserves financed in local currency, negative shocks to the country generate positive valuation effects on foreign exchange reserves³². Central banks can therefore accumulate reserves to hedge the public sector balance sheet against adverse outcomes, driven by factors that include unsustainable fiscal policies. Furthermore, central bank independence provides a technology for protecting these assets from spending demands³³.

This reserve accumulation approach may well work better than trying to restrain surges with capital flow measures, in a general sense, with reserve growth during inflow phases and the option to release reserves during outflows³⁴. And it is a particularly useful option where flows are going to government debt and regular capital flow measures are not viable.

In addition to these tools, we should consider our macro policy narratives. For a start, we need to rediscover the dangers of government borrowing. Responsible policymakers never forget that fiscal debt is risky. But the nature of policy discussions is that while many claims are valid, some points get more emphasis than others.

In the past decade, one such point was that fiscal consolidation hurts growth and is therefore self-defeating. Another was that higher government debt levels were safer than previously thought. I have personally observed

these claims justify sustained fiscal slippage in South Africa. If we had felt the urgency of debt sustainability more keenly, we would have had a wiser conversation. We need a more responsible set of narratives around fiscal risks³⁵.

We also need to think more clearly about allocative efficiency. One of the strongest lessons I have learnt as a policymaker is that poor countries are poor not simply because they do not have money, but because they do not use money effectively.

Too often, there is a tendency to look at a problem, cost out a solution and focus on raising the cash. Implementation is just a black box. But good policymaking starts with implementation and the financing need should reflect what can be used efficiently.

Indeed, one might cast the volatile and often damaging history of capital flows as a conflict between budget constraints and capacity constraints. Capital flows provide spending power and can radically shift the budget envelope, but implementation capacity is stickier, and budgets can easily overshoot capacity.

This point is relevant, once again, in the global dialogue about climate change justice and the financing that should be directed from rich countries to poor ones. There is a strong focus on costing the climate change impact for poor countries and using those estimates to lobby for massive inflows.

But we have seen many times that the sum of money is secondary to the quality of policies, the incentives they create and the capacity of the institutions available to invest funds. The capital flow sceptics and the climate justice activists should exchange notes.

Ladies and gentlemen, to conclude, I remain impressed by the power of global capital flows to support investment, reduce financing costs and accelerate convergence in developing economies – especially where domestic savings are below investment needs.

Nonetheless, this is a force that is dangerous as well as useful and powerful. The South African case shows both sides of the coin: intelligent use of capital flows in one period, and abuse in the second.

For countries where investment opportunities exceed local savings rates, doing without capital flows means giving up on significant growth. It is not an attractive strategy. A better one is to welcome capital flows, control risks and nurture institutions that can deliver productive investment choices. That applies to climate finance, too.

We need to remain optimistic about capital flows and vigilant about the risks, rather than pessimistic about the flows and allergic to the risks, or naïve about the flows and blind to the risks. My hope is that when the next boom comes, we will have learnt lessons that make that boom as safe, as long and as large as possible. ■

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Endnotes

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7. For 2019, a simple average of the capital stock per capita was 31.7% for a sample of middle-income emerging markets, as compared to the United States. The sample comprises Brazil (28.61%), China (33.64%), Indonesia (30.63%), India (11.76%), Turkey (55.06%), South Africa (23.01%) and Mexico (39.37%). These data are sourced from the Penn World Tables and refer to investment as a GDP concept, not financial wealth.
8. This specific point was raised recently in a blog post by John Cochrane, 'Bob Lucas and his papers', 17 May 2023. Available at: <https://johnhcochrane.blogspot.com/2023/05/bob-lucas-and-his-papers.html>

9. For the period 2003-2023, using policy rates less annual inflation rates from the IMF's World Economic Outlook, the US real policy rate is -1.17%. The UK is -1.0%, while the euro area is at -0.87%. An average of Brazil, China, India, Indonesia, Mexico, South Africa and Turkey is 0.74%, with a high of 5.2% (Brazil) and a low of -3.36% (Turkey). South Africa is at 1.45%.
10. For an analytical discussion of capital flows out of Britain in the late 19th and early 20th century, see Michael A Clemens and Jeffrey G Williamson, 'Where did foreign capital go? Fundamentals, failures and the Lucas Paradox, 1870-1913', NBER Working Paper No. 8028, December 2000. Available at: https://www.nber.org/system/files/working_papers/w8028/w8028.pdf
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13. At the end of the 1980s, Australia had a fiscal surplus of 1% of GDP and a current account deficit of 6% of GDP.
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16. In the four years before 1985, the current account recorded an average deficit of 3.02% of GDP. In the four years from 1985, the current account recorded an average surplus of 3.75% of GDP.
17. For a fuller discussion of macroeconomic performance in this period, see Lesetja Kganyago, Address at the Centre for Education in Economics (CEE) Africa, 'Reflections of macroeconomics policy since 1995: from NICE to VICE – and back again?', 28 September 2022. Available at: <https://www.bis.org/review/r221006c.htm>
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19. For the period 2002Q1 to 2008Q4, portfolio flows averaged 1.27% of GDP, of which general government comprised 0.197 percentage points (pp), public corporations 0.004pp and all other flows 1.066pp. From 2010Q1 to 2019Q4, total portfolio flows averaged 2.9% of GDP, comprising 2.02pp for government, 0.22pp for public corporations and 0.65pp for all other flows.
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21. Daron Acemoglu, 'The great debt cleanup', 23 June 2020. Available at: <https://www.project-syndicate.org/commentary/plan-to-navigate-emerging-market-debts-by-daron-acemoglu-2020-06>. The full quote is as follows: "Far from checking autocrats, international finance has been facilitating them. For example, in South Africa between 2009 and 2018, foreign funds continued pouring in even after it was obvious that then-President Jacob Zuma's kleptocratic government was hollowing out the country's economy and institutions. When Zuma was finally kicked out of power, it was because his own party, the African National Congress, took steps to remove him. The whip of international markets had little to do with it."
22. Jón Daníelsson, *The illusion of control*, New Haven and London: Yale University Press, 2022. See for instance p. 252: "What is lacking [in financial regulation] is risk culture. The financial authorities could do well by learning from their counterparts in other fields, like aviation. The airline industry is regulated with a view to simultaneously maximise the benefits to society and keep risk under control, and we see the outcome. The cost of flying is steadily falling while safety gets better every year. The central banks and regulators need such a risk culture."
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25. Consider, for instance, this summary: "Sovereign debt defaults and renegotiations have been the bread and butter of Latin American countries since the first defaults in the 1820s. During the first period of financial globalization (1820-1931)

there are sixty-seven defaults across all countries from the richest, like Argentina, to the poorest, like Bolivia.” Graciella Laura Kaminsky and Pablo Vega-García, ‘Varieties of sovereign crises: Latin America, 1830-1921’, April 2014. Available at: https://www.nber.org/system/files/working_papers/w20042/revisions/w20042.rev0.pdf

26. The title of the IMF’s April 2023 Regional Economic Outlook for Sub-Saharan Africa is ‘The big funding squeeze’. Available at: <https://www.imf.org/en/Publications/REO/SSA/Issues/2023/04/14/regional-economic-outlook-for-sub-saharan-africa-april-2023>

27. The nine references to ‘fiscal’ contrast with 119 instances of ‘bank’; 33 of ‘house’, ‘housing’ or ‘household’; and 28 for ‘corporate’ or ‘corporations’. Of the fiscal instances, three are versions of advice to ‘adjust fiscal policy’. There is one mention of fiscal revenues as a comparator for the size of banks’ external assets; one comment on capital flow measures generating fiscal revenue; and one reference to fiscal policy as an incentive, among others, for locals to borrow in foreign exchange. There is one discussion of themes which would count as macro-critical and therefore relevant for IMF surveillance, with fiscal policy included on that list. There is one mention in the context of the different tools in the integrated policy framework. The last use of ‘fiscal’ is in the reference section. Similarly, work done by the IMF in 2011 on the capital flows toolkit has six references to ‘fiscal’ and 139 to ‘bank’ – see Jonathan Ostry et al. ‘Managing capital inflows: what tools to use?’, IMF Staff Discussion Note. 11/06, 5 April 2011. Available at: <https://www.imf.org/external/pubs/ft/sdn/2011/sdn1106.pdf>

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35. This point is also well made by World Bank Chief Economist Indermit Gill in his foreword to the June 2023 Global Economic Prospects: "... long before the outbreak of the pandemic, governments across the world had developed an appetite for huge budget deficits. They turned a blind eye to the dangers of rising debt-to-GDP ratios. If a lost decade is to be avoided, these failures must be corrected—now, not later." (The reference to "These failures" includes reduced support for free trade as well as large fiscal deficits.) Available at: <https://openknowledge.worldbank.org/server/api/core/bitstreams/6e892b75-2594-4901-a036-46d0dec1e753/content>

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Deep trade agreements and firms' exports

Matteo Neri-Lainé, Gianluca Orefice and Michele Ruta discuss the effect of deep trade agreements in integrating developing countries' economies

Deep trade agreements are widely used by governments in developing countries to boost their firms' exports. This column combines data on firm-level exports for a large set of developing countries with detailed information on the content of trade agreements to investigate these effects.

It shows that deep trade agreements boost overall firm exports, but this effect is driven by larger and more productive firms that are connected to global value chains. Smaller and less connected firms are on average hurt. This selection effect has important implications for welfare.

Many developing countries have signed deep regional trade agreements (RTAs) during the last two decades with the aim of better integrating their economies and improving the export performance of firms (Hofmann *et al* 2017, Mattoo *et al* 2020).

While a large body of literature focuses on aggregate trade flows (eg. Baier *et al* 2019, Orefice and Rocha 2011, Mattoo *et al* 2022, Dhingra *et al* 2021, Fernandes *et al* 2021), there is little understanding of how deep trade agreements impact on firms.

Our recent research (Neri-Lainé *et al* 2023) shows that, in line with the new trade theory, the effect of deep trade agreements depends on the firms' characteristics. Large firms and firms involved in global value chains (GVCs) benefit the most from the enforcement of deep trade agreement, while small firms suffer the increased competition at destination (pro-competitive effect) and may exit from the export market (selection effect).

These effects have important implications for the welfare of signatory countries that were neglected by the existing literature on the consequences of deep trade agreements.

Firm-level effects of deeper trade agreements

We empirically investigate the effect of deep trade agreements on the export performance of heterogeneous firms. The analysis combines firm-level export data for 31 developing countries for the period 2000-2020 from the World Bank Exporter Dynamics Database (Fernandes *et al* 2016) with detailed information on the content of more than 300 RTAs from the World Bank Deep Trade Agreements database (Hofmann *et al* 2017).

The negative impact on the export performance of small firms that have lower productivity and are not integrated in global value chains signals the presence of a costly adjustment process which calls for appropriate domestic policies to complement deep integration

We adapt the standard gravity model for trade (Head and Mayer 2014) to firm-level analysis in which we include a variable capturing the depth of RTAs.

Namely, we construct several proxies of RTAs' depth based on the policy areas covered by the agreements and their legal enforceability: (1) total number of provisions (independently of their legal enforceability); (2) number of legally enforceable provisions (ie. whose implementation is supported by strong legal language and by the availability of a dispute settlement mechanism) – our preferred measure; (3) number of provisions covered by the current mandate of the WTO (WTO+); (4) number of provisions not covered by the current mandate of the WTO (WTO-X); and (5) number of provisions directly related to trade enhancing factors.

We apply a standard difference in difference approach controlling for any firm-year, destination-year, and origin-destination specific factor affecting the export performances of firms. We identify the effect of the deep trade agreements based on the *change* in the depth of RTAs between origin and destination country (ie. newly signed PTAs or amendment of pre-existing ones).

Specifically, we compare a given firm's exports towards destinations having experienced changes in RTA depth with those towards destinations that had no change in RTA depth (conditional on any firm-and destination-specific shock).

Baseline results, using the number of legally enforceable provisions in RTAs as a proxy for their depth, show that one additional legally enforceable policy area in RTAs increases firms' exports by 0.3%, on average. Moving from *shallow* RTAs (ie. agreements with only tariff cuts) to deep RTAs (ie. in the 75th percentile of RTA depth) corresponds to a 3.6% rise in firms' exports.

Different firms, different effects

The average effect of deep RTAs on the export performance of firms hides significant heterogeneity depending on firms' characteristics. Figure 1 summarises the effect of deep RTAs by firm type: (1) GVC versus non-GVC firms (respectively squares and circles in Figure 1), and (2) large versus small firms (respectively squares and circles in Figure 1).

In line with models of trade with heterogeneous firms and pricing behaviour (Atkeson and Burstein, 2008), we show that large and highly productive firms benefit while small and less productive firms suffer from deep RTAs.

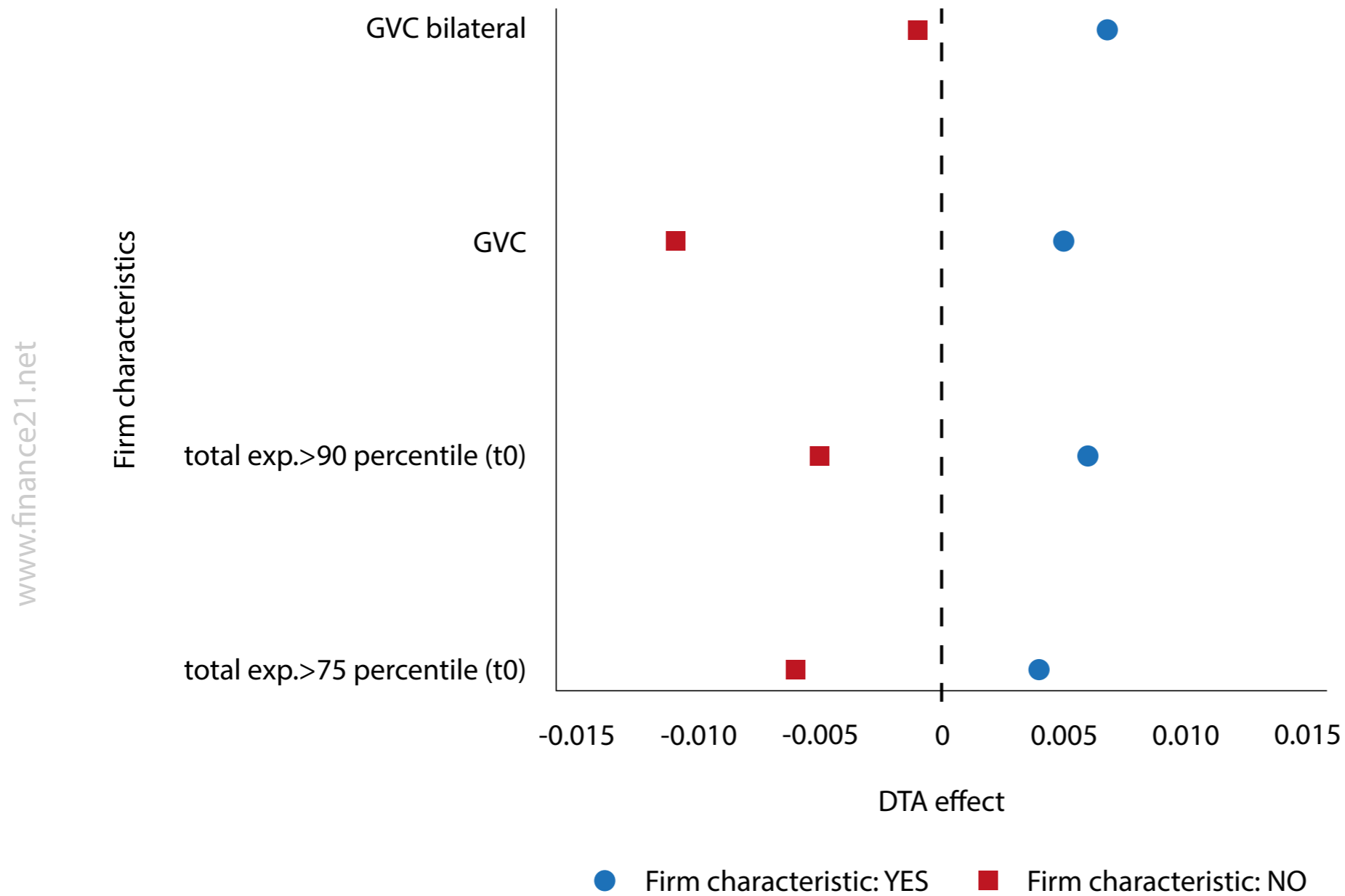
On average, including an additional legally enforceable provision in RTAs stimulates large firms' exports by 0.4–0.6% and reduces small firms' exports by 0.5–0.6%. Furthermore, firms participating in global value chains, ie. firms that export and import to/from the same country benefit the most from the RTAs.

The *pro-competitive* effect identified in our research highlights the importance of using firm-level data to understand the welfare implications of RTAs. Specifically, by improving the export performance of larger, more productive, and better-connected firms and reducing that of smaller, less productive, and less connected firms, deep trade agreements generate a reallocation of resources from the latter group to the former.

This leads to an overall increase in the average productivity of firms in the exporting country and a decrease in the average price for imported varieties in the importing country (a welfare gain for developing countries signing the trade agreement).

However, this reallocation of resources also entails adjustment costs as small firms exit export markets due to the increased competition at destination.

Figure 1. The heterogeneous trade effect of deep PTAs by firm characteristics



Note: Heterogeneity variables are estimated separately. Regressions includes firm-year, destination-year and origin-destination fixed effects. We control for tariffs. Standard errors are clustered by origin-destination-year.

Dynamic effects

We also analyse the dynamic effect of deep trade agreements on firms' exports using an event study approach. In Figure 2 we show the effect of RTA depth on treated firms (ie. firms exporting towards destination with a change in RTA depth) around the year of the change in RTA depth (t_0 in Figure 2). Regression includes firm-year, destination-year, and origin-destination fixed effects; the reference year is $t=-3$.

Two important messages emerge from the event study. First, before the change in RTA depth, *treated* and *untreated* firms (ie. respectively those that experienced and did not experience a change in the depth of RTAs at destination) do not differ in their export performance.

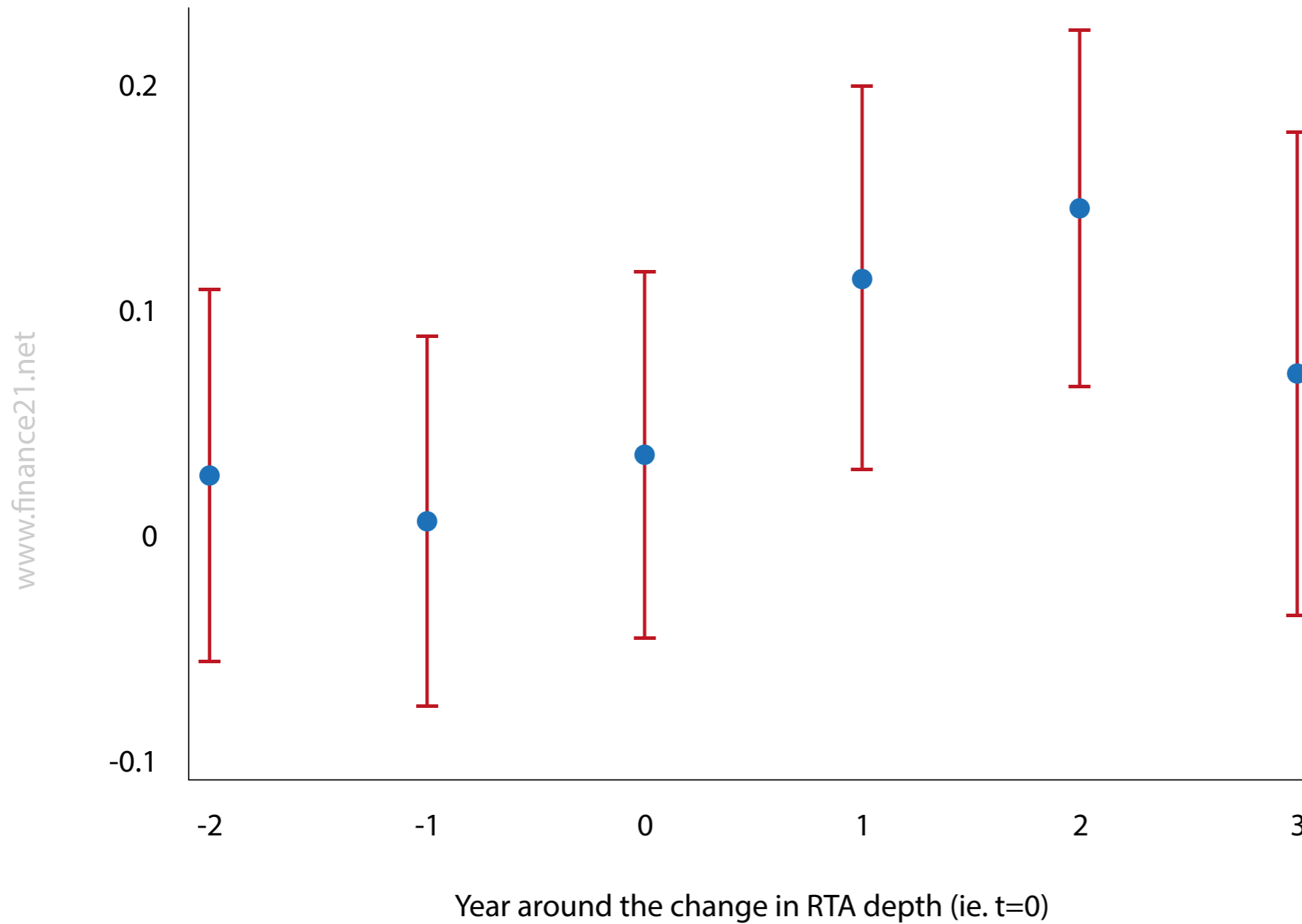
The absence of a pre-trend corroborates the causal interpretation of our earlier findings. Second, after the change in the depth of RTAs, treated firms export more into destinations that have signed a deep RTA with the country of origin.

This a positive effect vanishes after three years, which could reflect the increasing number of deep RTAs in the world (and the consequent reduction in market access towards other destinations) and the enforcement of non-discriminatory provisions in RTAs that de facto reduce trade costs for exporters in non-member countries.

The increasing number of preferential trade agreements in the world (Hofmann *et al* 2017) gives preferential market access towards a wider set of destinations, makes the existing trade agreements less 'unique' and hence reduces their effectiveness in boosting bilateral trade.

Also, non-discriminatory provisions in deep trade agreements apply to non-signatory countries. This makes exporters from third countries benefit from deep trade agreements, reducing the preferential nature of RTAs and hence eroding the advantage of firms in signatory countries (Lee *et al* 2023).

Figure 2. Firm exports event study



Note: Figure plots event time dummies for targeted firms relative to untargeted firms. Regression includes firm-year, destination-year and origin-destination fixed effects. Standard errors are clustered by origin-destination-year. Error bars show 90% confidence intervals.

Final remarks

Our paper uncovers important welfare and policy implications of deep trade agreements signed by developing countries. By reallocating resources toward larger, more productive, and better-connected firms, the pro-competitive selection effect of deep RTAs is expected to improve member countries' welfare.

Yet, the negative impact on the export performance of small firms that have lower productivity and are not integrated in global value chains signals the presence of a costly adjustment process which calls for appropriate domestic policies to complement deep integration. ■

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The trade effects of EU adequacy decisions



Digital trade is increasing rapidly. Martina Ferracane, Bernard Hoekman, Erik van der Marel and Filippo Santi consider how the EUs approach to data protection impacts digital trade

Policymakers need to balance societal demands to protect data privacy against potential adverse effects on productivity, innovation, and trade. This column analyses the trade impact of the European Commission's determinations that data protection regulation in a partner country is equivalent to that of the EU, permitting personal data to flow freely to and from the EU.

It finds that such decisions increase digital trade by 6% to 14%, with a suggestive club effect for 'adequate' countries. The results are mainly driven by the two adequacy decisions granted to the US, revealing the importance of transatlantic mutual recognition for digital trade.

Digital trade is a fast-growing part of the world economy, accounting for 12% to 22% of world trade, depending on the definition of digital goods and services. Growth rates of digital-based services associated with crossborder data flows over online networks have been outpacing all other types of trade (WTO 2023). Such trade is subject to regulations, including requirements pertaining to the protection of personal data crossing borders.

In a previous Vox column, two of us found that the EU's approach to personal data protection impacts digital trade in different directions (Ferracane and van der Marel 2021). Stronger rights for data subjects at the domestic level are positively associated with digital trade because of increased trust in the digital economy and lower regulatory heterogeneity.

On the other hand, the conditional model applied to transfer data across borders did not show any clear impact on trade. One potential explanation is that, while the EU model applies costly conditions for the transfers of data, these conditions do not apply to trading partners that implement 'adequate' protection to personal data¹.

The EU can determine whether a third country offers an adequate level of data protection. A positive evaluation requires that countries have a data protection regime 'essentially equivalent' to the European one. Between 2000 and 2021, the EU granted adequacy to 15 states or territories.

If EU member countries fail to approve a transatlantic adequacy agreement later this year it is likely to come at a significant cost

The two decisions pertaining to the US represented an exception as adequacy was granted only to those companies that certify to comply to certain privacy principles and associated requirements.

If adequacy is granted, personal data can flow freely from the EU (and Norway, Lichtenstein, and Iceland) to the adequate country, akin to intra-EU data flows. Absent an adequacy decision, companies that want to process data outside the EU are required to rely on (often expensive) mechanisms such as Binding Corporate Rules (BCRs) and Standard Contractual Clauses (SCCs), or exceptionally on derogations for instances when consent is obtained from data subjects for every crossborder transfer of personal data.

In our recent paper (Ferracane *et al* 2023) we use a structural gravity model to assess the trade effects of EU adequacy decisions and show how they affect digital trade between the EU and third countries. Our empirical model applies a three-way fixed effects approach and controls for all other possible digital-relevant bilateral covariates, including preferential trade agreements (PTAs) and other enforceable data flow arrangements.

As a robustness check we also select all PTAs with data privacy provisions within a digital trade chapter as a control variable instead of our broader preferential trade agreement variable.

In addition to the demanding set of fixed effects, we capture potential trend effects that are specific to a country-pair reflecting other digital integration factors, such as increasing bilateral crossborder data flows.

These effects control for any higher-than-average change in the trend of bilateral digital trade during the sample period relative to countries without adequacy.

We construct four alternative measures of digital trade given there is no generally accepted definition. The first is the category of 'Information industries' in the OECD Trade in Value-Added (TiVA) database, which covers information and communications technology (ICT) goods plus core digital services: IT and information, publishing, and telecom services. We then progressively expand on this by adding business and professional services, financial services, restaurants, accommodation, health, and education services.

We motivate the inclusion of sectors based on three different procedures. The first builds on a proxy for digital intensity used by Ferracane and van der Marel (2021) that measures the ratio of sectoral software expenditures to labour costs using US Census and US Bureau of Labor Statistics data.

The second is based on the list of companies that registered under the Privacy Shield Framework maintained by the US Department of Commerce. We compute sectoral shares using information on the primary sector of activity of each firm and compare the sectoral shares of covered companies to all US firms using the US Census, giving an indication of the relative importance of Privacy Shield (and thus crossborder data flows) for each services sector.

The third source of information is the *OECD-WTO-IMF Handbook on Measuring Digital Trade* (OECD-WTO-IMF 2020) which distinguishes between digitally ordered and digitally delivered products and the associated sector of activity. We use the latter category to broaden the scope of the digital sectors considered in the analysis. Altogether, our four definitions range from a narrow to a very broad set of digital goods and services.

We find that the EU adequacy decisions positively affect digital trade between the EU and third countries. This positive trade effect is bounded by one country, namely, the US. The two specific types of adequacy decisions the US received by the EU were both repealed by the European Court of Justice (ECJ).

Currently, no adequacy decision exists between the two trading partners, even though a political agreement has been found. Our findings suggest that the lack of an EU-US adequacy decision entails foregone trade gains. In our empirical gravity model, we estimate that a potential transatlantic data deal could enhance digital trade up to 16%.

Aside from ICT sectors, such an agreement would benefit other data-intensive sectors, ranging from business services to media entertainment and finance to travel, as well as education and health.

Beyond the two transatlantic partners, other adequacy-receiving countries appear to have benefitted indirectly from the two decisions granted to the US. This is because their digital exports to the US market started to grow as soon as a transatlantic data deal was put in place – a result we call a ‘club effect’. This may reflect the fact that global supply chains in both digital goods and services are spread across many countries.

If US firms outsource their data-based activities to third countries with an adequacy determination, the trade cost of doing so is lower as no additional safeguards are required.

Insofar as this is the case, our results suggest that the two previous adequacy decisions agreed between the EU and the US had an impact on the composition of digital trade within supply chains: about 7% of digital value-added trade shifted toward the network of countries with adequacy, away from being previously sourced from countries without adequacy (or from the domestic market).

The relationship between adequacy and digital trade might be country specific, with any positive association driven in part by the characteristics of the country considered and those it trades with. To consider such potential country-specificity, we use a synthetic control approach.

In the case of Argentina, which was granted adequacy by the EU in 2003, we use other Spanish-speaking countries in our sample to simulate Argentina's digital trade performance had the country not obtained an adequacy decision.

While digital trade shows an upward trend for both Argentina and its synthetic control group, we find that the adequacy decision had a significant positive impact on Argentina's digital trade with other countries that also have adequacy status, particularly the US. This outcome corroborates our gravity findings.

Earlier this year, the European Parliament recommended rejecting the European Commission's proposal for a new adequacy agreement with the US. The Parliament's Committee on Civil Liberties, Justice and Home Affairs deemed the level of protection in the new EU-US Data Privacy Framework to fall short of equivalence.

If EU member countries fail to approve a transatlantic adequacy agreement later this year it is likely to come at a significant cost. Such costs may go beyond the estimates we obtain in our study.

The [recent record-breaking €1.2 billion fine](#) imposed on Meta Platforms Ireland Inc. puts into question the use of standard contractual clauses (SCCs), the default option for firms located in jurisdictions where there is no adequacy arrangement with the EU.

Yet another rejection of transatlantic data adequacy in conjunction with uncertainty regarding whether standard contractual clauses can be used by individual companies as a substitute may induce either an exit from the EU market or a switch to facilities that process personal data within the EU.

Both outcomes can be expected to be associated with higher costs, with the latter more likely to be feasible for large companies than small and medium enterprises (SMEs), as suggested by the findings in Johnson *et al* (2023) that implementation of the GDPR resulted in an increase in the relative concentration of the website vendor market, with the effect persisting over time in the advertising vendor category most scrutinised by regulators. ■

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Endnote

1. Meltzer and Mattoo (2018) discuss the EU model of personal data protection; Frey and Presidente (2022) assess the effects of this model on firm performance.

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The Listing Act: no more than a minor boost to EU equity markets

Streamlining of the company listing process is welcome, but more fundamental reform is needed to revive the EU's flagging equity markets, Alexander Lehmann discusses

There is a growing sense of unease around the trends in European primary equity markets. The number of listed companies has been declining and continues to decline, and initial public offerings by European firms are now regularly done in the United States.

This is the opposite of what European Union regulators want. They emphasise regularly that public equity should play a bigger role in funding innovative companies, and would allow a variety of retail and institutional investors to share in the risks and growth of the corporate sector.

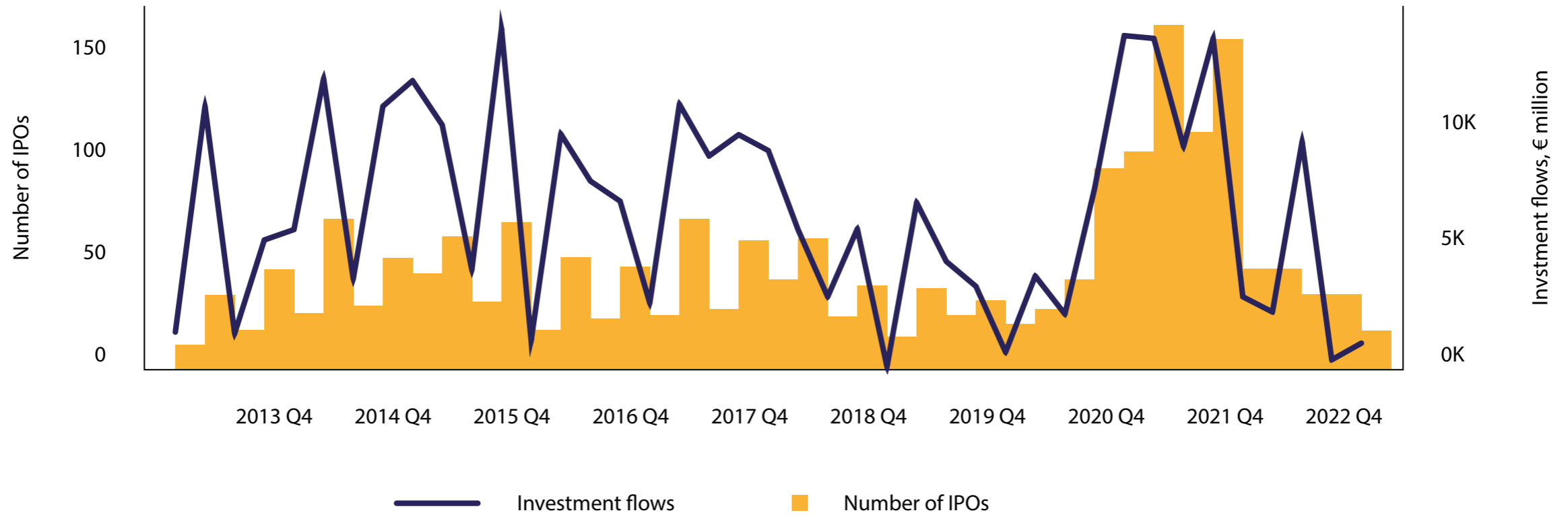
Capital raised on European equity markets in 2022 was the lowest since 1995, at only €89 billion (Suarez, 2023). First-time public offerings (IPOs) are a diminishing subset of this total and within the EU amounted to only €16 billion (more than half of which was accounted for by one large transaction in Germany). Equity issuance on so-called junior markets, where small and medium-sized enterprises (SMEs) benefit from a lower regulatory burden, fell by roughly two-thirds, while the volume of new listings is now minuscule.

The rebound in primary listing activity in 2021 following the COVID-19 pandemic appears to have been transient. Volumes of capital raised and the number of transactions in IPOs seem to have reverted to the more lacklustre levels of previous years. Meanwhile, equity markets in the US and Asia have grown, both relative to the size of the respective economies and compared to global markets overall.

Private equity investors, which do little to foster the benefits of market liquidity and suffer from other shortcomings (Lehmann, 2020a), continue to step into the fold. Notwithstanding the disappointing issuance volumes in EU public equity markets, private equity investments registered their second-highest level ever, at €130 billion¹, while fundraising broke a new record.

Figure 1. IPO volumes and number of firms newly listed on European exchanges

www.finance21.net



Source: [Federation of European Exchanges](#).

Reducing barriers to 'going public'

Eight years on from the publication of the EU's capital markets union plan, and despite the undoubted progress with several legislative projects, the role of EU equity markets seems in fact to have diminished.

The Commission's proposal seeks to design rules that are consistent across the various national markets, and which will make listing more attractive, in particular to smaller companies

This ongoing eclipse of public equity, and of the listed company itself, has several important ramifications for the European economy, and is now the focus of new regulation in both the EU and the United Kingdom.

The European Commission in December 2022 proposed a reform of the regime that governs the listing of companies, including a 'Listings Act'². This is inching forward in the legislative process and has been promoted as a step to revive activity in EU primary equity markets.

In essence, the proposed measures seek to make life as a listed company more attractive for owners, while reducing red tape and other administrative burden involved in the listing process itself and easing disclosure and other obligations on listed companies, in particular for SMEs. Concretely:

- The Commission proposed a new directive that would allow so-called multiple-voting right shares in smaller companies. This is particularly useful where existing owners seek to preserve privileged rights while gaining access to equity capital in the public markets.
- Smaller firms would benefit from revisions to the EU's main capital markets law (MiFID II), as requirements on brokers to charge for investment research would be eased for smaller firms. These so-called 'unbundling' provisions were designed to stem conflicts of interest in brokerage firms, which did not distinguish between the costs of trading and research.
- The listing process itself is to become less costly with a reduction in disclosures required in a prospectus at the time of an IPO. Smaller firms would be encouraged to list and the information that needs to be disclosed in subsequent rounds of capital raising (secondary listings) would also be streamlined.

- Once firms are listed, the requirements on disclosing possible insider information held by owners and managers would also be streamlined. This would simplify the regime in the EU Market Abuse regulation of 2014.

The Commission's initiative proceeds in parallel with a similar reform of the listing regime in the UK, which has also seen a decline in listings. Unlike in the EU, competitiveness is a secondary objective in the mandate of UK financial regulators.

A proposal issued by the Bank of England in early May essentially envisaged easing post-issuance requirements on listed companies, lowering listing requirements and integrating two market segments (standard and premium), thereby relaxing corporate governance requirements somewhat³. UK rules on dual-class shares could also become more liberal for a limited period following an initial listing.

Trade-offs

In making the listing process more efficient, the Commission's proposals would compromise on some of the concepts that have underpinned capital markets rulemaking since the financial crisis. A report for the Commission suggested that excessive requirements for disclosure and investor protection explained the relative absence of SME IPOs and called for a much greater differentiation of listing rules by issuer size (Fernandez *et al* 2021).

Given the scarcity of listings, most of the compromises in the proposed Listing Act seem justified by the objective of attracting companies into the public market and boosting market liquidity, in particular where such changes benefit SME listings.

For instance, the amendments to the prospectus rules, which govern what information is published at the time of a firm's listing, should not materially reduce information obtained by investors (documents need to observe a 300-page limit). Companies that are already admitted to trading are to be given a more straightforward path to raise additional capital in secondary issues.

This should come at minimal risks to investors because such companies are likely to have been covered by industry research already. The changes embodied in the proposed Listing Act, therefore, suggest a sensible emphasis on 'proportionality' in pre- and post-listing requirements. This should facilitate market liquidity and market access for smaller issuers.

Containing insider dealing and protecting investor rights have been key objectives in capital market regulation. Experience suggests that EU rules on insider dealing in the 2014 Market Abuse Regulation have been particularly problematic for smaller companies, where management and ownership functions are more often intertwined, and where it may be more difficult to identify what amounts to insider information and who holds it.

For these companies, streamlined requirements for disclosure and identification of insiders seem justified, also because national supervisors will be given extra powers to spot market manipulation.

More problematic, however, may be the proposal for greater leeway for issuers in defining multiple types of shareholder rights, when they list on the dedicated SME equity markets for the first time. This of course comes at some cost to investor rights and the principle of 'one shareholder one vote'.

National authorities will have greater discretion in applying this clause, likely reflecting local corporate governance traditions. This could be particularly helpful in under-developed capital markets, such as in central and southeastern Europe where the depth of SME equity markets is extremely limited (see Lehmann, 2020b).

In these markets, a listing may become more attractive for owners that seek to retain privileged control rights within a public company, though the definition of such rights and shareholder tiers will come at the cost of further fragmenting the single market.

The CMU agenda that lies ahead

Overall, the Commission's proposal seeks to design rules that are consistent across the various national markets, and which will make listing more attractive, in particular to smaller companies. It also seeks to reflect the underdevelopment of markets in several EU states and their different corporate governance traditions.

In this effort it perhaps heeds calls for a market development that is more bottom-up or led by national prerogatives, and which aims at a 'polycentric' CMU. Safeguarding such long-standing concepts in regulation such as transparency, investor protection and market integrity has worked for now, but may be more difficult if such variety is accommodated more broadly.

Yet, the proposed Listing Act implements largely technical changes, which by themselves will do little to instil new dynamism in EU equity markets. A listing regime that is less onerous for smaller companies will be supportive of market liquidity, but much more is needed to foster secondary market liquidity and cross-border holdings, the two central objectives of the CMU agenda.

There remain other major structural barriers to market liquidity, including:

- Inadequate funding of promising start-ups and other growth companies, which constrains firms in the pre-IPO phase and incentivises listing elsewhere;

- Lack of sufficient institutional capital in public markets, specifically from pension and insurance funds;
- Tax and corporate governance rules, which remain largely national prerogatives and continue to fragment markets and undermine liquidity, including because of long delays in recouping withholding tax on cross-border holdings;
- An often inefficient and fragmented post-trade clearing and settlement infrastructure.

Moreover, the discretion and role of national market supervisors has if anything been elevated, and little has been done to streamline procedures within the European Securities and Markets Authority (ESMA) or expand its resources.

The CMU strategy flags only some of these barriers. The next European Commission in 2024 will need to revisit this. EU countries will need to back any revised strategy more fully, recognising the central role the CMU could play in addressing Europe's various financing shortfalls, and boosting its growth and sustainability plans. ■

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1. See <https://www.investeurope.eu/research/activity-data/>
2. See European Commission press release of 7 December 2022, https://ec.europa.eu/commission/presscorner/detail/en/ip_22_7348
3. See UK Financial Conduct Authority press release of 3 May 2023, <https://www.fca.org.uk/news/press-releases/fca-proposes-simplify-rules-help-encourage-companies-list-uk>

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Why the digital euro might be dead on arrival

Cyril Monnet and Dirk Niepelt argue that in protecting the current banking model the ECB could be sacrificing the digital euro on the altar of banking as we know it

The ECB has highlighted its commitment to developing a digital euro and has explicitly stated that the digital currency will adhere to three principles: preserve European strategic autonomy, reduce rent extraction by payment service providers, and serve as a robust monetary anchor when cash transactions decline.

This column argues that a fourth, implicit objective – to protect banks and their business model – risks undermining the project. This could prove to be a significant missed opportunity given that social benefits of the digital euro substantially exceed its private ones.

As demonstrated by three recent progress reports, the ECB is committed to its retail central bank digital currency (CBDC) project (ECB 2022a, 2022b, 2023). Nevertheless, the design choices the reports document raise doubts about the ECB's objectives and strategy. As a consequence, the digital euro might well be dead on arrival, as we explain in Monnet (2023) and Niepelt (2023).

The ECB's explicit and implicit objectives

The reports state three main objectives for a digital euro. It should:

- preserve European strategic autonomy in the payment sphere,
- help reduce rent extraction by home and overseas payment service providers, and
- serve as a robust monetary anchor when cash transactions decline.

Attaining these objectives requires an attractive payment instrument and widespread adoption across Europe.

In line with G7 and G20 policy principles, the ECB also does not want the digital euro to endanger the central bank's ability to fulfil its stability mandate, so the digital euro should not add further instability to the financial system.

The ECB seems to have jumped to the conclusion that this entails banking as usual. Enter a fourth objective, which the ECB is much less explicit about: do no harm to banks and protect their business model.

Banks have no interest in seeing the digital euro alive and well unless digital euro-related bank services such as onboarding or wallet management are even more profitable

This fourth, implicit objective dominates all others. Key design options favoured by the Governing Council trim the digital euro's attractiveness rather than increasing it. They include holding limits for consumers (a few thousand euros), even lower ones for merchants (zero), and negative interest premia during periods of financial stress. Notwithstanding the goal of securing a robust monetary anchor, the ECB appears to view these features as permanent.

Hurdles for digital euro adoption

Regulated financial intermediaries shall be responsible for deploying the digital euro. This raises a serious conflict of interest: a substantial share of banks' profits originates from offering payment services.

Petralia *et al* (2019) report that 17% of banks' total revenue originated from payments in 2017 – a number that most likely increased following the COVID pandemic, which saw an increase in the use of non-cash means of payment.

So, banks have no interest in seeing the digital euro alive and well unless digital euro-related bank services such as onboarding or wallet management are even more profitable.

There are more basic hurdles to overcome before the digital euro will widely be adopted. As an ECB (2022c) survey shows, users prefer cash payments for privacy reasons and card payments for the convenience they offer (speed and security).

So, convenience and privacy are key for adoption, but the digital euro will likely be perceived as subpar along both dimensions. The best available private sector solution for retail payments will certainly dominate the digital euro in terms of user convenience. And in terms of privacy vis-à-vis government as well as censorship resistance, many citizens in Europe have limited faith in the ECB.

Those who trust in deposit insurance or do not worry about the differences between public and private money will hesitate to swap their payment instruments of choice against the new ECB one.

Everybody else might appreciate that the digital euro will maintain its value under any circumstances, but given its likely low yield, they will probably only seek it during flight-to-safety episodes.

Other robust sources of demand are not evident either. Business-to-business applications are not the focus of the digital euro project, and merchants with a holding limit of zero will barely be drivers of institutional change and will remain captive to private solutions.

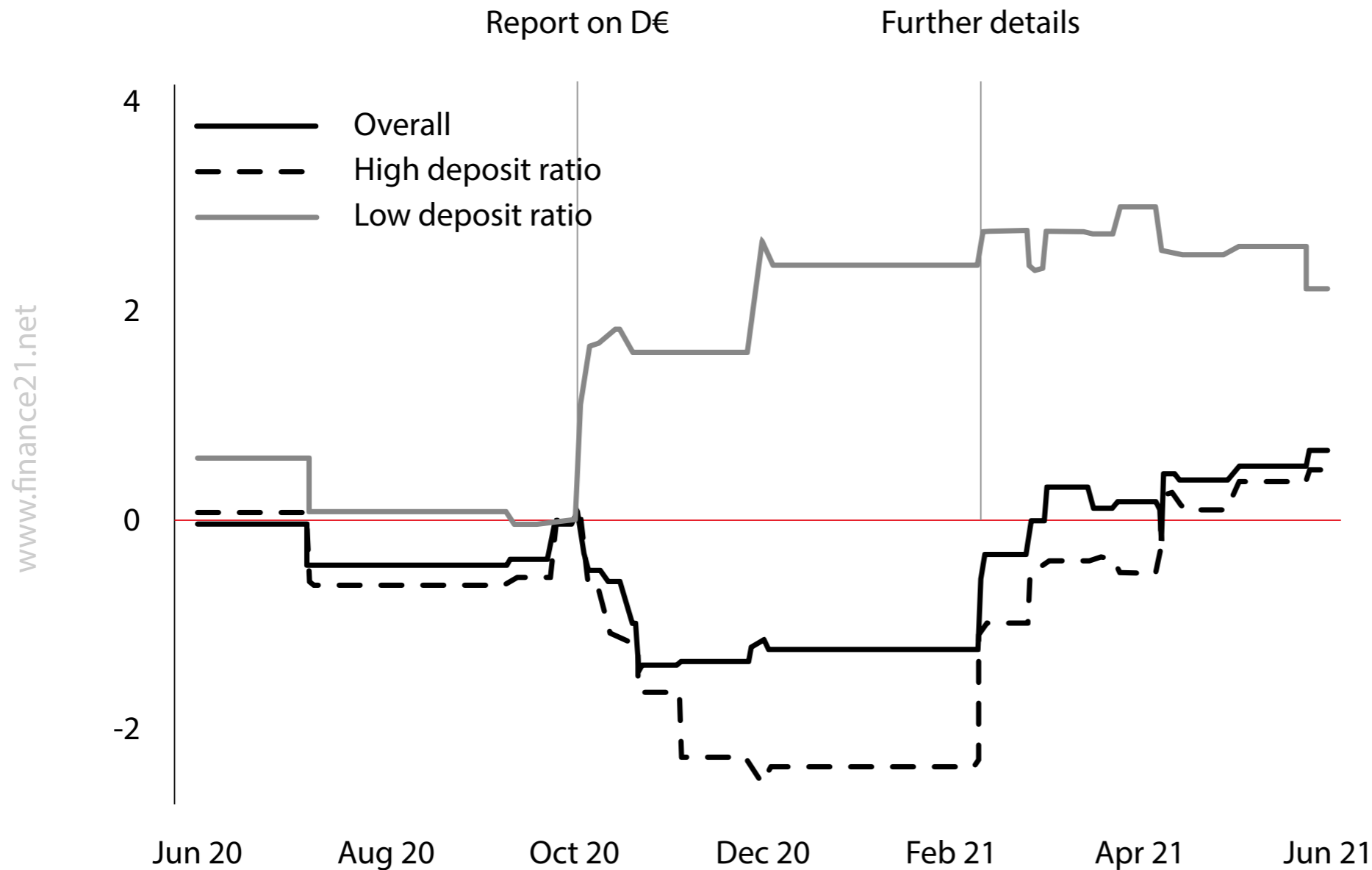
Moreover, markets seem to doubt the digital euro's potential, too. Burlon *et al* (2022) show that after news about the digital euro in October 2020, share prices of banks that rely more heavily on deposit funding incurred losses relative to those of less deposit dependent competitors, but this difference started to disappear when plans on holding limits and negative premia were made public (see Figure 1 which is reproduced from Burlon *et al* 2022). That is, markets appear to view the digital euro in its current form as a side issue for banks, or even an outright failure.

Private versus social benefits of the digital euro

The previous discussion demonstrates that promoting the digital euro requires an aggressive marketing strategy because private incentives for adoption are limited. However, the pursuit of such an aggressive approach is unlikely as this runs counter to the ECB's fourth, implicit objective of protecting banks' existing business model.

This is problematic and could turn the project into a significant missed opportunity, for the potential social benefits of the digital euro substantially exceed its private ones. After all, the case for a digital euro could be quite

Figure 1. Euro area banks' stock market reactions to news about central bank digital currency (percentage points)



Notes: the figure reports the results of an estimation model. Each horizontal segment reports the cumulated abnormal returns up to the latest key event, relative to the level on 1 October 2020. The solid line reports the average across all banks in the sample. The dashed and dotted lines report the average with two groups of banks – those with deposit ratios above or below the median, respectively. The two grey lines indicating the publication of the ECB report on a digital euro on 2 October 2020 and the interview on 9 February 2021.

compelling from a taxpayer and public policy perspective even if it is mixed or even weak from an individual user standpoint.

An effective digital euro could not only foster competition in the payment sector but also reduce the social costs of liquidity provision, substantially scale down too-big-to-fail problems and the associated bank regulation and increase transparency around the costs and benefits of liquidity creation.

These potential gains are large and deserve careful scrutiny. Realising them might call for subsidies to foster adoption rather than deterrents and restrictions.

Historians, economists, commentators and (mostly former) high-ranking central bankers alike have highlighted the stability risks of private money creation and fractional reserve banking (eg. King 2016). The advent of retail CBDC offers the opportunity to rethink the current monetary architecture and to re-evaluate these very features.

However, rather than opting for a rethink, the ECB seems to have decided to stick with the status quo. This is tantamount to sacrificing the digital euro on the altar of banking as we know it. ■

Cyril Monnet is Professor of Economics, and Dirk Niepelt is a Professor, both at the University of Bern

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Making banks safe

The financial system remains fragile. Stephen Cecchetti and Kermit Schoenholtz recommend strengthening capital and liquidity requirements, modifying accounting standards, and improving stress tests

The regulatory reforms that followed the financial crisis of 2007-09 created a financial system that is far more resilient than the one we had 15 years ago. Today, banks and some nonbanks face more rigorous capital and liquidity requirements. Improved collateral rules for market-making activities can dampen shocks. And, some institutions are subject to well-structured resolution regimes.

Yet, the events of March 2023 make clear that the system remains fragile. The progress thus far is simply not enough. What else needs to be done?

In a recent paper (Cecchetti and Schoenholtz 2023), we address this critical question. Our assessment of the banking system turmoil of 2023 leads us to several obvious conclusions, some of which clearly escaped both bank managers and their supervisors.

Perhaps the simplest and most significant is that banks can survive either risky assets or volatile funding, but not both. Another is that supervisors are willing to treat some banks as systemic in death, but not in life.

We also draw two compelling lessons from the recent supervisory and resolution debacles. First, a financial system which relies heavily on supervisory discretion is unlikely to prove resilient. Second, authorities with emergency powers to bail out intermediaries during a panic will always do so.

That is, policymakers are incapable of making credible commitments to impose losses on depositors and others. In our view, the only way to address this commitment problem is to prevent crises.

Based on our analysis, we develop a list of deficiencies in the current system. We then proceed to enumerate principles for making the regulatory framework more robust. Finally, we evaluate a series of proposed reform by asking whether they address the identified deficiencies and meet the principles.

In this column, we summarise the existing deficiencies, the principles for reform, and our evaluation of some specific proposals for making the financial system more robust. To anticipate our recommendations, which are similar to those of Admati *et al* (2023) and Acharya *et al* (2023), we argue that authorities should:

While financial intermediaries and the financial market infrastructure are far more robust than they were 15 years ago, the events of 2023 brought to light the lingering vulnerabilities of the financial system

1. significantly increase capital requirements
2. strengthen and simplify liquidity requirements
3. shift to mark-to-market accounting
4. improve the transparency, flexibility and severity of capital and liquidity stress tests.

Deficiencies of the current system

Starting with the system's inadequacies, first and foremost, as we saw yet again, uninsured deposits are prone to runs. Moreover, due to advances in communications and technology, a run can now overwhelm a bank within hours, transforming almost immediately into a system-wide panic.

Second, even in the case of simple banks like Silicon Valley Bank (SVB), which was the first to fail in March 2023, supervisors have a very difficult time identifying risks in real time. And, when they do, enforcement is still a challenge, reflecting both a high burden of proof on the supervisor and a coordination problem within and across agencies. For more complex banks that have numerous means for concealing risk taking, detection is substantially more difficult.

Third, authorities' regulatory preferences evolve. One official's view about what is required or advisable will almost surely differ from that of their predecessor and successor.

Fourth, the presence of highly illiquid assets on banks' balance sheets makes the measurement of capital levels extremely difficult. Ideally we would like to have a forward-looking measure of a bank's economic value. In lieu of

this, we need to improve accounting rules to ensure that reported measures of regulatory capital are not absurdly inaccurate, especially during times of stress.

Fifth, soft-touch regulation of nonbanks that engage in bank-like activities encourages risk-shifting away from banks¹. The dearth of regulation and supervision that is based on the principle of 'same activity, same risk, same regulation' remains a serious problem.

Finally, some managerial compensation schemes encourage risk taking at the expense of depositors, bondholders and taxpayers. When a bank is very short of capital, these arrangements can encourage gambling for resurrection.

Principles of a robust regulatory framework

Turning to principles, we start with the fact that regulation should be rule-based. Rules have a broad range of benefits. They address the commitment problem by narrowing supervisory discretion. They are less likely to change when officials' preferences change. They are more credible, since it is clear when authorities are following them and when they are not.

They make it easier to identify violations of well-specified rules and enforce remedies. Finally, a set of well-defined rules may make it possible to apply the same regulatory and supervisory standards to nonbanks engaging in bank-like activities based on the principle of 'same activity, same risk, same regulation'.

Second, a robust framework is simple and transparent. Since examiners on the ground inevitably have checklists that they are going to use to assess compliance, simplicity and transparency are essential for effective enforcement. Beyond that, it promotes market discipline as they create an environment where external monitoring is more reliable.

Third, a robust framework must have stringent standards. Ensuring sufficiently large capital and liquidity buffers has a range of advantages. First, large buffers anticipate the inevitable gaming associated with a set of stable rules. That is, they help counter regulatory arbitrage.

Second, by making insolvency and illiquidity less likely, they reduce the risk of bailout.

Third, high levels of capital and liquidity substitute for unavoidable weaknesses in discretionary supervision. Fourth, regardless of the accounting standards in place, large buffers guard against uncertainties in asset valuations that can lead to overestimation of actual net worth.

Finally, a robust framework is efficient in its use of resources. When multiple agencies have the same responsibility, it can make agreement on sanctions difficult, and delay their enforcement. Consequently, we are persuaded the system should be as streamlined as possible (eg. Volcker Alliance 2015).

Finally, the most important property of a robust framework is that, by limiting the spillovers to the broader financial system and the real economy, it allows banks to fail in an orderly way.

Evaluating proposed reforms

Table 1 summarises our evaluation of a range of possible regulatory reforms. Each column reflects a specific proposal, while the cells reflect our assessment of whether that proposal addresses the deficiencies of the current system or is consistent with the principles for robust regulatory reform that make up the rows of the table.

We use green shading when we believe the answer to the question is yes, white when it is no, and orange where we believe the proposal is counterproductive.

Table 1. Evaluating proposals for regulatory reform

	Strengthen existing standards					Adjust or replace deposit insurance				
	Higher capital req.	Strengthen liquidity req.	Modify accounting standards	Improve stress tests	Require sub debt	Eliminate brokered deposits	Targeted cap for SMEs	100% insurance for all	Pawnbroker for All Seasons (PFAS)	Narrow banks
Meets principles of a robust regulatory framework										
a. Rules based										
b. Simple/transparent										
c. Tough standards										
d. Efficient										
Addresses deficiencies of the current system										
i. Uninsured deposits are prone to runs										
ii. Complexity thwarts effectiveness										
iii. Changing preferences reduce credibility										
iv. Measurement of capital is difficult										
v. Accounting rules reduce usefulness										
vi. Nonbank regulation favours risk shifting										

Green shading implies the reform is consistent with the principle or addresses the deficiency.

Orange shading means that the proposed reform violates the principle or exacerbates the deficiency.

In Cecchetti and Schoenholtz (2023), we address all these proposals. For the sake of brevity, here we focus only on those that strengthen existing standards, best address the deficiencies, and are fully consistent with the principles for reform.

Raise and simplify capital requirements for banks and nonbanks

This straightforward proposal increases loss absorbency, reducing the likelihood of insolvency for any specific adverse valuation shock. Done well, it can meet all the principles: it is clearly rule based; it should be simple and transparent; by making the requirement high enough, it is tough; and it should be relatively efficient.

Importantly, while requiring more capital is privately costly, within a range of up to at least 15% of total assets, we doubt that it is socially costly (Cecchetti and Schoenholtz 2020).

Consequently, while we welcome Federal Reserve Vice Chair for Supervision Michael Barr's recent proposal to broaden and raise capital requirements, we believe that policymakers should raise these requirements much further than Barr plans (Barr 2023).

As for addressing the deficiencies of the current system, a larger capital buffer makes banks less run prone; reduces complexity; lowers the impact of authorities' changing preferences; addresses the difficulties in measurement and accounting; and, if applied comprehensively to institutions engaged in banking activities, reduces incentives for risk shifting.

With respect to interest rate risk, the current Basel III standard relies on the discretion of the supervisors to adjust a bank's capital requirement for securities that are not marked to market (eg. 'held to maturity').

In light of the 2023 banking turmoil and of past episodes (such as the savings and loan crisis in the 1980s), interest rate risk should be included in the nondiscretionary portion of capital requirements².

Strengthen and simplify liquidity requirements

The current liquidity coverage ratio (LCR) seems woefully inadequate. The LCR requires banks to hold reserves and government securities sufficient to cover outflows in a 30-day stress scenario. (Cecchetti and Schoenholtz 2018a).

However, it assumes a run-off rate of 10% within 30 days for uninsured deposits, whereas virtually all SVB's deposits either fled or sought to flee within 24 hours!

One possibility is to make the assumed runoff rate sensitive not only to the volatility of the liability but also to a bank's (properly measured) net worth (eg. Richardson *et al* 2023). For banks like SVB, such an LCR could have compelled reduced reliance on uninsured deposits nearly a year before the bank failed.

Put differently, such a capital-sensitive runoff assumption directly addresses the fatal compound risk that felled SVB and other midsized banks.

As noted in the second column of Table 1, a strengthening of liquidity requirements is consistent with all our principles, and addresses all deficiencies except for the challenges associated with accounting rules (which distort the valuation of capital, not liquidity).

Modify financial accounting

To ensure that regulatory capital more accurately reflects each bank's true financial condition, it is essential that authorities change accounting standards. Fluctuations in the market price of securities on their balance sheets ought to have considerable influence on banks' regulatory capital.

While we prefer a mark-to-market or fair value approach, an intermediate solution is for banks, which already report unrealised losses on their securities, to report an 'adjusted' measure of their net worth for use by the FDIC to ensure 'prompt corrective action' (the timely resolution of a poorly capitalised bank)³.

Making the adjusted measure prominent in public disclosures also shines a bright light on capital adequacy and, hopefully, spurs both market and supervisory discipline.

As the third column of Table 1 highlights, mark-to-market accounting is consistent with all the principles and helps address most of the deficiencies in the current system.

Improve stress tests

The theory underlying stress tests is that when a large common shock hits, there is no one to whom a bank can sell assets or from whom it can raise capital. Ensuring that each systemic intermediary can withstand significant stress raises the likelihood that the system will continue to provide critical financial services.

To be useful, stress tests need to be transparent, flexible, and severe (Cecchetti and Schoenholtz 2018b).

To enhance the effectiveness of stress tests, we recommend four changes. First, as the Federal Reserve now recognises, there should be multiple adverse scenarios, not just one.

Second, to ensure the proper incentives, managerial compensation should be linked to the outcome.

Third, because it is difficult to model the amplification that results from banks' initial responses to adverse shocks, the severity of some of the scenarios should be outside of historical experience.

Finally, stress tests should focus on banks' most profitable activities, as these are likely to reflect greater risk exposure.

Looking at the principles, stress tests fail in three ways: they are not simple, they depend on supervisory insight and discretion, and their resource intensity means they are not efficient. However, as Table 1 highlights, improved stress tests can help address all the deficiencies.

Conclusion

While financial intermediaries and the financial market infrastructure are far more robust than they were 15 years ago, the events of 2023 brought to light the lingering vulnerabilities of the financial system.

In this column, and our longer essay, we provide a framework for evaluating proposed reforms that leads us to recommend strengthening capital and liquidity requirements, modifying accounting standards, and improving stress tests.

We hope that international standard setters and domestic authorities work expeditiously to design and implement each and every one of these changes. ■

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Endnotes

1. See Pozsar et al (2012) for a detailed discussion of nonbank intermediation.
2. See Robinson (2013) for a brief discussion of the 1980s savings and loan crisis.
3. See Svoronos (2018) for a discussion of the importance of early intervention in resolving weak banks.

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Responsive and responsible bank regulation and supervision

The regulatory framework is evolving. Michelle Bowman urges regulators to focus on novel banking activities, including banking as a service and digital assets, to prevent a regulatory void

Bank regulators, particularly in the United States, have come to an inflection point where we are again taking stock of the reforms implemented after the 2008 financial crisis and evaluating whether these reforms have proven to be sufficient. One justification for pushing these reviews forward has been the recent stress in the banking system.

The regulatory framework has evolved substantially since the 2008 financial crisis. The regulatory landscape has become more restrictive, with large increases in capital and liquidity requirements, and other post-crisis reforms to improve bank resiliency. Since that time, the banking landscape has also evolved. Today, to stay competitive, banks need to be able to quickly adopt new and innovative technology.

My remarks will address the importance of a responsive and responsible regulatory framework, including regulation and supervision. A responsive framework adapts quickly to changing economic conditions, changing business activities and models, and emerging risks.

A responsible framework enables regulators to make changes that are informed by open debate and take into account intended and unintended consequences. These two concepts—adapting to changing conditions, and transparency about regulatory adjustments—are intertwined. They inform my view about how bank regulation should evolve and adapt over time.

This is particularly relevant now in light of the calls for reform of the regulatory framework, motivated in part by a desire to remediate perceived weaknesses that contributed to recent bank failures.

Responsive regulation and supervision

This year, we have seen the failures of Silicon Valley Bank (SVB), Signature Bank (Signature), and First Republic Bank, and the merger of Credit Suisse into UBS.

In the United States, the bank failures of SVB and Signature were accompanied by government intervention in the form of a guarantee on uninsured deposits at these institutions, and the creation of a new, broad-based, emergency liquidity facility designed to calm markets and provide reassurance about the underlying strength of the US banking system. These bank failures also highlighted the need for regulators to consider reform efforts to make the financial system stronger and more resilient.

The effects of capital extend well beyond the impact on international competition, particularly in light of the growing role of non-bank companies in financial services, the so-called shadow banking system

Many of the problems we have seen at these banks—interest rate risk, liquidity risk, poor risk management—are not caused by any evolution in banking. These bank failures and recent stress in the banking system have highlighted key deficiencies in risk management practices, and key deficiencies in supervisory priorities.

The Federal Reserve and other banking agencies have been trying to determine what more can be done to respond to the recent stress, but we also need to reflect on how reform efforts can lead to the best results, while minimizing unintended consequences.

Independent review

In my view, a necessary next step is to engage an independent third party to analyse the surrounding events of the recent bank failures to fully understand the factors and circumstances that contributed to the recent bank failures and to the ensuing stress in the banking system¹.

Several efforts have been undertaken to provide this type of after-the-fact review². Much of the work done to date has been helpful and has brought to light some uncomfortable realities about the lead-up to the bank failures. But much of this work was prepared internally, by Federal Reserve supervision staff, relying on a limited number of unattributed source interviews, and completed on an expedited timeframe with a limited scope.

Although the report was published as a report of the Board of Governors, it was the product of one Board Member, and was not reviewed by the other members of the Board prior to its publication. Troublingly, other Board members were afforded no ability to contribute to the report's content. There is a genuine question whether these efforts provide a sufficient accounting of what occurred.

A supplemental, independent review would help overcome the limitations of scope and timing of these initial efforts, and address concerns about the impartiality and independence of the reviews.

Additional, independent reviews could add substantial value³. These reviews should play an important role in informing the future path of supervision and regulation. The diagnosis of what went wrong can help inform necessary changes to supervision and regulation, the Fed's emergency authorities and liquidity tools, and the resolution, auction, and insurance processes of the Federal Deposit Insurance Corporation (FDIC).

Misperceptions and misunderstandings about the root causes and related issues could result in changes that are not only unnecessary but result in real harm to banks and their customers, to the financial system, and to the broader economy.

The policy agenda—the set of reforms to supervision and regulation that are intended to remediate perceived shortcomings—has already begun to take shape, driven by the conclusions from the current set of limited reviews.

And while I think some changes to supervision and regulation—such as a renewed examination focus on core banking risks like liquidity and interest rate risk and a careful review of liquidity requirements and expectations—are warranted and helpful, I am concerned that other reforms may be based on faulty assumptions or incomplete information.

In particular, as the United States moves forward with implementing new international capital standards, I am concerned that new capital requirements could unnecessarily hinder bank lending and diminish competition. We need to consider whether examiners have the appropriate tools and support to identify important issues and demand prompt remediation. Increasing capital requirements simply does not get at this underlying concern about the effectiveness of supervision.

I have heard the argument that recent bank stress was the result of changes Congress made several years ago to promote risk-based and tailored supervision, and a shift to a less assertive supervisory approach. I have not seen

compelling evidence to support this. As I and many of my colleagues have noted, the banking system today is strong and resilient, despite recent banking stress⁴.

This is in no small part due to the extensive reforms implemented after the 2008 financial crisis. Banks today are much better capitalized, with substantially more liquidity, and are subject to a new range of supervisory tools that did not exist prior to 2008.

The strong foundation of the banking system results in banks that are well prepared to continue lending to their communities and supporting the broader economy even in stressful economic times. The underlying strength and resilience of the banking system also begs the question—what are the justifications for higher capital requirements?

Supervisory reform

Supervisory reform proposals—particularly those that address a perceived retreat from robust supervision over the last few years—could similarly be improved by additional review, analysis, and discussion.

The notion that any regulator, including the Federal Reserve, would purposefully promote a less assertive supervisory approach or try to limit the ability of examiners to identify issues and require remediation, is inconsistent with every experience of my nearly 14 years in the professional banking and regulatory environments—as a banker, a state bank commissioner, and as a member of the Federal Reserve Board⁵.

Supervision has long been and continues to be a critical element of the regulatory framework at the Federal Reserve, the other US banking agencies, and internationally. While I have long been an advocate for greater transparency in supervision, transparency should not be mistaken for leniency⁶.

When we provide regulated institutions with clear expectations, and institutions fail to live up to those expectations, examiners are better positioned to require prompt remediation. This approach results in greater consistency and fairness and supports bank efforts to meet supervisory expectations by facilitating open engagement with examiners.

Echoes of the past

The recent banking stress presents many of the same dynamics that led to the savings and loan crisis in the 1980s. Savings and loan institutions have been and continue to be important providers of banking services in the United States, but during the 1980s many of these institutions failed.

These institutions experienced a period of rapid asset growth, followed by rapidly rising interest rates that depressed the value of some of these assets and an erosion of customer confidence that led to deposit withdrawals.

Many of these same dynamics created banking stress over the past few months, but the buildup of these risks was foreseeable. The failure to identify and properly address the buildup of these risks was a substantial oversight for the management and supervisors of SVB and was ultimately fatal to the bank. It seems obvious that reform efforts should concentrate on supervision programs and their effectiveness in identifying material risks to banking institutions.

It is incumbent on policymakers, as we revisit the regulatory framework, to pursue policy informed by an impartial review of the facts. There are several areas where it is apparent that improvements are needed—more effective communication among regulators and within the Federal Reserve System and Board’s supervisory program, greater transparency in supervisory expectations with enforceable and timely consequences when expectations

are not met, a focus on the most relevant banking risks with a demonstrated nexus to bank stability and safety and soundness, and a clearly articulated and implementable approach to the supervision of novel banking activities.

One area in particular that requires attention is the current approach to the supervision of novel banking activities, which leaves financial institutions in a supervisory void. While there have been some efforts to provide guidance, there remains substantial uncertainty about the permissibility of and supervisory expectations for these activities, including banking as a service, digital assets, and other novel activities.

This leaves banks in the perilous position of relying on general but non-binding statements by policymakers only to be criticized at some point in the future. The absence of a clear regulatory and supervisory approach creates the risk that regulators may determine novel activities are impermissible or impose new requirements and expectations on these activities after the fact and, for some first movers, after significant investment.

If our role is effective supervision and regulation, we must be willing to engage on both the novel and traditional activities.

These changes in supervisory approach could help remediate current shortcomings and build capacity to embrace, evolve with, and respond to emerging risks. Failure to follow this approach could have significant consequences for banks navigating higher interest rates while meeting the credit and financial needs of their customers.

Responsible reform of the regulatory framework

A review of bank regulation would be incomplete without a discussion of some basic principles for how the regulatory framework should evolve over time. In my view, responsible reforms reflect and incorporate a number of principles I have spoken about in the past: a commitment to transparency, accountability, efficiency, and due process⁷.

These considerations are all important, but one overlooked aspect of responsible reform is the imperative of evaluating the consequences of revisions. I view this as an extension of the need for efficiency.

A broader consideration of consequences does not assume the need for a particular reform, but instead takes into account how a particular policy change would interact with the regulatory framework and the impact on the broader financial system.

In thinking through regulatory reform, it is critical to understand the context. Requirements for capital, liquidity, resolution plans, stress testing, and supervisory approach are all elements of the regulatory framework. Each of these complements the others in support of safety and soundness.

So, when considering reforms, we must think about which tools are most effective and efficient in addressing identified shortcomings. I expect that we will find improvements to supervision, revisions to liquidity requirements, or improvements to bank preparedness to access liquidity are more effective than increases in capital for a broad set of banks, especially during a time of economic uncertainty.

Last year, the US banking regulators confirmed their commitment to implementing the Basel III endgame reforms, and I expect a proposal for public comment will be published this summer⁸. I intend to approach the proposal with an open mind, as we consider taking appropriate and measured steps to reform the US capital framework. I support providing sufficient time, of at least 120 days, for industry and stakeholders to review and provide comment on the proposal.

A key element of the rulemaking process is openness and transparency. In the past, the Board has held public meetings to consider rules of significance. During the pandemic, the Board largely departed from this practice. I believe we should return to having more public, open meetings on matters of importance.

Public Board meetings enable Board members to air their views and perspectives and raise potential concerns about how proposals will affect economic activity and financial stability. Public meetings also promote accountability by allowing interested parties to hear the discussion and debate among policymakers on matters that directly affect them.

As we and other regulators around the world begin the process for implementing the final elements of the Basel III international capital framework, it is imperative that we understand both the underlying goals of these changes and their practical impacts.

When policymakers raise capital requirements, the tendency can be to singularly focus on the perceived benefits—higher capital implies greater resiliency of the banking system. But there's a tradeoff. Resiliency, in terms of higher capital, comes at a cost—namely, decreased credit availability and increased cost of credit in normal times—and can have broad impacts on banks, the broader financial system, and the economy.

One of the core objectives of the Basel capital standards is to promote a level playing field internationally among banks subject to the standards. This objective can be challenging to evaluate—the business activities, structure, and broader financial landscape varies significantly from country to country, which complicates a horizontal evaluation of capital standards across jurisdictions. And while Basel capital standards are negotiated and internationally agreed to among financial regulators, they also require implementation by each of the many jurisdictions.

In contrast, regulators in the United States have often adopted 'gold-plating' for international Basel capital standards during implementation, layering on higher or expanded requirements above those adopted internationally, including an added stress capital buffer, the enhanced supplementary leverage ratio, and the 'method two' calculation methodology for the global systemically important bank (G-SIB) surcharge.

Some gold-plating in the United States is the product of Congressional directives, like the so-called Collins floor, which requires large US banks to calculate their capital requirements using multiple methodologies and apply the one resulting in higher aggregate capital requirements.

This is not an indictment of the robust capital standards we have in the United States today, but this US gold-plating is the current baseline as we consider the impact of future capital changes.

While some deviation in standards is to be expected during local implementation of international capital requirements, policymakers should not ignore the underlying goal of promoting international consistency and parity. We often see deviations across jurisdictions to adjust to local market conditions and for other reasons, often by including extended phase-in periods or reducing the size of capital increases.

Gold-plating US standards could further exacerbate the existing differences in international capital standards. We should be mindful of how such jurisdiction-specific deviations could impact international banking activities and crossborder competition.

While the policy objective in implementing capital standards is not to disadvantage US banks in non-US markets, or to give an advantage to foreign banks operating in the United States, if international capital standards present substantial variability across jurisdictions, they could have detrimental consequences.

Non-bank financial services firms

The effects of capital, however, extend well beyond the impact on international competition, particularly in light of the growing role of non-bank companies in financial services, the so-called shadow banking system.

Non-bank competitors, who often already have a pricing advantage, compete in many of the same markets as banks without the same regulatory expectations. Rising bank capital requirements may exacerbate the competitive dynamics that result in advantages to non-bank competitors and push additional financial activity out of the regulated banking system.

This shift—while possibly leaving a stronger and more resilient banking system—could create a financial system in which banks simply can't compete in a cost-effective manner. The shadow banking system has many connections to the regulated banking system.

Even the resiliency of a smaller, safer banking system could prove illusory when we look deeper into the connections between banks and non-banks, for example, with subscription lines of credit supporting the private credit industry, and the indirect bank-financing of non-bank mortgage lending activities through traditional bank credit lines.

How much and what types of financial activity should exist inside versus outside the regulated financial sector? We should be aware that making banks safer and sounder by pushing activity and risk to the shadow banking system may not make the broader financial system safer.

Regulatory influence on banking products and services and the broader banking system

Regulation has the power to dramatically reshape banking by affecting which products and services banks offer, the price of financial services, and the competitive landscape. Regulation can affect whether certain banks will be insulated from competition, ensconcing too-big-to-fail institutions atop the banking system and reducing competition and the availability of banking services in certain product markets and geographies. A thorough consideration of these dynamics should be a key element of regulatory reform.

Availability of products

Beyond the effects of capital on competition with foreign firms and non-banks, capital requirements can also have a direct impact on bank willingness and ability to engage in core banking activities. Banks pursue business strategies and offer products not despite capital requirements, but with the full knowledge and understanding of the capital allocations required to engage in that activity.

Increasing capital requirements can result in banks retreating from certain activities. The net result of a pullback could be higher costs due to the pass-through of higher regulatory requirements, or less availability of certain products and services for consumers. This could also increase concentration risks among competitors that remain in certain product markets.

Policymakers should fully consider these real-world consequences and engage in a transparent and public discussion of the pros and cons of options for capital reform. Banking regulatory and supervisory policy—including capital policy—should be focused on promoting a safe and sound banking system.

I am concerned about the adoption of reforms that attempt to steer banks toward or away from business activities. Bank regulators are not and should not be in the business of making capital allocation decisions regarding bank lending. In the same way, bank regulators should also not direct bank business strategy about the products and services offered by establishing capital requirements that are disproportionate to risk.

Regulatory reform and the banking landscape

A broader concern about regulatory policy, of which capital requirements are an important component, is the impact on the broader banking landscape. A regulator's initial reaction to a bank failure may be to increase capital costs, focusing on the impact of increased capital on the failed bank and limiting consideration of that impact to the point of the failure.

In that narrow test sample, there is no doubt that more capital is preferable and would improve solvency. But broader regulatory reform does not impact only one bank, or impact only banks experiencing significant banking stress, or only banks that have a history of mismanagement.

Broad-based changes can affect the incentives of the various tiers of firms. For example, flattening regulatory requirements—imposing the same high bar on all firms over a certain size—at first blush seems like it would improve financial resiliency.

But we should not assume that the banking system would remain static in response to uniform higher regulatory standards across institutions of dramatically different sizes, complexity, business models, and risk.

Eliminating banking standards tailored for these characteristics would create intense pressure on the smaller end of that spectrum to consolidate, as smaller banks struggle to adapt to regulation ill-suited for their size or complexity, applying instead regulations designed for a GSIB.

My intuition is that this type of approach could become a self-fulfilling prophecy, as banks regulated like G-SIBs would have strong incentives to grow or merge, to help develop economies of scale that come with larger size. Instead of addressing the problem of too-big-to-fail banks, regulation could become a tool that insulates too-big-to-fail banks from competition from smaller competitors.

Fundamentally, this raises the question of the ongoing role of tailoring in supervision and regulation. The concept of tailoring—of aligning supervision and regulation with bank risk and complexity, alternatively called risk-based supervision—has recently come under threat of being eroded through regulatory reform efforts in the United States⁹.

The tailoring approach has long been a feature of regulation and supervision in the United States, and I think it provides a useful framework for how to think about responsible approaches to regulatory reform.

The potential impact of risk-insensitive regulatory reform on banks and competition

What are the consequences of deviating from risk-based supervision and tailoring, when we apply standards designed for larger and more complex firms to smaller and simpler firms?

As an academic matter, and operating in a vacuum, higher standards imply that banks get safer; they hold more capital, face increased scrutiny by examiners, and are subjected to higher standards on all aspects of their business. But we need to consider whether this is truly necessary, and if implemented, what would be the practical outcome?

Under the weight of overly burdensome or redundant regulation, the business models of some banks may simply cease to be viable. Many banks would be unable to operate under the weight of increased compliance costs.

Of course, the banking system cannot tolerate unlimited risk, and regulatory policy bears within it the choice about how much risk is appropriate within the banking system. While conservatism, and ensuring safety and soundness, may be appropriate to some degree, at a certain point regulatory requirements become unmoored from risk and force good banks out of the market.

The consequences of excessive and overlapping regulations will inevitably be forced consolidation and reduced consumer choice, especially in underserved banking markets. Even in the absence of consolidation, banks always face choices in responding to regulation, and may pare back on lending to small businesses, or forfeit their banking charter and choose to operate instead within the nonbank sector.

Overregulation in trading book capital requirements could increase the cost of market-making—impacting the liquidity of debt and equity markets—and increase the cost of market funding. We cannot understate the potential impacts. Communities often fund local infrastructure projects by issuing municipal bonds in public debt markets.

If this funding source evaporates, or becomes more expensive, that can have severe consequences for these communities. Banking is not risk-free, and the goal of the regulatory framework is to support the safe and sound operation of banks, not to eliminate risk altogether.

If one is concerned about those who are underserved in the current market, it is necessary to understand that different sizes of banks often meet the specific banking needs of unique communities and customers in geographic areas or within product lines that may not provide a variety of options.

Smaller banks support their communities in unique ways, and often have deeper community ties and commitments than out-of-market competitors without direct relationships to their community. There seems to be a misperception by some—based solely on the aggregate number of banks in the United States—that there are simply too many bank charters competing for too little business.

It is difficult to know what the optimum number of banks in the banking system may be, but it is important to recognize that the number of charters does not tell the whole story.

A real concern is whether regulatory reform could have the unintended consequence of hollowing out the mid-sized tier of banks, effectively preventing the largest banks from facing new competition.

If we believe in the virtue of competition as a way to spur innovation and improve customer choice, we need to be cautious about less risk-sensitive regulatory and supervisory expectations.

If we were to apply some of the same heightened standards for banks with \$50 billion or \$100 billion in assets as we have for banks with trillions of dollars in assets, this inevitably would create pressure to merge to create economies of scale to lessen the cost of regulatory compliance, resulting in further bank consolidation.

By doing so, we would eliminate the current dynamic banking system that incorporates institutions regulated in tiers. We would prevent the next large bank from growing to be a viable competitor, and essentially permanently and officially designate a handful of banks as 'too big to fail', despite years of policymaker efforts fighting against the perceived government guarantee of only the largest banks.

Our goal should not be to create a 'barbell' of banking institutions based on size, with a small number of too-big-to-fail banks at the large end of the spectrum, and some smaller community banks at the low end.

Bank regulation is most effective when it adapts to changing economic conditions, changing business activities and models, and emerging risks. But policymakers should not be shortsighted about the potential consequences of policy changes, consequences that may have long-term effects on the contours of the banking system.

Driving activity out of banks into the shadow banking system does not make the financial system safer, it simply makes banks less competitive, and increases economic and financial stability risks.

As we consider the evolution of the financial system, and the current and future role of banks within it, a renewed focus on unintended consequences is a particularly important topic to consider and would ensure that our actions support resiliency in the global financial system.

Closing thoughts

My remarks should not be interpreted as a categorical rejection of reform efforts. Some reform efforts—to both regulation and supervision—are a natural part of the evolution of the regulatory framework, and some would address weaknesses revealed by the recent bank failures.

There is room to improve bank supervision for large banks, particularly those in Category IV of the US tailoring framework, and we need to evaluate whether our regulations could have inadvertently contributed to stress in the banking system¹⁰.

But these reform efforts should be both informed by an impartial and independent review of what led to the failures and healthy public debate, which should take into account the unintended consequences of reform. We must be circumspect about what went wrong, deliberate about what to fix, and cognizant of unintended consequences.

It is imperative that we preserve a dynamic banking sector, with banks of all sizes that serve the needs of their unique customers wherever they are located.

It is abundantly clear that regulatory and supervisory reform is on the way. But we should ensure that changes ultimately promote a safe and sound banking system. That system should serve the needs of customers and support the broader economy. ■

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Endnotes

1. Michelle W Bowman, [“The Evolving Nature of Banking, Bank Culture, and Bank Runs,”](#) (PDF) (speech at the 21st Annual Symposium on Building the Financial System of the 21st Century: An Agenda for Europe and the United States, Frankfurt, Germany, May 12, 2023).
2. See Government Accountability Office, [Bank Regulation: Preliminary Review of Agency Actions Related to March 2023 Bank Failures](#) (PDF) GAO-23-106736 (Washington: Government Accountability Office, April 2023); Federal Deposit Insurance Corporation, [FDIC’s Supervision of Signature Bank](#) (PDF) (Washington: Federal Deposit Insurance Corporation, April 28, 2023); Michael S Barr, Vice Chair for Supervision of the Board of Governors of the Federal Reserve System, [“Review of the Federal Reserve’s Supervision and Regulation of Silicon Valley Bank”](#) (PDF) (April 28, 2023).
3. See eg. Michael S Barr, [“Review of the Federal Reserve’s Supervision and Regulation of Silicon Valley Bank”](#) (“We welcome external reviews of SVB’s failure, as well as congressional oversight, and we intend to take these into account as we make changes to our framework of bank supervision and regulation to ensure that the banking system remains strong and resilient.”); letter from Senator Jon Tester and Senator Thom Tillis to President Joe Biden, March 18, 2023 (“Though the regulatory agencies tasked with overseeing our financial institutions have released a series of internal reports examining causes, failures, and corrective measures, we believe an independent examination that covers the full jurisdictional scope of these failures, led by non-partisan experts, is critically important.”); Margaret E Tahyar, [Statement before the Subcommittee on Financial Institutions and Monetary Policy of the House Committee on Financial Services](#), Washington, DC (PDF) (May 10, 2023). (“There should be a structurally independent investigation conducted with the same level of depth and professional standards that the major federal agencies require of independent investigations in the private sector.”).
4. See [Joint Statement](#) of Secretary of the Treasury Janet L Yellen, Federal Reserve Board Chair Jerome H Powell, and FDIC Chairman Martin J Gruenberg (March 12, 2023) (“The US banking system remains resilient and on a solid foundation, in large part due to reforms that were made after the financial crisis that ensured better safeguards for the banking industry.”); Michelle W Bowman, [“Considerations for Revisions to the Bank Regulatory Framework”](#) (PDF) (speech at the

Texas Bankers Association Annual Convention, San Antonio, Texas, May 19, 2023) (“While we have seen stress in some parts of the banking system, overall the system is strong and resilient. US banks have high levels of capital and liquidity, and banks of all sizes continue to support the economy. To a large degree, this strength comes from the work done at the direction of Congress, most recently pursuant to the bipartisan Economic Growth, Regulatory Relief, and Consumer Protection Act, which better aligned regulation with risk”); Michael S Barr, [Testimony before the Financial Services Subcommittee](#), US House of Representatives, Washington, DC (May 16, 2023) (“Overall, the US banking system remains strong and resilient, and depositors should be confident that all deposits in our banking system are safe.”).

5. See eg. Randal K Quarles, [“Spontaneity and Order: Transparency, Accountability, and Fairness in Bank Supervision”](#) (PDF) (speech at the American Bar Association Banking Law Committee Meeting, Washington, DC, January 17, 2020) (“Through their engagement with banks, supervisors promote good risk management and thus help banks pre-emptively avert excessive risk taking that would be costly and inefficient to correct after the fact. Where banks fall materially out of compliance with a regulatory framework or act in a manner that poses a threat to their safety and soundness, supervisors can act rapidly to address the failures that led to the lack of compliance or threat to safety and soundness.”).

6. See Michelle W Bowman, [“Independence, Predictability, and Tailoring in Banking Regulation and Supervision”](#) (PDF) (speech at the American Bankers Association Community Banking Conference, Orlando, Florida, February 13, 2023) (“To be clear, I do not consider transparency to mean leniency. We hold banks of all sizes to high standards, commensurate with their size and risk, and being transparent does not dilute the rigor of our regulatory standards. Transparency helps ensure that banks are aware of these standards and expectations so that they can work more effectively and efficiently to meet them.”).

7. See eg. Michelle W Bowman, [“Independence, Predictability, and Tailoring in Banking Regulation and Supervision”](#) (PDF) (speech at the American Bankers Association Community Banking Conference, Orlando, Florida, February 13, 2023); Michelle W Bowman, [“Large Bank Supervision and Regulation”](#) (PDF) (speech at the Institute of International Finance, Washington, DC, September 30, 2022); Michelle W Bowman, [“Creating a New Model for the Future of Supervision”](#) (PDF)

(speech at the Community Banking in the 21st Century Research and Policy Conference, St Louis, Missouri, September 28, 2021).

8. See Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency, [“Agencies Reaffirm Commitment to Basel III Standards”](#) joint press release (September 9, 2022).

9. See, Michelle W Bowman, [“Statement on Third Party Risk Management Guidance”](#) (June 6, 2023), (“[O]ne size fits all regulatory expectations for banks, including small banks, and failing to appropriately consider and mitigate the compliance and implementation burden imposed on these small banks, signals a concerning trend in our regulatory approach.”).

10. See 12 CFR 252.5(e) (defining a Category IV banking organization).

The views expressed here are my own and not necessarily those of my colleagues on the Federal Open Market Committee or the Board of Governors. This article is based on a [speech](#) delivered at the Salzburg Global Seminar on Global Turbulence and Financial Resilience: Implications for Financial Services and Society, Salzburg, Austria, June 2023.



When AI becomes a central banker

There are efficiency and cost benefits in using AI. Jon Danielsson discusses what tasks can safely be outsourced to AI and what needs to stay in the hands of human decision makers

Artificial intelligence is expected to be widely used by central banks as it brings considerable cost saving and efficiency benefits. However, as this column argues, it also raises difficult questions around which tasks can safely be outsourced to AI and what needs to stay in the hands of human decision makers.

Senior decision makers will need to appreciate how AI advice differs from that produced by human specialists, and shape their human resource policies and organisational structure to allow for the most efficient use of AI without it threatening the mission of the organisation.

Central banks are rapidly deploying artificial intelligence (AI), driven by the promise of increased efficiency and cost reductions. AI engines are already serving as central bankers. But with most AI applications today low level, and with the conservative nature of central banks, AI adoption is slower than in private sector financial institutions.

Still, the direction of travel seems inevitable, with AI set to take on increasingly important roles in central banking. That raises questions about what we can entrust to AI and where humans need to be in charge.

We might think the economy and especially the financial system – the domain of the central banks – is the ideal application for AI. After all, the economy and the financial system generate almost infinite amounts of data, so plenty for AI to train on.

Every minute financial institutional decision is recorded and trades are stamped to the microsecond. Emails, messages, and phone calls of traders and important decision makers' interactions with clients are recorded, and central banks have access to very granular economic data.

But data do not equal information, and making sense of all these data flows is like drinking from a fire hose. Even worse, the information about the next crisis event or inflationary episode might not even be in observed data.

What AI can and can't do

At the risk of oversimplifying, it is helpful to think of the benefits and threats of AI on a continuum.

Decision makers [...] must both appreciate how AI advice differs from that produced by human specialists and shape their human resource policies and organisational structure to allow for the most efficient use of AI without it threatening the mission of the organisation

On one end, we have a problem with well-defined objectives, bounded immutable rules, and finite and known action space, like the game of chess. Here, AI excels, making much better decisions than humans. It might not even need data because it can generate its own training datasets.

For central banks, this includes ordinary day-to-day operations, monitoring, and decisions, such as the enforcement of microprudential rules, payment system operation, and the monitoring of economic activity. The abundance of data, clear rules and objectives, and repeated events make it ideal for AI.

We already see this in the private sector, with Blackrock's AI-powered Aladdin serving as the world's top risk management engine. Robo-regulators in charge of 'RegTech' are an ideal AI application. At the moment, such work may be performed by professionals with a bachelor's or master's degree, and central banks employ a large number of these.

Central banks may first perceive value in having AI collaborate with human staff to tackle some of the many jobs that require attention, while not altering staff levels.

However, as time passes, central banks may grow to embrace the superior decisions and cost savings that come from replacing employees with AI. That is mainly possible with today's AI technology (Noy and Zhang 2023, Ilzetzki and Jain 2023.)

As the rules blur, objectives become unclear, events infrequent, and the action space fuzzy, AI starts to lose its advantage. It has limited information to train on, and important decisions might draw on domains outside of the AI training dataset.

This includes higher-level economic activity analysis, which may involve PhD-level economists authoring reports and forecasting risk, inflation, and other economic variables – jobs that require comprehensive understanding of data, statistics, programming, and, most importantly, economics.

Such employees might generate recommendations on typical monetary policy decisions based on some Taylor-type rule, macroprudential tuning of the composition and the amount of liquidity and capital buffers, or market turmoil analysis.

While the skill level for such work is higher than for ordinary activities, a long history of repeated research, coupled with standard analysis frameworks, leaves significant amount of material for AI to train on. And crucially, such work does not involve much abstract analysis.

AI may in the future outperform human personnel in such activities, and senior decision makers might come to appreciate the faster and more accurate reports by AI. This is already happening rapidly, for example, with ChatGPT and AI-overseen forecasting.

In extreme cases, such as deciding how to respond to financial crises or rapidly rising inflation – events that the typical central banker might only face once in their professional lifetime – human decision makers have the advantage since they might have to set their own objectives, while events are essentially unique, information extremely scarce, expert advice is contradictory, and the action space unknown.

This is the one area where AI is at a disadvantage and may be outperformed by the human abstract analyst (Danielsson *et al* 2022)

In such situations, mistakes can be catastrophic. In the 1980s, an AI called EURISKO used a cute trick to defeat all of its human competitors in a naval wargame, sinking its own slowest ships to achieve better manoeuvrability than its human competitors. And that is the problem with AI.

How do we know it will do the right thing? Human admirals don't have to be told they can't sink their own ships; they just know. The AI engine has to be told. But the world is complex, and creating rules covering every eventuality is impossible. AI will eventually run into cases where it takes critical decisions no human would find acceptable.

Of course, human decision makers mess up more often than AI. But, there are crucial differences. The former also come with a lifetime of experience and knowledge of relevant fields, like philosophy, history, politics, and ethics, allowing them to react to unforeseen circumstances and make decisions subject to political and ethical standards without it being necessary to spell them out.

While AI may make better decisions than a single human most of the time, it currently has only one representation of the world, whereas each human has their own individual worldview based on past experiences. Group decisions made by decision makers with diverse points of view can result in more robust decisions than an individual AI. No current, or envisioned, AI technology can make such group consensus decisions (Danielsson *et al* 2020).

Furthermore, before putting humans in charge of the most important domains, we can ask them how they would make decisions in hypothetical scenarios and, crucially, ask them to justify them. They can be held to account and be required to testify to Senate committees.

If they mess up, they can be fired, punished, incarcerated, and lose their reputation. You can't do any of that with AI. Nobody knows how it reasons or decides, nor can it explain itself. You can hold the AI engine to account, but it will not care.

Conclusion

The usage of AI is growing so quickly that decision makers risk being caught off guard and faced with a fait accompli. ChatGPT and machine learning overseen by AI are already used by junior central bankers for policy work.

Instead of steering AI adoption before it becomes too widespread, central banks risk being forced to respond to AI that is already in use. While one may declare that artificial intelligence will never be utilised for certain jobs, history shows that the use of such technology sneaks up on us, and senior decision makers may be the last to know.

AI promises to significantly aid central banks by assisting them with the increasing number of tasks they encounter, allowing them to target limited resources more efficiently and execute their job more robustly. It will change both the organisation and what will be demanded of employees.

While most central bankers may not become AI experts, they likely will need to 'speak' AI – be familiar with it – and be comfortable taking guidance from and managing AI engines.

The most senior decision makers then must both appreciate how AI advice differs from that produced by human specialists and shape their human resource policies and organisational structure to allow for the most efficient use of AI without it threatening the mission of the organisation. ■

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Paradise lost?

Crypto has failed to deliver on its promises. Fabio Panetta argues that the public sector should establish a comprehensive regulatory framework that addresses the risks with crypto

Introduction

Some 15 years ago, software developers using the pseudonym Satoshi Nakamoto created the source code of what they thought could be decentralised digital cash¹. Since then, crypto has relied on constantly creating new narratives to attract new investors, revealing incompatible views of what cryptoassets are or ought to be.

The vision of digital cash – of a decentralised payment infrastructure based on cryptography – went awry when blockchain networks became congested in 2017, resulting in soaring transaction fees².

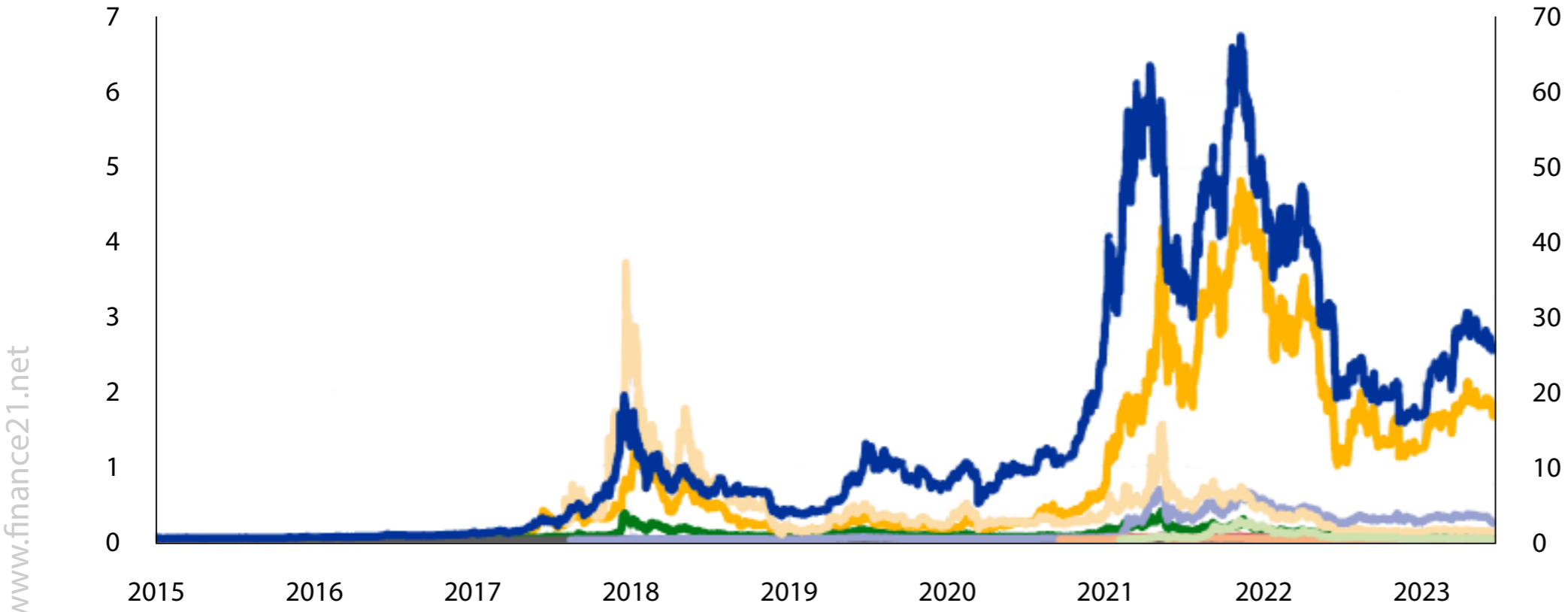
Subsequently, the narrative of digital gold gained momentum, sparking a ‘crypto rush’ that led to one in five adults in the United States and one in ten in Europe speculating on crypto, with a peak market capitalisation of €2.5 trillion³.

However, this illusion of cryptoassets serving as easy money and a robust store of value dissipated with the onset of the crypto winter in November 2021. The fall in the price of cryptos (Chart 1) led to a decrease of around €2 trillion worth of cryptoassets within less than a year. This caught millions of investors unprepared⁴. An estimated three-quarters of bitcoin users suffered losses on their initial investments at this time⁵.

Understandably, many are now questioning the future of cryptoassets. But the bursting of the bubble does not necessarily spell the end of cryptoassets⁶. People like to gamble and investing in crypto offers them a way to do so⁷.

Crypto valuations are highly volatile, reflecting the absence of any intrinsic value. This makes them particularly sensitive to changes in risk appetite and market narratives. The recent developments that have affected leading cryptoasset exchanges have highlighted the contradictions of a system which, though created to counteract the centralisation of the financial system, has become highly centralised itself.

Chart 1. Prices of bitcoin and selected altcoins (USD thousands).



- BTC (rhs)
- ETH
- DOT
- XRP
- ADA
- LTC
- LINK
- DOGE
- BND
- BCH
- UNI
- SOL

Notes: The data are for the period from 1 January 2015 to 15 June 2023 and are based on the price of cryptoassets as in the Crypto Coin Comparison Aggregated Index (CCCAGG) provided by CryptoCompare. The altcoins' names are abbreviated as follows: Bitcoin (BTC), Ether (ETH), Polkadot (DOT), Ripple (XRP), Cardano (ADA), Litecoin (LTC), Chainlink (LINK), Dogecoin (DOGE), Binance Coin (BNB), Bitcoin Cash (BCH), Uniswap (UNI), Solana (SOL). Source: CryptoCompare.

I will contend that due to their limitations, cryptos have not developed into a form of finance that is innovative and robust, but have instead morphed into one that is deleterious. The crypto ecosystem is riddled with market failures and negative externalities, and it is bound to experience further market disruptions unless proper regulatory safeguards are put in place.

Policymakers should be wary of supporting an industry that has so far produced no societal benefits and is increasingly trying to integrate into the traditional financial system, both to acquire legitimacy as part of that system and to piggyback on it.

The crypto ecosystem is riddled with market failures and negative externalities, and it is bound to experience further market disruptions unless proper regulatory safeguards are put in place

Instead, regulators should subject cryptos to rigorous regulatory standards, address their social cost, and treat unsound crypto models for what they truly are: a form of gambling.

This may prompt the ecosystem to make more effort to provide genuine value in the field of digital finance.

Shifting narratives: from decentralised payments to centralised gambling

The core promise of cryptos is to replace trust with technology, contending that the concept 'code is law' will allow a self-policing system to emerge, free of human judgement and error. This would in turn make it possible for money and finance to operate without trusted intermediaries.

However, this narrative often obfuscates reality. Unbacked cryptos have made no inroads into the conventional role of money. And they have progressively moved away from their original goal of decentralisation to increasingly rely on centralised solutions and market structures. They have become speculative assets⁸, as well as a means of circumventing capital controls, sanctions or financial regulation.

Blockchain limitations

A key reason why cryptos have failed to make good on their claim to perform the role of money is technical. Indeed, the use of blockchain – particularly in the form of public, permissionless blockchain – for transacting cryptoassets has exhibited significant limitations⁹.

Transacting cryptos on blockchains can be inefficient, slow and expensive; they face the blockchain trilemma, whereby aiming for optimal levels of security, scalability and decentralisation at the same time is not achievable¹⁰.

Cryptoassets relying on a proof-of-work validation mechanism, which is especially relevant for bitcoin as the largest cryptoasset by market capitalisation¹¹, are ecologically detrimental. Public authorities will therefore need

to evaluate whether the outsized carbon footprint of certain cryptoassets undermines their green transition commitments¹².

Moreover, proof-of-work validation mechanisms are inadequate for large-scale use¹³. Bitcoin, for example, can only accommodate up to seven transactions per second and fees can be exorbitant.

While alternative solutions to overcome the blockchain trilemma and proof-of-work consensus shortcomings have emerged for faster and more affordable transactions, including those outside the blockchain, they have drawbacks of their own. 'Off-chain' transactions conducted via third-party platforms compromise the core principles of cryptoassets, including security, validity and immutability¹⁴.

Another important aspect is the operational risk inherent in public blockchains due to the absence of an accountable central governance body that manages operations, incidents or code errors¹⁵.

Moreover, the handling of cryptoassets can be challenging. In a decentralised blockchain, users must protect their personal keys using self-custody wallets, which can discourage widespread adoption due to the tasks and risks involved, for example the theft or loss of a key. Given the immutability of blockchains, they do not permit transaction reversal¹⁶.

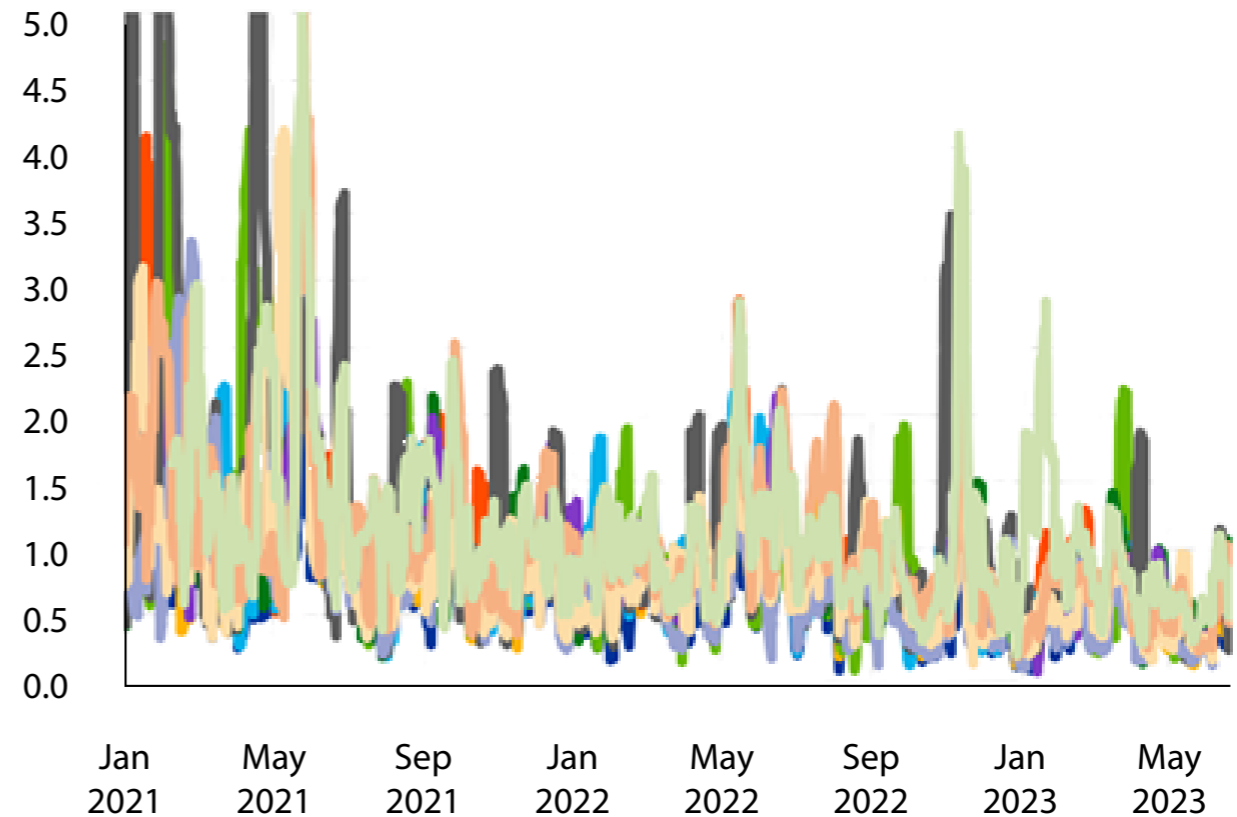
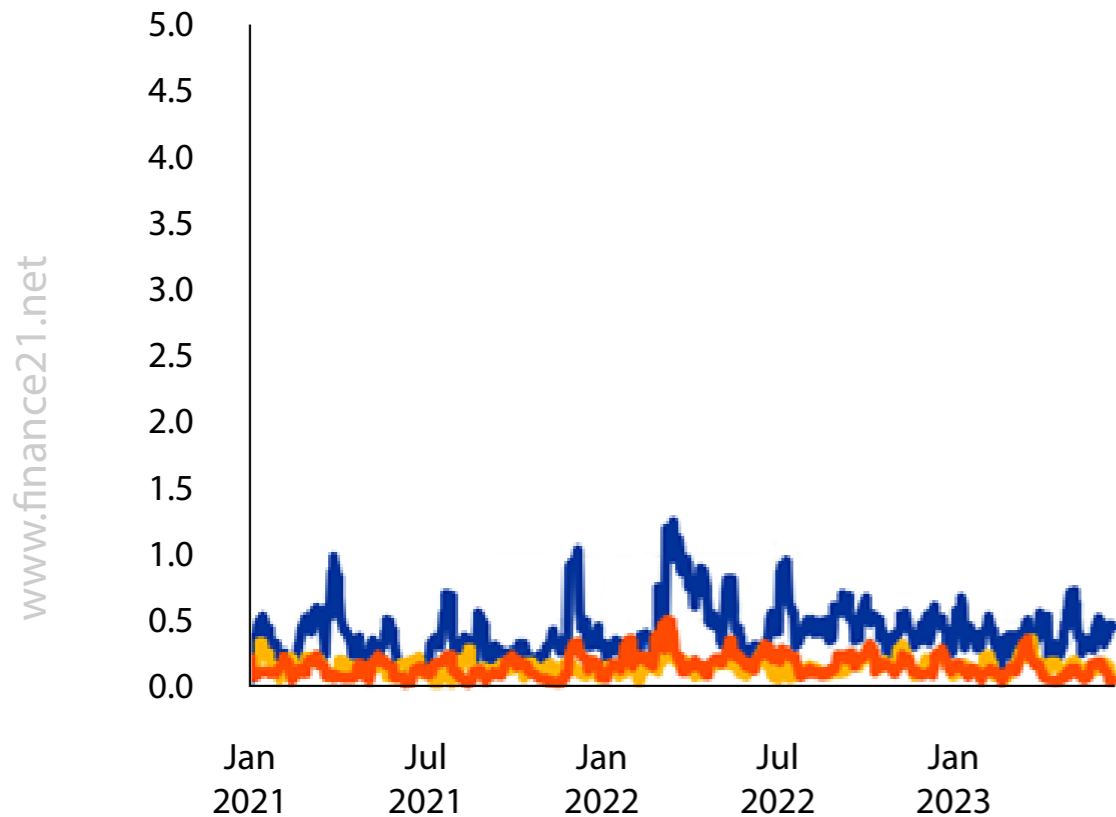
Instability

Another key limitation of unbacked cryptos is their instability. Unbacked cryptos lack intrinsic value and have no backing reserves or price stabilisation mechanisms¹⁷. This makes them inherently highly volatile and unsuitable as a means of payment. Bitcoin, for instance, exhibits volatility levels up to four times higher than stocks, or gold (Chart 2).

Chart 2. Price volatility of cryptos compared with other assets (annualised seven-day rolling standard deviation of daily percentage changes of prices).

a) Gold, oil and equity index

b) Bitcoin and selected altcoins



Oil
Gold
DJ Stoxx 600

BTC (rhs)
ETH
DOT
XRP
ADA
LTC
LINK
DOGE
BND
BCH
UNI
SOL

Notes: The data are for the period from 1 January 2015 to 15 June 2023. For visibility reasons, the maximum of the y-axis for Chart 2, panel b is set to 5. Nevertheless, on 30 and 31 January 2021 the price volatility of DOGE exceeded 28. Oil data refer to the European Brent Spot price. The altcoins' names are abbreviated as follows: Bitcoin (BTC), Ether (ETH), Polkadot (DOT), Ripple (XRP), Cardano (ADA), Litecoin (LTC), Chainlink (LINK), Dogecoin (DOGE), Binance Coin (BNB), Bitcoin Cash (BCH), Uniswap (UNI), Solana (SOL).

Sources: CryptoCompare, Bloomberg, Refinitiv and ECB calculations.

Such high volatility also means that households cannot rely on cryptoassets as a store of value to smooth their consumption over time. Similarly, firms cannot rely on cryptoassets as a unit of account for the calculation of prices or for their balance sheet.

Moreover, unbacked cryptos do not improve our capacity to hedge against inflation. Indeed, their price developments exhibit an increasing correlation with stock markets (Chart 3). And empirical analysis finds that momentum in the cryptoasset market and global financial market volatility do have an impact on bitcoin trading against fiat currencies¹⁸.

Cryptos as a means of gambling and circumvention

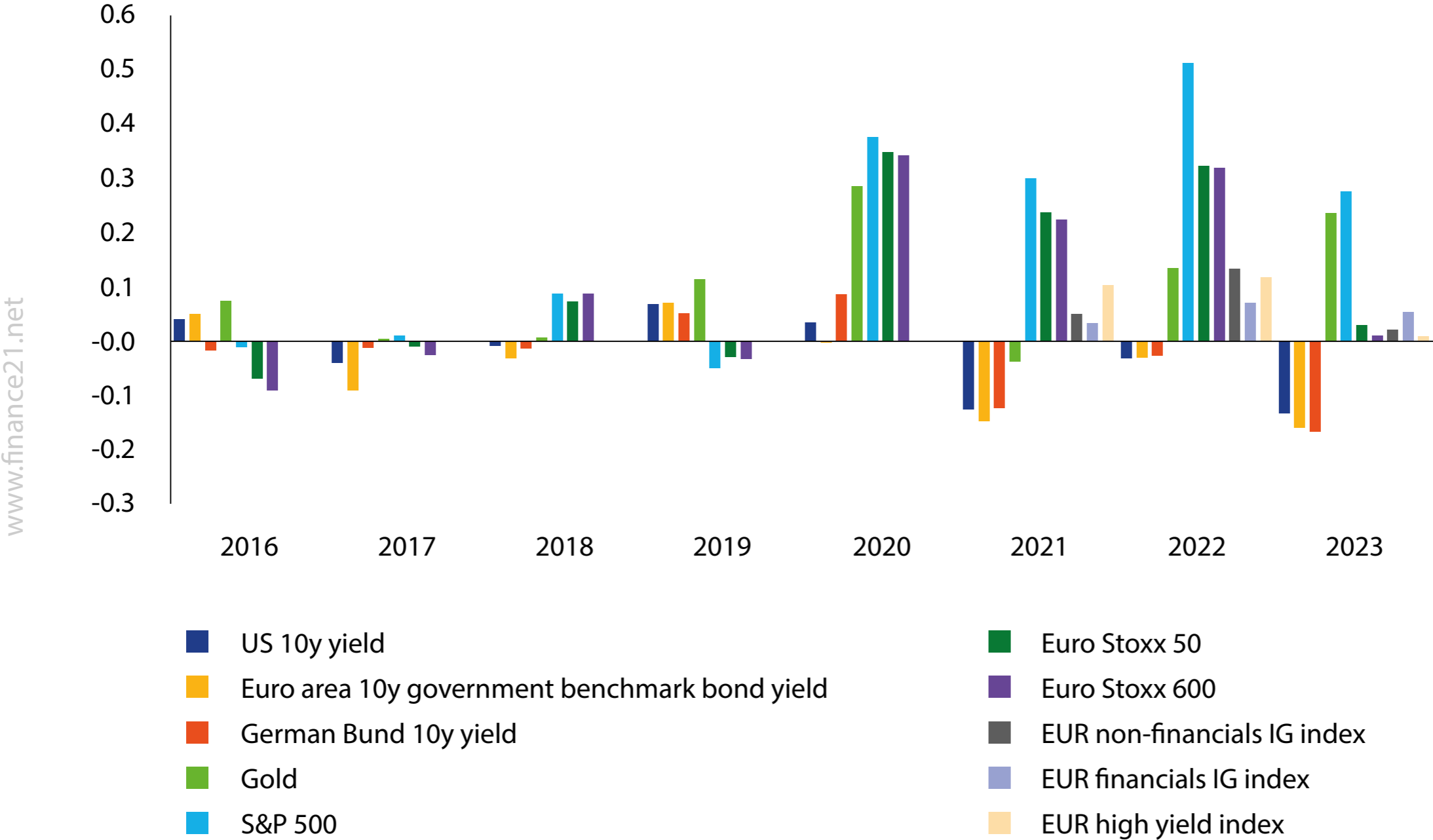
But the very instability of unbacked cryptos does make them appealing as a means of gambling. And their use as such has been facilitated by the establishment of a centralised market structure that supports the broader use of cryptoassets¹⁹.

Crypto exchanges have become gateways into the crypto ecosystem, often providing user access to crypto markets in conjunction with other services like wallets, custody, staking²⁰ or lending. Off-chain grids or third-party platforms have offered users easy and cost-effective ways to engage in trading and speculation, while stablecoins are being used to bridge the gap between fiat and crypto by promising a stable value relative to fiat currency²¹.

Besides gambling, cryptoassets are also being used for bypassing capital controls, sanctions and traditional financial regulation. A prime example is bitcoin, which is used to circumvent taxes and regulations, in particular to evade restrictions on international capital flows and foreign exchange transactions, including on remittances²².

These practices may have destabilising macroeconomic implications in some jurisdictions, notably in developing and emerging markets.

Chart 3. Returns correlations of bitcoin vis-à-vis selected financial assets (yearly rolling correlation).



Notes: The data are for the period from 1 January 2016 to 16 June 2023.
Sources: Bloomberg, S&P Global iBoxx, CryptoCompare and ECB calculations.

Risks from the growing centralisation of the crypto ecosystem

The crypto ecosystem's move away from its original goals towards more centralised forms of organisation, typically without regulatory oversight, is giving rise to substantial costs and an array of contradictions. There are two major facets to this phenomenon.

The re-emergence of classic financial sector shortcomings and vulnerabilities

First, dependence on third-party intermediaries, many of which are still unregulated, has resulted in market failures and negative externalities, which crypto was initially designed to sidestep.

The crypto ecosystem, for instance, has cultivated its own concentration risks, with stablecoins assuming a key role in trading and liquidity provision within decentralised finance markets²³. The difficulties faced by prominent stablecoins in the past year likely contributed significantly to the noticeable downturn in these markets²⁴.

Indeed, stablecoins often pose greater risks than initially thought. They introduce into the crypto space the kind of maturity mismatches commonly seen in money market mutual funds. As we have seen in the past year, redemption at par at all times is not guaranteed, risks of runs and contagion are omnipresent, and liquidation of reserve assets can lead to procyclical effects through collateral chains across the crypto ecosystem.

Another episode of instability driven by high concentration risk was the fall of the crypto exchange FTX. Initially the crisis seemed to primarily affect liquidity, but it quickly evolved into a solvency crisis. This situation arose due to FTX's inadequate risk management, unclear business boundaries and mishandling of customer funds.

The repercussions of this event rippled through the crypto ecosystem, causing cascading liquidations²⁵ that underscored the interconnectedness and opacity of crypto markets. Ultimately, it showcased how swiftly confidence in the industry could deteriorate.

Similarities to the FTX case can be seen in the recent civil charges brought by the US Securities and Exchange Commission against the biggest remaining crypto exchange: Binance. These civil charges allege that Binance's CEO and Binance entities were involved in an extensive web of deception, conflicts of interest, lack of disclosure and calculated evasion of the law²⁶. Should these allegations be proven, this would be yet another example of the fundamental shortcomings of the crypto ecosystem.

The recent crypto failures also show that risk, in itself, is technology-neutral. In financial services, it does not matter if a business ledger is kept on paper as it was for hundreds of years, in a centralised system as we have now or on a blockchain as in the cryptoasset ecosystem.

In the end, whether a firm remains in business or fails depends on how it manages credit risk, market risk, liquidity risk and leverage. Crypto enthusiasts would do well to remember that new technology does not make financial risk disappear. The financial risk either remains or transforms into a different type.

It is like pressing a balloon on one side: it will change in shape until it pops on the other side. And if the balloon is full of hot air, it may rise for a while but will burst in the end.

Links with the traditional financial sector

The second contradiction arises from the crypto industry's attempt to strengthen ties with actors in the financial system, including banks, big tech companies and the public sector.

Major payment networks²⁷ and intermediaries²⁸ have enhanced their support services for cryptoassets. Numerous prominent tech companies, including Meta (formerly Facebook) and Twitter, have explored ways to incorporate crypto into their platforms²⁹.

By leveraging their large customer base and offering a mix of payments and other financial services, tech firms, especially big techs, could solidify the ties between cryptoassets and the financial system.

The recent failures of Silvergate Bank and Signature Bank have highlighted the risks for banks associated with raising deposits from the crypto sector. The stability of these deposits is questionable given cryptos' volatility.

The discontinuation of the Silvergate Exchange Network and SigNet, which functioned as a quasi-payment system for the crypto investments of Silvergate Bank and Signature Bank clients, also shows how cryptoassets service providers depend on the traditional financial sector for settlement in fiat money.

The crypto industry not only seeks to strengthen its ties with the traditional financial industry. It also seeks to gain access to the public safety net that strongly regulated financial entities benefit from³⁰. Indeed, Circle, the issuer of the USD Coin (USDC) tried to gain access to the Federal Reserve's overnight reverse repurchasing facility in order to back its stablecoin³¹.

The crypto industry is seeking to grow by parasitising the financial system: it touts itself as an alternative to the financial sector, yet it seeks shelter within that very sector to address its inherent risks, all in the absence of adequate regulatory safeguards.

The public response: backing, regulating or innovating?

The public sector response can be encapsulated in three main suggestions.

Not giving in to the temptation to offer public backing to cryptos

First, the temptation to offer public backing to cryptos must be resisted.

The idea of permitting stablecoin issuers as non-bank financial institutions to hold their reserves at central banks might seem appealing, but could lead to serious adverse consequences.

By granting stablecoins access to the central bank's balance sheet, we would effectively outsource the provision of central bank money. If the stablecoin issuer were able to invest its reserve assets³² in the form of risk-free deposits at the central bank, this would eliminate the investment risks that ultimately fall on the shoulders of stablecoin holders. And the stablecoin issuer could offer the stablecoin holders a means of payment that would be a close substitute for central bank money³³.

This would compromise monetary sovereignty, financial stability and the smooth operation of the payment system. For example, a stablecoin could displace sovereign money by using the large customer network of a big tech, with far-reaching implications³⁴. Therefore, central banks should exercise prudence and retain control over their balance sheet and the money supply.

Regulating cryptos adequately and comprehensively

Second, regulators should refrain from implying that regulation can transform cryptoassets into safe assets. Efforts to legitimise unsound crypto models in a bid to attract crypto activities should be avoided³⁵.

Moreover, the principle of 'same activity, same risk, same regulation' should be endorsed. Cryptos cannot become as safe as other assets and investors should be aware of the risks. Anti-money laundering/countering the financing of terrorism rules should be enforced, and crypto activities of traditional firms should be carefully monitored.

While some jurisdictions attempt to apply existing regulatory frameworks to cryptoassets, the EU's Markets in Crypto-Assets Regulation offers a customised regulatory structure that applies to all 27 EU member states and

draws on existing regulation where appropriate (e-money being one example). The EU has also updated existing regulation, for instance by extending the travel rule to crypto transactions³⁶.

Despite the EU taking the lead in establishing a comprehensive framework regulating crypto activities, further steps are necessary. All activities related to the crypto industry should be regulated, including decentralised finance activities like cryptoasset lending or non-custodial wallet services³⁷.

Moreover, the regulatory framework for unbacked cryptoassets may be deemed lighter than for stablecoins as it relies mainly on disclosure requirements for issuing white papers³⁸, and on the supervision of the service providers which will offer them for trading. The risks posed by unbacked cryptoassets, which are largely used for speculative purposes, should be fully recognised.

Enhancing transparency and awareness of the risks associated with cryptoassets and their social cost are critical aspects of this approach. Public authorities will also need to address those social costs: for instance, cryptos' ecological footprint cannot be ignored in view of environmental challenges.

Additionally, the experience of FTX, which expanded massively with little oversight, underscores the importance of global crypto regulation and regulatory cooperation. The Financial Stability Board's recommendations³⁹ for the regulation and oversight of cryptoasset activities and markets need to be finalised and implemented urgently, also in non-FSB jurisdictions.

The Basel Committee on Banking Supervision's standard on the prudential treatment of banks' cryptoasset exposures is a positive step in this direction. It stipulates conservative capital requirements for unbacked

cryptoassets with a risk weight of 1,250%, as well as an exposure limit constraining the total amount of unbacked crypto a bank can hold to generally below 1% of Tier 1 capital.

It will be key for the European Union and other Basel jurisdictions to transpose the Basel standard into their legislation by the 1 January 2025 deadline⁴⁰. However, regulation alone will not be sufficient.

Innovating: digital settlement assets and central bank digital currencies

Third, the public sector needs to contribute to the development of reliable digital settlement assets.

Central banks are innovating to provide a stability anchor that maintains trust in all forms of money in the digital age. Central bank money for retail use is currently only available in physical form – cash. But the digitisation of payments is diminishing the role of cash and its capacity to provide an effective monetary anchor.

A central bank digital currency would offer a digital, risk-free standard and facilitate convertibility among different forms of private digital money. It would uphold the singleness of money and protect monetary sovereignty. We are advancing with our digital euro project and aim to complete our investigation phase later this year.

Furthermore, the tokenisation of digital finance may require central banks to modify their technological infrastructure supporting the issuance of central bank money for wholesale transactions. This could involve establishing a bridge between market distributed ledger technology (DLT) platforms and central bank infrastructures, or a new DLT-based wholesale settlement service with DLT-based central bank money⁴¹. We will involve the market in the exploratory work that we have recently announced⁴².

Conclusion

Cryptoassets have been promoted as decentralised alternatives promising more resilient financial services. However, the reality does not live up to that promise. The blockchain technology underpinning cryptoassets can be extremely slow, energy-intensive and insufficiently scalable. The practicality of cryptoassets for everyday transactions is low due to their complex handling and significant price volatility.

To address these drawbacks, the crypto ecosystem has changed its narrative, favouring more centralised forms of organisation that emphasise crypto speculation and quick profit. But recent events have exposed the fragility of the crypto ecosystem, demonstrating how quickly confidence in cryptoassets can evaporate.

In many respects, this ecosystem has recreated the very shortcomings and vulnerabilities that blockchain technology initially intended to address.

Further complicating matters, the crypto market seeks integration into the financial sector for increased relevance and public sector support. This would not provide the basis of a sustainable future for crypto. If anything, it would only heighten contradictions and vulnerabilities, resulting in greater instability and centralisation.

The public sector should adopt a determined position by establishing a comprehensive regulatory framework that addresses the social and environmental risks associated with crypto, including the use of unbacked cryptoassets for speculative purposes.

It should also resist calls to provide state backing for cryptos, which would essentially socialise crypto risks. The public sector should instead focus its efforts on contributing to the development of reliable digital settlement assets, including through their work on central bank digital currencies.

Decisive action of this kind should motivate the crypto ecosystem, including its foundational technology, the blockchain, to realign its objectives towards delivering real economic value within the digital finance landscape. ■

Fabio Panetta is a Member of the Executive Board of the ECB

Endnotes

1. See Nakamoto, S (2008), [“Bitcoin: A Peer-to-Peer Electronic Cash System”](#), bitcoin.org.
2. To maintain a system of decentralised consensus on a blockchain, self-interested validators need to be rewarded for recording transactions. In order to achieve sufficiently high rewards, the number of transactions per block needs to be limited. As transactions near this limit, congestion increases the cost of transactions exponentially. See Boissay et al (2022), [“Blockchain scalability and the fragmentation of crypto”](#), BIS Bulletin, No 56, Bank for International Settlements, 7 June.
3. It should be noted that holdings of cryptoassets are often concentrated in the hands of a few holders who could influence supply and prices. Moreover, some investments are the proceeds of illicit activities, which may be price elastic.
4. The market capitalisation of cryptoassets decreased from its peak of around €2.68 trillion on 10 November 2021 to €801 billion on 2 July 2022. By 14 June 2023 it stood at €978 billion. Source: CoinMarketCap.
5. See Auer et al (2022), [“Crypto trading and Bitcoin prices: evidence from a new database of retail adoption”](#), BIS Working Papers, No 1049, Bank for International Settlements, November.
6. See Panetta, F (2023), [“Caveat emptor does not apply to crypto”](#), The ECB Blog, 5 January.
7. See Panetta, F (2022), [“Crypto dominos: the bursting crypto bubbles and the destiny of digital finance”](#), speech at the Insight Summit, London Business School, 7 December.
8. Incidences of fraud, human error and manipulation have eroded the trust of crypto enthusiasts, leading to calls for scrutiny, oversight and public intervention. Research and analysis show that fully decentralised set-ups are often concentrated on few holders or require other types of human intervention. This makes them prone to manipulation and risks. See for example, Sayeed and Marco-Gisbert (2019), [“Assessing Blockchain Consensus and Security Mechanisms against the 51% Attack”](#), Applied Sciences, Vol. 9, No 9, April.
9. Blockchain technology may however be well-suited to other areas, for instance, supply chain management.
10. See S Shukla (2022), [The ‘Blockchain Trilemma’ That’s Holding Back Crypto](#), The Washington Post, 11 September.
11. As of 14 June bitcoin had a market capitalisation of €465.92 billion. Source: CoinGecko.

12. See Gschossmann, I van der Kraaij, A, Benoit, P-L and Rocher, E (2022), [“Mining the environment – is climate risk priced into crypto-assets?”](#), ECB Macroeprudential Bulletin, 11 July.

13. Moreover, Makarov and Schoar show that bitcoin mining is highly concentrated: the top 10% of miners control 90% of mining capacity and just 0.1% (about 50 miners) control close to 50% of mining capacity. Alternatively, blockchains based on proof of stake are faster, but also tend towards centralisation, as larger coin holders can reap more rewards, concentrating power and the risk of 51% attacks. See Makarov, I and Schoar, A (2022), “Blockchain Analysis of the Bitcoin Market”, NBER Working Papers, No 29396, National Bureau of Economic Research, 18 April.

14. See Soares, X (2023), [“On-Chain vs. Off-Chain Transactions: What’s the Difference?”](#), CoinDesk, 11 May.

15. See Walch, A (2018), [“Chapter 11 - Open-Source Operational Risk: Should Public Blockchains Serve as Financial Market Infrastructures?”](#), in Chuen, DLK and Deng, R (eds.), Handbook of Blockchain, Digital Finance, and Inclusion, Vol. 2, Academic Press, pp. 243-269.

16. Moreover, the fact that data stored on the blockchain is immutable and transparent may put the technology in conflict with digital privacy rights.

17. In the absence of flexible supply mechanisms, unbacked cryptos are incapable of effectively responding to temporary fluctuations in demand and thus fail to stabilise their value. Similarly, bitcoin’s limited supply – at 21 million coins – means that it does not offer protection against the risk of structural deflation.

18. Di Casola, P, Habib, M and Tercero-Lucas, D (2023), [“Global and local drivers of Bitcoin trading vis-à-vis fiat currencies”](#), ECB Working Paper Series, forthcoming.

19. The industry’s trend towards centralisation is clear. Since 2015 approximately 75% of the actual bitcoin volume has been associated with exchanges or exchange-like entities, including online wallets, over-the-counter (OTC) desks and large institutional traders. See Makarov and Schoar (2022), *op. cit.*

20. Staking is the foundation of the proof-of-stake consensus mechanism, which entails individuals locking up their assets (native coins) on a blockchain to secure the protocol. The stake acts as a form of collateral to ensure that validators, who are responsible for verifying and appending the blockchain, act in a manner that is in line with the protocol’s rules. See Oderbolz, N, Marosvölgyi, B and Hafner, M (2023), [“The Economics of Crypto Staking”](#), Swiss Economics Blog, 1 March.

21. They back their value with securities, commodities, as well as fiat money. Interestingly and inevitably, major stablecoin issuers – such as Tether or Circle – adopt centralised organisational structures, directly contradicting the initial ideas as laid down in Satoshi Nakamoto’s white paper. The notion that stablecoin issuers might invest in cryptoassets could further concentrate holdings and contradict the low-risk requirements for stablecoin reserves.
22. Graf von Luckner, C, Reinhart, CM and Rogoff, K (2023), [“Decrypting new age international capital flows”](#), Journal of Monetary Economics, 1 June.
23. Although it represents only a small part of the cryptoasset market, the stablecoin Tether accounts for close to half of all trading on cryptoasset trading platforms. See the section entitled [“Stablecoins’ role within the crypto-asset ecosystem”](#) in Adachi, M et al (2022), [“Stablecoins’ role in crypto and beyond: functions, risks and policy”](#), Macroprudential Bulletin, Issue 18, ECB.
24. See the May 2023 report by the ESRB Task Force on Crypto-Assets and Decentralised Finance entitled [“Crypto-assets and decentralised finance”](#).
25. A decentralised finance ecosystem is built around crypto lending that is collateralised by other cryptoassets, using smart contracts to implement margin calls. The failure of FTX had a large impact on the price of cryptoassets serving as collateral for crypto lending. This triggered cascading liquidations by crypto lenders because of the decrease in the value of the collateral.
26. See US Securities and Exchange Commission (2023), [SEC Files 13 Charges Against Binance Entities and Founder Changpeng Zhao](#), 5 June.
27. In particular, [Mastercard](#), [PayPal](#) and [Visa](#) continue building capabilities and strategic partnerships to support cryptoassets (as well as stablecoins).
28. See, for example, [JP Morgan’s Onyx Coin Systems Product Team](#), [Fidelity’s Fidelity CryptoSM Account](#) and [Citi’s collaboration with METACO to develop and pilot digital asset custody capabilities](#).
29. Meta expressed interest in the metaverse and the potential integration of cryptoassets and blockchain technology within its virtual reality platform. The company has been exploring the concept of a blockchain-based digital currency

called 'Facebook Diem' (previously known as Libra). Twitter has integrated bitcoin tipping features. It allows users to send and receive bitcoin tips to content creators and other users on the platform.

30. See PYMTS (2023), [Circle Says Lack of Direct EMI Access to EU Central Bank Accounts Stifles Payments Innovation](#).

31. Circle's USD 31 billion USDC stablecoin maintains around USD 25 billion of its reserves in short-term US Treasury bills in the exclusive Circle Reserve Fund, managed by BlackRock. The fund is registered as a '2a-7' government money market fund. Circle's objective for the fund was to secure access to the Federal Reserve's reverse repurchasing facility through BlackRock, allowing the company to move USDC's remaining cash reserves from partner banks to the fund under a Federal Reserve account.

32. Reserve assets are the assets against which the stablecoins are valued and redeemed.

33. In contrast, the substitutability between central bank money and bank deposits is limited by the fact that, on bank balance sheets, deposits are matched against risky assets (bank loans).

34. See Panetta, F (2020), ["From the payments revolution to the reinvention of money"](#), speech at the Deutsche Bundesbank conference on the "Future of Payments in Europe", 27 November.

35. See Chipolina, S and Asgari, N (2023), ["Binance slams US crypto crackdown and makes bid for UK oversight"](#), Financial Times, 10 May.

36. The 'travel rule', already used in traditional finance, will in the future cover transfers of cryptoassets. Information on the source of the asset and its beneficiary will have to 'travel' with the transaction and be stored on both sides of the transfer. The law also covers transactions above €1,000 from 'self-hosted wallets' (a cryptoasset wallet address of a private user) when they interact with hosted wallets managed by cryptoasset service providers. See [Regulation \(EU\) 2023/1113 of the European Parliament and of the Council of 31 May 2023 on information accompanying transfers of funds and certain cryptoassets and amending Directive \(EU\) 2015/849 \(Text with EEA relevance\)](#), Official Journal L 150, 9 June 2023, p. 1–39.

37. Crypto lending is a centralised or decentralised finance service that allows investors to lend out their crypto holdings to borrowers. Decentralised crypto lending platforms use smart contracts to automate loan payouts and yields, and users can deposit collateral to receive a loan if they meet the appropriate requirements automatically (see Duggan, W (2023), ["Crypto Lending: Earn Money From Your Crypto Holdings"](#), Forbes, 30 January). A non-custodial wallet, or self-custody

wallet, entails the crypto owner being fully responsible for managing their own cryptos. The users have full control of their crypto holdings, manage their own private key and handle transactions themselves (see [“Custodial vs Non-Custodial Wallets”](#), crypto.com, 17 February 2023).

38. This is a sort of prospectus for cryptoassets that informs potential holders about the characteristics of the issued cryptoasset before they offer a token to the public or list it on a trading platform.

39. See Financial Stability Board (2023), [“Crypto-assets and Global “Stablecoins”](#).

40. See European Central Bank (2023), [“Crypto-assets: a new standard for banks”](#), Supervision Newsletter, 15 February.

41. Panetta, F (2022), [“Demystifying wholesale central bank digital currency”](#), speech at the Deutsche Bundesbank’s Symposium on “Payments and Securities Settlement in Europe – today and tomorrow”, Frankfurt am Main, 26 September.

42. European Central Bank (2023), [“Eurosystem to explore new technologies for wholesale central bank money settlement”](#), Frankfurt am Main, 28 April.

This article is based on a [speech](#) delivered at a panel on the future of crypto at the 22nd BIS Annual Conference, 23 June 2023.

The value added of CBDCs: a view from the euro area



Maria Demertzis and Catarina Martins argue that the ECB is uniquely positioned to help create the global standard, and in the process to help protect the EU's global strategic interests

Executive summary

Different jurisdictions have set out different reasons for creating central bank digital currencies (CBDCs). Some countries, particularly those with already-operational CBDCs for retail purposes, aim to promote financial inclusion. But in countries where most citizens have access to financial services, central banks are interested in CBDCs as an aspect of the increasing digitalisation of finance.

Central banks could also choose to use CBDCs to guarantee in full citizen's holdings (currently, deposits in commercial bank are only partially guaranteed), but this would trigger major changes in the financial system in terms of the role of commercial banks in intermediation and the role of fiat money. So far, central banks have not opted to go this way.

In the euro area, consumers have multiple payment options and a very efficient retail payments system. The currency enjoys high levels of trust and is not challenged by the emergence of private currencies, such as Bitcoin, or by the risk that cash, a monetary system's anchor, will disappear. Therefore, creating a CBDC for retail purposes in the euro area offers little obvious value added, at least for the foreseeable future.

However, there is a strong case for building a CBDC that banks could use for crossborder wholesale purposes (ie. with other currencies). Wholesale CBDCs could revolutionise the way that crossborder, cross-currency payments are made for two reasons.

1. Crossborder payments are currently slow and inefficient. Pilot projects have shown that wholesale payments with CBDCs can generate substantial time and cost savings.

2. Any two central banks that have operational wholesale CBDCs could settle transactions between themselves. This would be very different from the current system, as most settlements today are done via the dollar (and then the euro) infrastructure and use correspondent banks.

The euro area and the United States would have to consider carefully from a geopolitical perspective how wholesale CBDCs might affect their global economic standing. By developing a CBDC for wholesale purposes, the European Union would be able to contribute to developing the global standard.

Wholesale CBDCs have the potential to change the current dollar-based system into one that is more diverse

1 Introduction

Central bank digital currencies (CBDCs), a digital equivalent of cash, are increasingly gaining traction. At least 114 jurisdictions, representing 95 percent of global GDP, are at some stage of developing a CBDC¹. In 11 countries, CBDCs are now a reality and operate in parallel to their physical equivalent. But it is not necessarily easy for the consumer to understand the difference between a euro in coin or note form and a digital euro.

A good starting point in identify the benefits of CBDCs is to understand the problem that cannot be solved through the increasing range of digital payment options provided by the private sector, and which therefore requires the state's intervention. This is important in explaining why the taxpayer might be asked to finance the creation of a CBDC.

We argue that CBDCs do have added value, but this is not the same for every country. In countries with high levels of financial exclusion and where there is a lack of modern and reliable digital payment systems, a CBDC can facilitate access to payments for many people. But in countries with ample payment solutions and where financial exclusion is a second-order problem, the justification is different.

Central banks worry that as finance becomes increasingly digitalised, two things might happen: first physical cash, the anchor of any financial system, will be displaced, and second, private currencies will become popular. Both could reduce the monopoly of sovereign money. Central banks fear this would compromise their ability to maintain monetary and financial stability.

CBDCs will have a dual purpose, just like their physical equivalent: for retail purposes, typically by consumers and small businesses to make daily payments, representing a small part of total payments; and for wholesale (ie. bulk) purposes by banks and other financial institutions, either domestically or cross border. In the euro area, most efforts

to date have focused on how to develop a retail CBDC. Only recently² has there been also an attempt to advance thinking on the wholesale aspects as well.

On the retail side, the arguments for a digital euro put forward by the European Central Bank revolve around the speed of digitalisation of finance and the notion of strategic autonomy. The prospect of finance becoming predominantly and eventually even exclusively digital threatens the existence of sovereign money and compromises the role of its guardian, the central bank.

The ECB also argues that a big part of all payments is managed by foreign players, who collect sensitive information about EU citizens. A pan-European payment method that is very close to cash would help reduce this vulnerability. It would also help homogenise payments in the euro area and, given easier access, may help promote the international role of the euro.

However, these reasons, understandable as they might be, do not make a compelling case for a retail digital euro, at least for now. There is no imminent threat that digitalisation will undermine the role of the physical euro. And there are easier ways, like through regulation, to promote the creation of a uniformly-accepted digital instant payment method in the EU, without having the taxpayer finance a CBDC.

Meanwhile, Europe's vulnerability arising from foreign players being present in the payment sphere is a very delicate argument. Does the EU want to create European payment players at the expense of competition?

Finally, the euro has acquired a very stable international role, second to, and quite far from, the dollar. At best, a digital equivalent can only expand the euro's international appeal at the margins. Other factors that pertain to a more integrated and well-governed European economy would advance more significantly its international acceptability.

There are also several technical choices, including limits on the amount of digital euros that any citizen can hold, or the fact that these deposits will not be remunerated, that also prevent the greater international use of the euro.

In addition, the Eurosystem has a very fast and efficient retail payment system and can still find efficiency gains within the current system. All these make the case for a digital euro even less attractive.

However, the EU and the global financial system can really benefit from developing wholesale CBDCs for making payments outside the euro area. This can generate efficiency gains for all payments made outside the EU. In our view, the creation of CBDCs globally has the potential of revolutionising crossborder payments.

For now, one reason why the dollar is the currency of choice globally is because it offers the infrastructure via which any two parties can settle a transaction. Any two countries that have CBDCs will have in principle the ability to settle transactions between them, bypassing the current dollar-based system.

Before this could happen however, there would have to be a commonly agreed global standard on how to design and use CBDCs. This is a significant barrier as it requires mutual recognition of legal systems and agreement on economic and technical design issues (BIS, 2022).

Global governance will be a major obstacle to this revolution and the euro area and the United States would have to consider carefully how their economic standing globally would be affected.

For example, current sanctions on Russia mean that countries that want to continue economic relations with Russia cannot do so in dollars or euros. Mutually accepted CBDCs between any two countries could allow them to continue trading and therefore bypass sanctions.

This reduces the need for the dollar infrastructure in international settlements and, importantly, raises the threshold for returning to the dollar when the option presents itself in the future. International financial fragmentation encourages the development of CBDCs and may be part of the explanation for their rapid advancement in the past few years.

2 The emergence of CBDCs

We first clarify how CBDCs may differ from physical cash. Figure 1 describes the taxonomy of money. The digital form of a sovereign currency, a CBDC would be legal tender and fully guaranteed by public authorities. This contrasts with deposits in commercial banks which are guaranteed only in part: for example, €100,000 in the euro area and \$250,000 in the US.

As legal tender, CBDCs could not be refused as means of payment or for repaying debts in the respective jurisdictions.

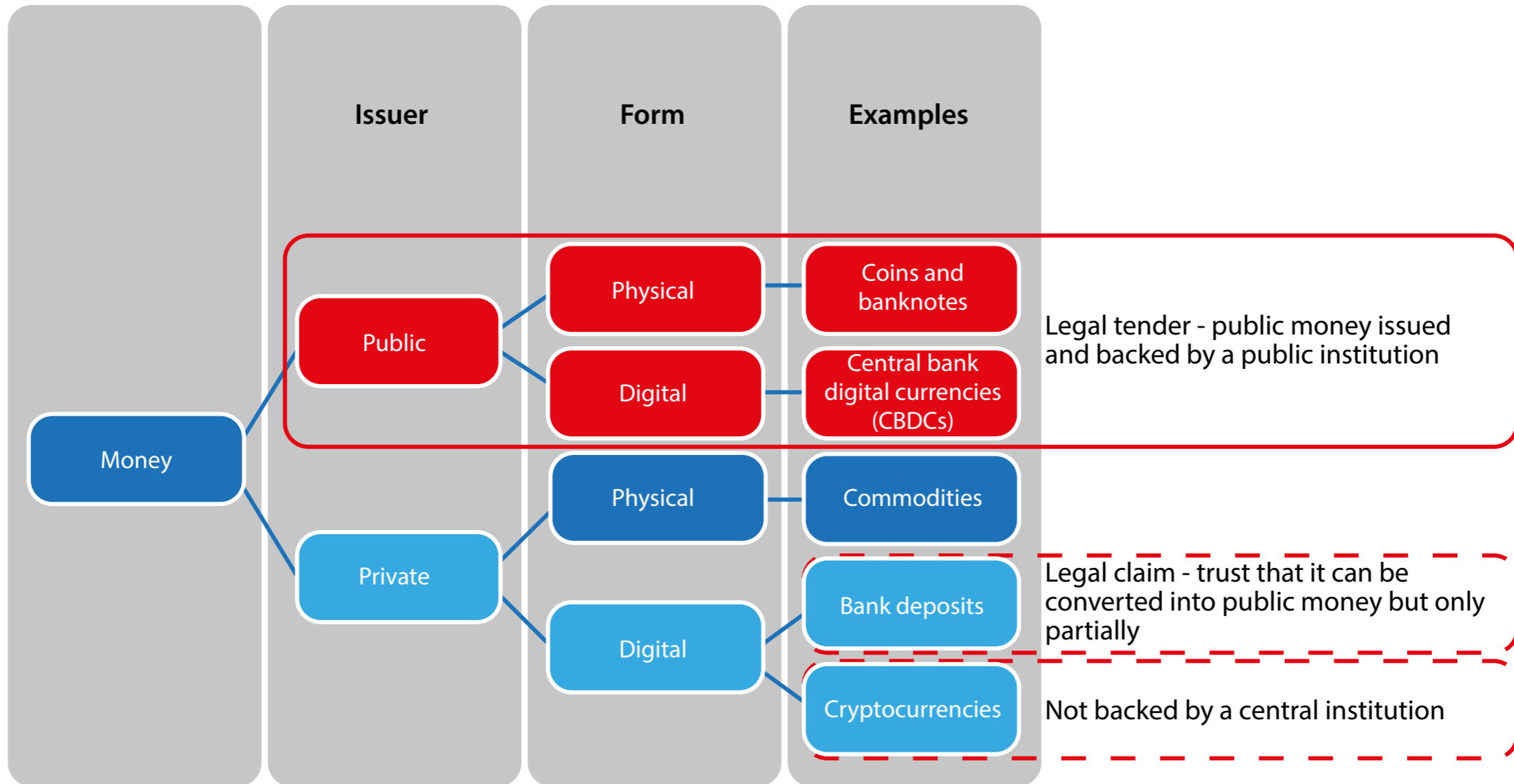
However, legal tender laws are not sufficient to guarantee the acceptability of a new currency, as shown in the literature (Lotz and Rocheteau, 2002). In a two-sided market, acceptability comes not only from take-up by consumers, but also from take-up by merchants, who must invest in the necessary equipment. This has been shown to be an obstacle and would have to be addressed for CBDCs.

Also, CBDCs will be convertible one-to-one into other forms of central bank money – reserve balances or cash. A CBDC will be the closest substitute possible to physical cash, which settles near instantly.

However, while the technology may be able to ensure privacy, CBDCs will not allow for anonymity in the same way as physical cash. Last, holding CBDCs would mean holding a direct liability with the respective central bank, very much like holding a banknote.

Figure 1. Taxonomy of money

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Source: Adapted from Claeys et al (2018).

Central banks have become interested in the idea of CBDCs for three main reasons:

1. The emergence of cryptocurrencies. The Bitcoin revolution has provided means of payment that are privately issued and managed. If private money were to become successful, especially if it is in principle available to everyone globally, it could displace publicly issued money (cash) and fiat money that is issued by financial institutions but monitored and guaranteed in part by public authorities.

The existence of private money reduces the money base that central banks control, and therefore reduces their ability to control inflation and monitor financial stability. With CBDCs, central banks would provide a digital equivalent of public money that would mimic the technological features of cryptocurrencies.

2. Increasing use of digital payments. The increased digitalisation of payments reduces the role and use of cash in most economies. Cash is often referred to as the anchor of the financial system, providing the necessary trust to the whole system.

The worry is that with decreasing use of cash in everyday transactions, physical cash would disappear, thus eroding trust in the system. A digital equivalent of cash would maintain the anchor while addressing the change in payment preferences.

3. Improve the reach and efficiency of payment systems. In several countries where many people do not have access to the financial system or digital payments, CBDCs offer increased financial inclusion.

This is potentially a game changer, and it is not a coincidence that those countries already using CBDCs, such as Nigeria and the Bahamas, have financial inclusion as a prime motive.

However, even for countries where financial exclusion is a small and isolated problem, there are benefits to improving the efficiency of payments.

This is particularly true for payments across borders, where CBDCs have the potential to create a global standard for international payments that is both efficient and universally accepted. This has the potential to revolutionise the way payments are settled between any two entities anywhere in the world.

While these three reasons are not exhaustive, they are the main arguments put forward by most countries. Other reasons that have been mentioned for developing CBDCs are a more cost-effective issuance and management of physical cash (Reserve Bank of India, 2022), support for the wide application of new technology and innovation, and the strengthening of operational resilience and cybersecurity³.

Central banks worldwide are experimenting with the technology to identify which type of CBDC, retail and/or wholesale, will provide value-added for their consumers and cover their needs.

3 The case for a retail CBDC

Currently, a consumer (payer) who wants to make a payment instructs their bank to make a transfer to the payee's account. The transaction involves an amount moving from one bank to the other and is settled by the central bank.

With CBDCs, however, both the payer and the payee will have accounts directly at the central bank. There will be no commercial banks involved⁴. Both the payment and the settlement will happen via the central bank directly. Furthermore, CBDCs could use new technology, such as distributed ledger technology (DLT), which is being explored.

The motive for deploying a retail CBDC depends crucially on how the three factors we have described in section 2 have impacted a particular jurisdiction. Are cryptocurrencies a threat to traditional forms of payment and possibly a source of financial instability?

Is physical cash redundant, therefore, threatening to de-anchor trust in the monetary system? Are there efficiency gains to be had in payments both for retailers and in wholesale?

3.1 Cryptocurrencies are not taking over payments

The emergence of cryptocurrencies has democratised payments and financial services in that it has provided easier access by removing intermediaries. However, cryptocurrencies have also proved to be very bad means of payment or store of value because their price has been very volatile (Demertzis and Martins, 2023).

In practice, the fear that cryptocurrencies could displace sovereign money has so far proved unfounded. Nevertheless, the experience is not the same around the world, and of course things might change in the future.

Despite its increasing size, the crypto market still represents a small fraction of the total financial system. According to the ECB, the value of all cryptoassets represented less than 1 percent of total global financial assets by April 2022 (Panetta, 2022a). They also represent a small component of the total value of payments.

The *Global Payments Report* (FIS, 2023) noted that cryptocurrencies are used much more for investment purposes than as a means of payment (77 percent compared to 18 percent, according to their survey), and that the value of e-commerce payments using crypto represented 0.19 percent of global e-commerce value in 2022.

Table 1. 2022 Global Crypto Adoption Index

Overall index ranking	Country	Overall index ranking	Country
1	Vietnam	11	Nigeria
2	Philippines	12	Turkey
3	Ukraine	13	Argentina
4	India	14	Morocco
5	United States	15	Colombia
6	Pakistan	16	Nepal
7	Brazil	17	United Kingdom
8	Thailand	18	Ecuador
9	Russia	19	Kenya
10	China	20	Indonesia

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Source: Chainalysis (2022).

However, in Africa, Asia and Latin America, cryptocurrencies are increasingly playing a more active role. An index compiled by Chainalysis (2022) tried to capture a broad picture of cryptocurrency adoption by scoring countries on a variety of measures. It ranks only two high-income countries – the US and the United Kingdom – among the top 20 crypto adopters in 2022 (Table 1).

According to White and White (2022), Africa is the fastest-growing cryptocurrency market among developing regions. Between 2020 and 2021, Africa saw a 1,200 percent increase in cryptocurrency payments. Remittances, which are a very important source of income for the continent, have been greatly facilitated by cryptocurrencies (White and White, 2022).

In Nigeria, 10.3 percent⁵ of the population owned cryptocurrency in 2022. The popularity of crypto in Nigeria is explained by financial exclusion, the lack of access to financial services. However, the weakness of the domestic currency and inflation is also a reason for the popularity of crypto alternatives.

A CBDC would help, at least in principle, to reduce financial exclusion, but would not by itself alleviate doubts about the strength of the sovereign currency.

3.2 Cash is still popular

The increased popularity of digital payments, particularly during the COVID-19 lockdowns, has reduced the need for cash. Nevertheless, cash still has an important role in point of sale (PoS) payments, particularly in less-developed regions and it is here to stay at least for the foreseeable future (BIS, 2023; FIS, 2023).

European Central Bank data for the euro area indicates that, despite the reduction in cash payments at the point of sale, from 79 percent in 2016 to 59 percent in 2022, cash remains the most popular payment method, especially for low-value transactions (Figure 2, top panel).

Citizens' opinions on the importance of having the cash option demonstrates that a society without cash is nowhere close. The proportion of people considering cash 'very important' and 'fairly important' is above 50 percent for most euro area countries (Figure 2, bottom panel). This goes against the popular belief that cash will soon be abandoned.

Zamora-Pérez *et al* (2022) argued that, at the global level, the demand for cash has not decreased but rather has increased. This has happened despite the many new innovative solutions that have emerged for non-cash payments.

Some of this increased demand may be related to a precautionary savings motive: a means of storing value in a period of low-interest rates that spanned several years.

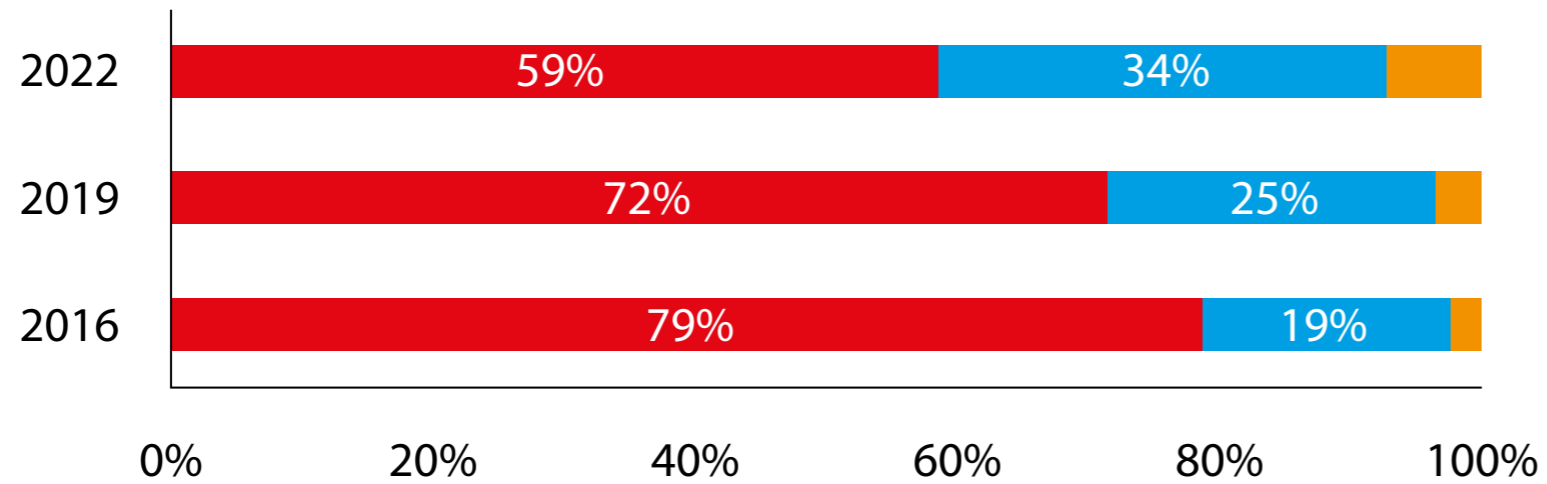
Additionally, even countries like Sweden, that have attempted to go totally cashless, have acknowledged that this might not be possible and that some, even if limited, amounts of cash will always be needed⁶. Armelius *et al* (2020) went as far as arguing that Sweden may be an outlier when it comes to the trend towards a cashless society, and not the trendsetter.

Nevertheless, it is important to acknowledge that the process of digitalisation will mean that the demand for physical cash will continue to decline. It is much more difficult to assess whether it will disappear completely or, like in Sweden, stabilise at a low level⁷.

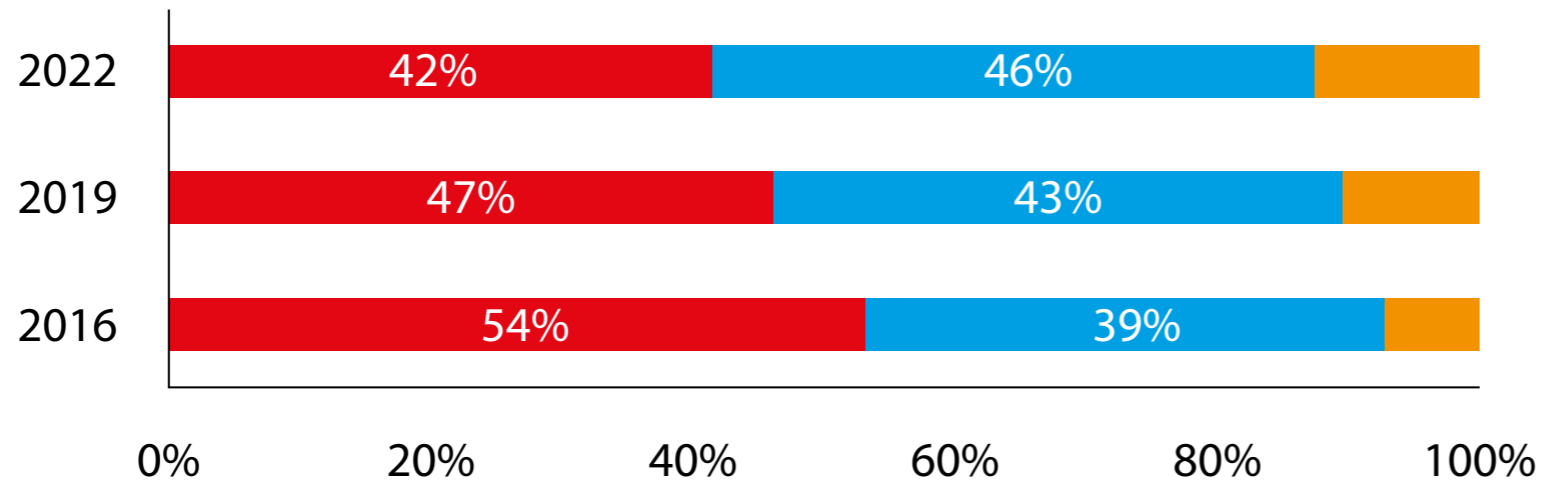
Part of the answer will depend on how well CBDCs, as the closest digital equivalent to cash, can take over the role of cash in providing an anchor for the system. Choices in the design of the CBDC will determine how close to cash CBDCs can be. Privacy and anonymity, the thresholds for consumer holdings of CBDCs and whether it will be remunerated or not will be relevant in this regard.

Figure 2. Payment preferences and the importance of cash in the euro area

Number of transactions

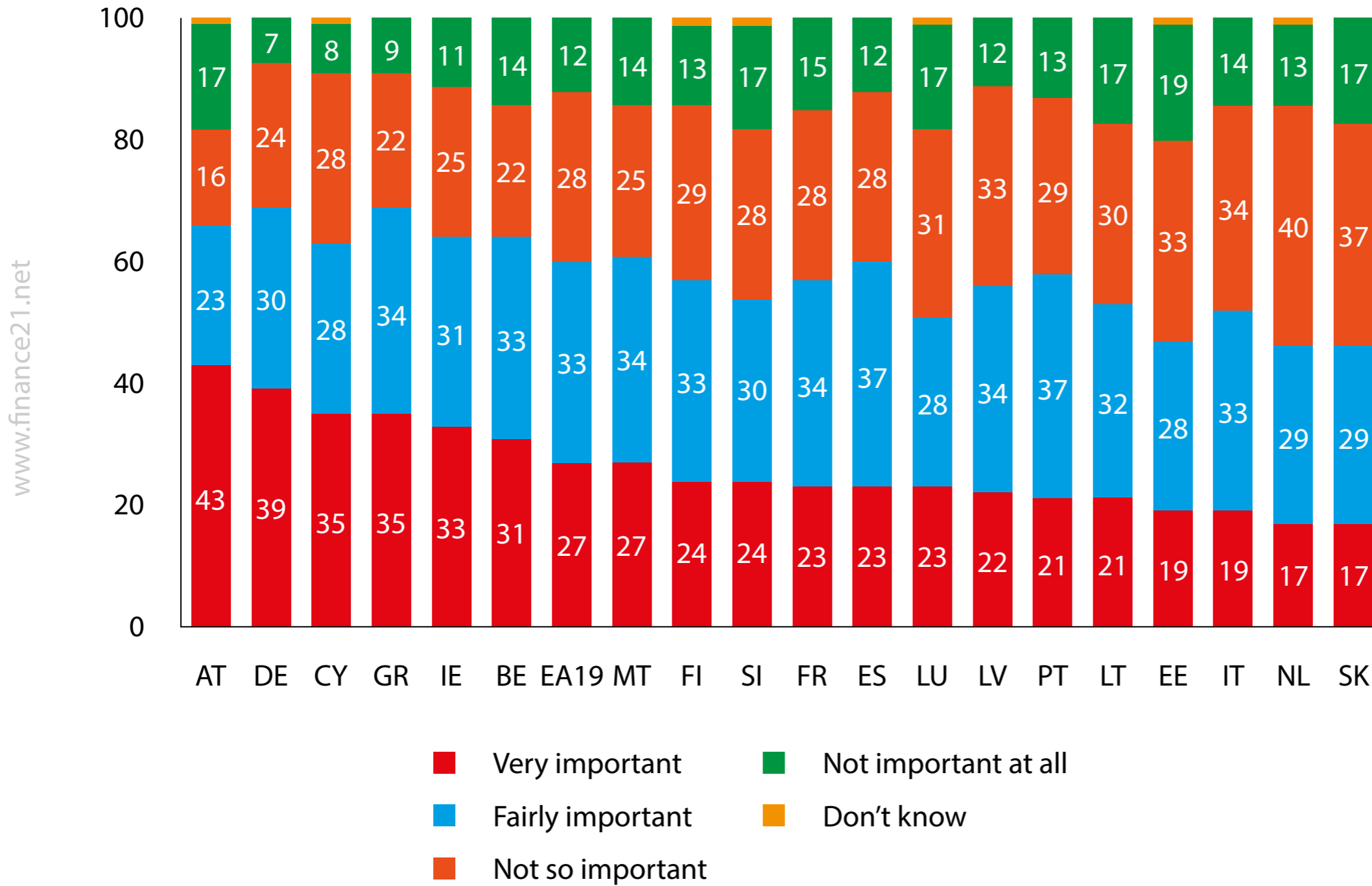


Value of transactions



Cash Card Others

Importance of having the option to pay with cash, by country (%)



Source: Bruegel based on ECB (2022).

3.3 Financial exclusion and the introduction of retail CBDCs

Perhaps the most compelling argument for introducing retail CBDCs is that it will increase financial inclusion. It is therefore not surprising that countries where a substantial part of the population is excluded from financial services were the first to introduce their national currencies in digital form.

Nigeria's eNaira, for example, was launched at the end of 2021, with the aims of increasing remittances, fostering crossborder trade, improving financial inclusion, enabling the government to make welfare payments more easily and making monetary policy more effective⁸.

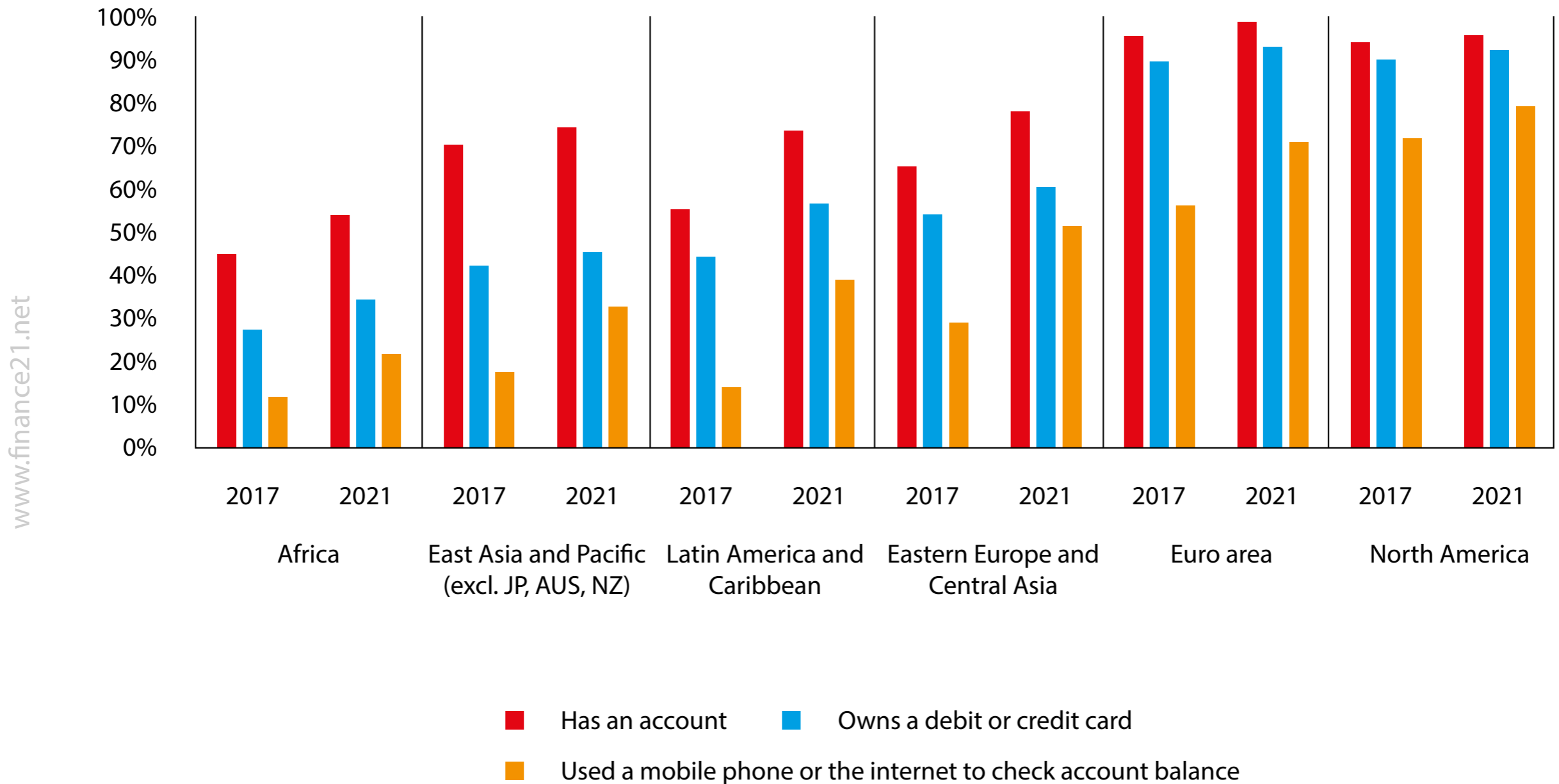
Providing the local population with access to digital payments and through them facilitating crossborder transactions in the form of remittances is particularly important, given the relevance of remittances as a source of income for the country. Figure 3 shows the level of financial inclusion worldwide.

Advanced economies such as euro area countries, the US and Canada have very high levels of financial inclusion. This is not the case for African countries or some Caribbean countries, where CBDCs are already being introduced.

However, a CBDC by itself is not enough to reduce financial exclusion. For CBDCs to be adopted widely there needs to be broad access to internet connection, consumers need to have mobile phones and merchants need to have invested in the equipment to accept payments in CBDCs.

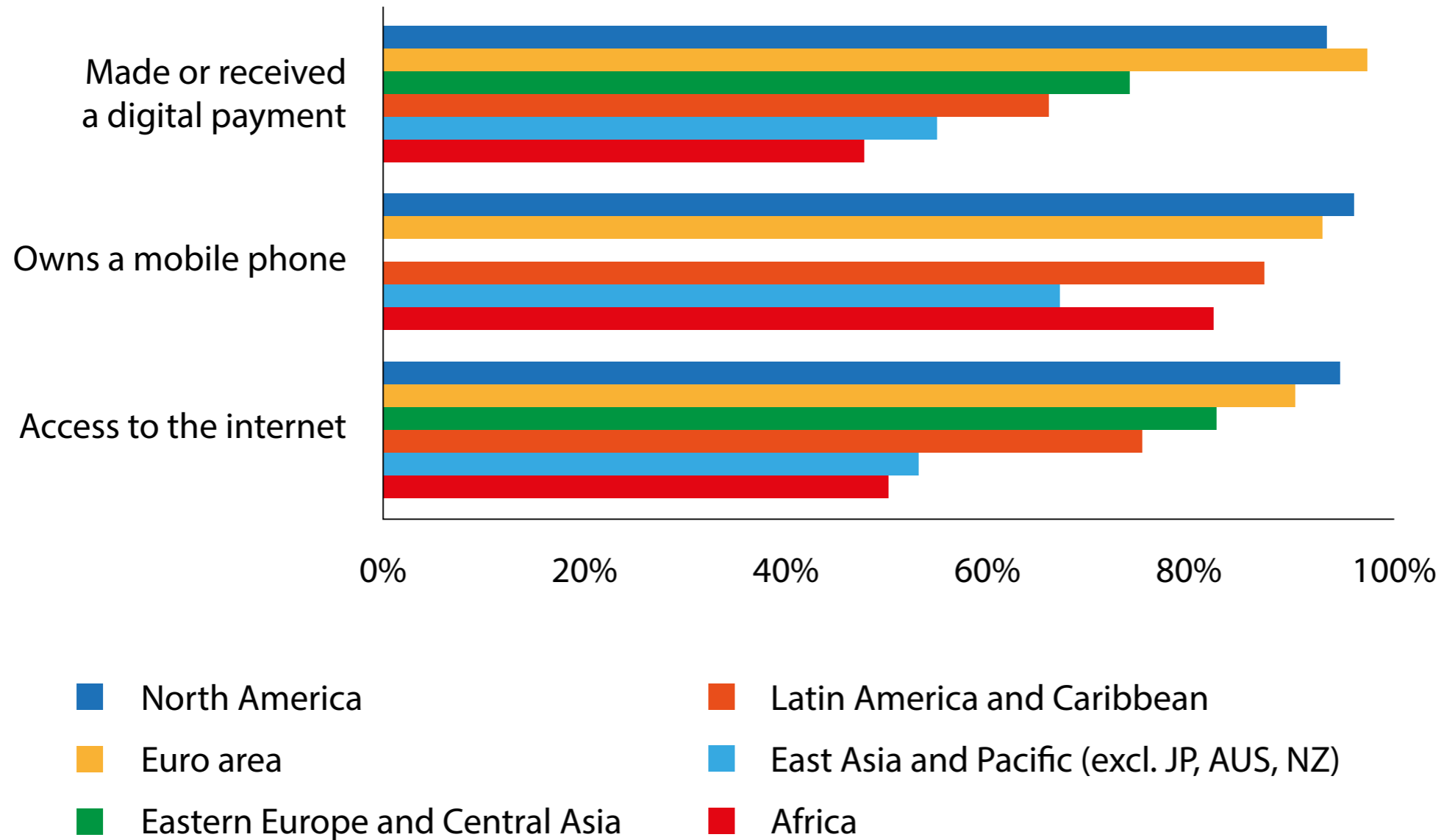
Figure 4 shows that while a large proportion of the African population has access to a mobile phone, access to the internet by contrast is not as widespread (50 percent), which defines the limits of success that the introduction of a digital currency can have.

Figure 3. Financial inclusion, three metrics



Notes: JP = Japan, AUS = Australia, NZ = New Zealand.
 Source: Bruegel based on the Global Findex Database 2021.

Figure 4. Digital infrastructure and penetration



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Source: Bruegel based on the Global Findex Database 2021.

It is worth noting that even if there is digital access, it is not immediately the case that the introduction of CBDCs is the only or even the easiest way to improve financial inclusion, as shown by India and Brazil.

Officially launched in 2016, Unified Payments Interface (UPI)⁹ is an Indian instant payment system widely adopted in the country. Given its huge success, it is seeking agreements with other countries to enable its acceptance abroad¹⁰.

The Central Bank of Brazil meanwhile launched a platform for real-time digital payments called PIX which has proved an enormous success. Since the launch, the number of registered users has increased continuously, reaching more than 137 million in May 2023¹¹, which represents more than 60 percent of the country's population.

PIX does not require any exchange of personal data, as the payer just asks for the payee's QR code, and payment transfers happen at very high speed at any time of the day. According to the 2023 *Global Payment Report*, average fees on PIX transactions are 0.22 percent of the transaction cost compared to 1 percent for debit cards and 2.2 percent for credit cards.

It would be very difficult to make a case for introducing a retail CBDC that can provide more value added than this to the consumer, a fact that explains why the Central Bank of Brazil's interest in introducing a CBDC is mainly for wholesale purposes¹².

3.4 How popular are CBDCs?

Admittedly, digital equivalents of sovereign currencies have existed for no more than two years. But their uptake is not as impressive as authorities hoped.

Table 2 shows their uptake level for three countries, Nigeria, the Bahamas and China. Compared to total currency in circulation, CBDCs represent very small amounts and in none of these cases above 0.17 percent of the total.

There are major problems to overcome. For the Sand Dollar, the CBDC of the Bahamas, introduced in October 2020, at least two issues might contribute to its small uptake¹³.

First, the public confuses the Sand Dollar with privately issued cryptocurrencies that are not immediately trusted. After the scandal around FTX, which was based in the Bahamas, the public grew very sceptical about any digital currency.

Second, the Sand Dollar is not readily accepted everywhere. Merchants do not all have the right equipment to accept it (a reason also given for the eNaira), even though they incur no cost for having the equipment.

Table 2. CBDCs in circulation

December 2022 values	Nigerian eNaira	Bahamian Sand Dollar	Chinese e-CNY
CBDC in circulation	3 billion eNaira	303,785 Sand Dollars	13.61 billion e-CNY
% of total currency in circulation	0.01%	0.17%	0.13%

Source: Bruegel based on Central Bank of Nigeria, Central Bank of The Bahamas and People's Bank of China.

This raises interesting questions about how to increase public acceptability. Historical incidents show that legal tender laws are not sufficient to guarantee the acceptability of a new currency (Lotz and Rocheteau, 2002).

In a two-sided market, acceptability comes not only in the form of consumer take-up, but also from merchants who must invest in the necessary equipment. This has been shown to be an obstacle. Zamora-Pérez *et al* (2022) found that providing the status of legal tender is not always the right means of increasing the popularity of a currency, as the cost of building the infrastructure necessary for a currency's adoption must be addressed.

However, Brazil's PIX payment system shows that mandatory participation of certain private players may be enough to create sufficient network effects, necessary for such markets to pick up. Similarly, Chinese public authorities are beginning to pay civil servants salaries in e-yuan¹⁴.

An important reason for low uptake is the lack of trust in the underlying currency. The digital representation of a currency is not sufficient to generate trust. It may allow for easier access but that can only help marginally. This is shown to be an important explanatory factor in the poor adoption of the eNaira in Nigeria¹⁵.

An interesting experiment is taking place in Zimbabwe, where authorities have issued a gold-backed token¹⁶ as a way of improving the trust in the local currency, the Zim dollar. Pegging the currency to a trusted asset is one way of trying to improve its stability and reputation. But it can also prove to be very expensive and ultimately non-credible. It will be interesting to see how far this effort goes to establish trust in the country's CBDC.

3.5 A mixed case for establishing a retail CBDC

We have so far discussed arguments that are regularly made to justify the introduction of a retail CBDC, and the experience of countries that have decided to launch CBDCs.

The process of digitalisation in payments has not made a clear case for CBDCs. If anything, there is still insufficient understanding among the public in countries where they are already in operation, of the difference between CBDCs and private cryptocurrencies.

The most compelling reason in favour of a CBDC is financial inclusion. But even for this, CBDCs are not a solution by themselves. Other elements, like digital infrastructure, need to be available. And the Brazilian example shows that when digital infrastructure is available, there are other solutions to financial inclusion. The key is finding effective ways of creating network effects.

The welfare implications of introducing retail CBDCs remain very understudied. Piazzesi and Schneider (2022) suggested that the emergence of digital currencies could distort the level of competitiveness in payment systems.

This is of relevance in jurisdictions, such as the euro area, where there are plenty of other available private payment alternatives. CBDCs have the potential to prevent useful innovation in private markets, therefore, reducing aggregate welfare.

On the other hand, Williamson (2022) took a different view. Competing with private means of payment, CBDCs will attract safe assets (deposits). This, he argued, is a way of managing safe assets in a better, more welfare-enhancing way compared to how private banks deal with this stock. CBDCs could in theory be a way of bypassing the imperfections of partial deposit guaranteed systems.

However, CBDCs are not the only way of guaranteeing deposits in full. Regulatory adjustments could do this instantly. Importantly, a regime that shifts deposits from private banks to the central bank will necessarily change

the face of retail banking, an action that should not be done lightly. This has never been the motive behind introducing CBDCs and should not be dealt with as a mere unforeseen consequence.

There remain operational risks of introducing a retail CBDC. How will deposit holders retrieve them from private banks and place them at the central bank? Can this happen all at once, or will it trigger a run on the banks? There are also issues of cyber security and no system can be completely secure.

How does technology and the regulation that applies to it ensure financial stability? Finally, there is overwhelming evidence that consumers worry about privacy and anonymity (ECB, 2021; Noll, 2023).

While the technology that the ledger provides may offer novel solutions to a number of issues, the legal framework behind CBDCs is as credible as that of physical currencies and the institutions responsible for their issuance. A digital representation of a currency cannot solve governance shortcomings.

4 What is novel about wholesale CBDCs?

4.1 Improving wholesale payments

In the current system, bank reserves in the central bank available for wholesale transactions are already a form of central bank digital currency.

In other words, payers and payees in the wholesale market – banks – already have accounts at the central bank. This means that, unlike CBDCs for retail purposes, wholesale CBDCs do not need to be created from scratch. Rather, it is about using the most modern technology – distributed ledger technology (DLT) – to operate wholesale transactions.

Then the question is whether this new technology can provide efficiency gains in wholesale payments domestically, or between central banks across borders.

In various advanced economies, domestic payment systems are already very efficient: for example, real-time gross settlement systems such as T2, launched by the Eurosystem in March 2023 to replace the previous TARGET2 system, which settles euro-denominated payments, and the Fedwire Funds Service, which settles dollar-denominated transactions.

The systems are operated by the respective central bank. T2 is already meant to improve cost efficiency, provide greater cyber security and optimise the use of liquidity by harmonising and integrating various TARGET services¹⁷.

Even though wholesale settlement systems are quite advanced in the EU and in the US, the ECB and the Fed are both exploring how DLT can prove more efficient and secure for domestic interbank transfers¹⁸.

However, it is in crossborder and cross-currency transactions that DLT could provide sizeable gains. These transactions are subject to inefficiencies related to the current correspondent banking architecture (Hebert *et al* 2023). International payment systems have not kept up with the scale of crossborder financial flows in an increasingly open world.

The systems used are costly, slow and complex, which means that many participants from emerging markets and the developing world have been left with no access to the global financial system.

In an increasingly interconnected world, the need to improve crossborder payments has been established as a priority by the G20, with the Financial Stability Board leading in coordination of efforts¹⁹.

BIS (2021) provided a flavour of the potential gains from new ways of making crossborder payments. Table 3 summarises the results of such comparisons.

A transaction that currently takes three to five days could be completed in less than 10 seconds. Cost savings could also be significant, but their magnitude would vary between banks and regions. For example, average costs for overseas transactions amount to 2 percent in Europe, while in Latin America such costs amount to as much as 7 percent.

New payment solutions being explored could reduce this cost to as low as 1 percent. Savings would come from removing the network of correspondent banks in the chain of transactions and putting in place instead direct corridors that allow central banks to communicate.

Such efficiency gains were achieved in a pilot project called mBridges (BIS, 2022), in which the following central banks participated: the Hong Kong Monetary Authority, the Bank of Thailand, the Central Bank of the United Arab Emirates, the People's Bank of China, and the BIS Innovation Hub Hong Kong Centre. Using DLT, the project established a multi-CBDC platform via which market participants could make crossborder peer-to-peer payments directly using central bank money.

Along with efficiency and cost gains, the project demonstrated an ability to reduce settlement risk and allow for the use of local currencies for international payments, a move away from having to rely on international tradable currencies like the dollar and the euro. The pilot showed though that several complex choices would have to be made.

Table 3. Efficiency gains from DLT compared to the current payment system

	Current payment systems	New technologies for payments
Transaction time	3-5 days	2-10 seconds
Costs	<2% - >7%	As low as 1%
Accessibility	Via corresponding banks	Peer-to-peer

Source: Bruegel based on BIS (2021).

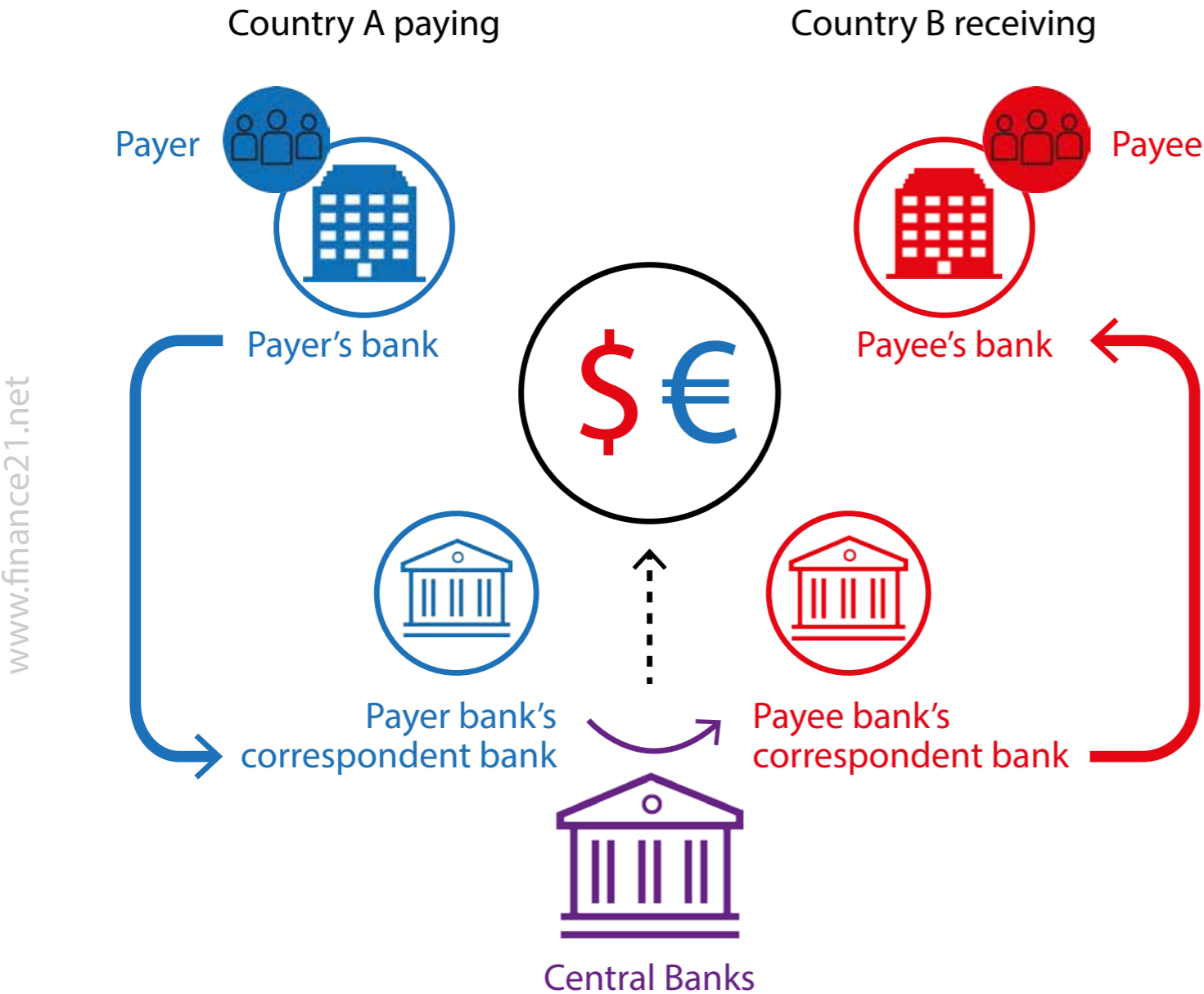
4.2 From a dollar-centric system to bilateral settlements

The international financial system has long relied on the dollar, which has meant having to rely on the dollar settlement system. Figure 5 describes the current system of economic exchange between any two countries.

A company in country A, the payer, instructs its bank to make a payment; the bank then contacts its correspondent bank. The latter will engage with the correspondent bank in country B, which finalises the cycle by contacting the payee's bank and crediting the due amount to the receiver's account.

Depending on the currency in which the exchange is made, the respective central bank will be involved. It is important to note that the dollar is by far the main currency of choice globally in trade invoicing (more than half of global trade) and foreign exchange transactions (almost 90 percent of the total volume) (Moronoti, 2022). This also means that US settlement authorities are involved in finalising most global transactions.

Figure 5. The dollar (euro) based international financial system



Source: Bruegel based on BIS (2022).

Wholesale CBDCs would change this system. Central banks would have dedicated corridors (like the mBridges described above) for settlement directly between themselves. There would be no need for correspondent banks. The payer's bank would have an account directly at the country's central bank, which in turn would communicate directly with the central bank in the payee's country.

This would mean more diversification of currency pairs, with increased liquidity for currency pairs that do not include the dollar. Also, more direct relationships between parties would lead to the de-risking of transactions.

The payer's bank can pay the payee's bank in one of three ways (Figure 6). First, it can hold domestic currency in an account in the domestic central bank, in which case the two central banks will transact using a pre-agreed currency.

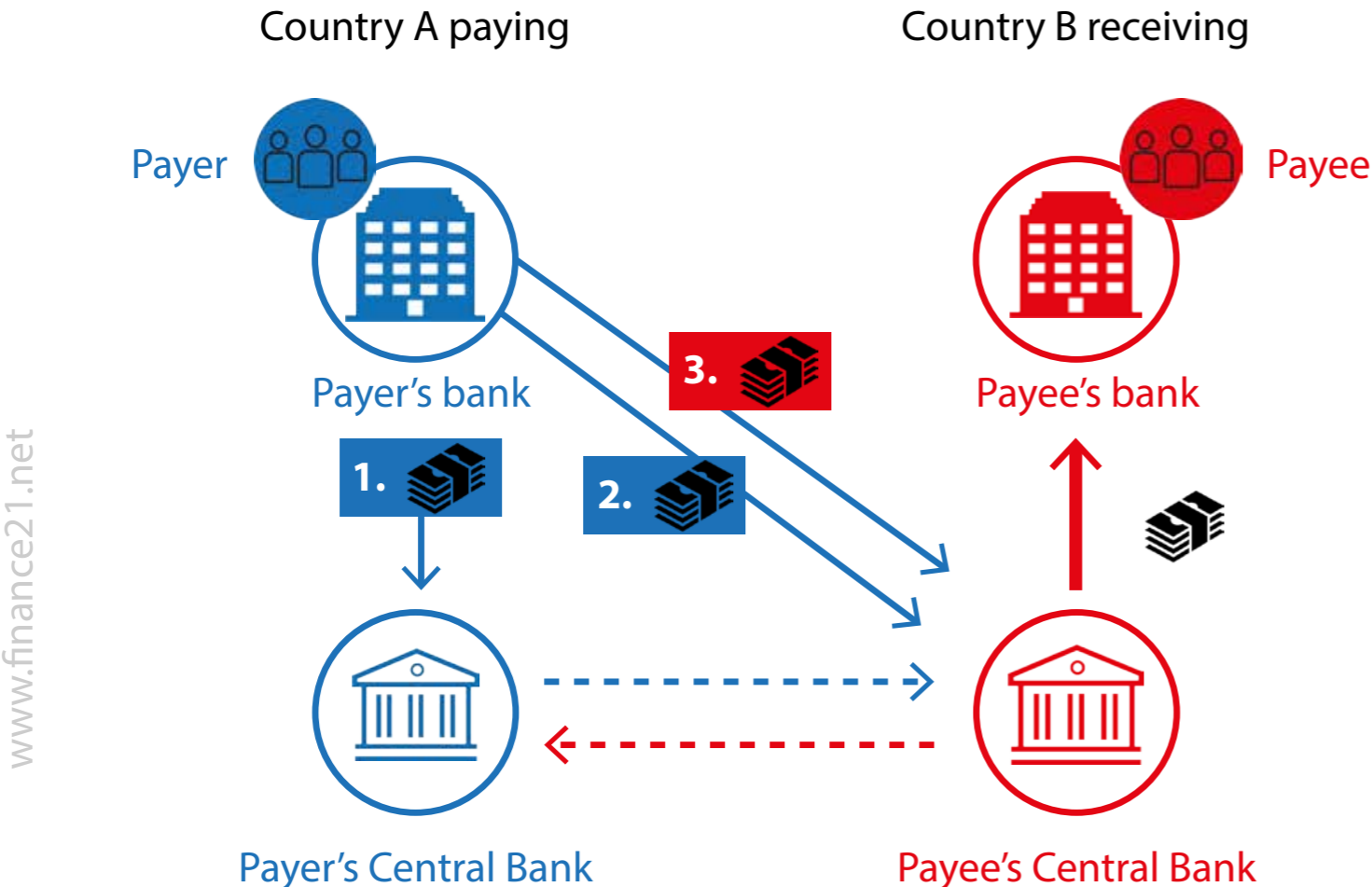
Second, the payer's bank could have a domestic currency account at the foreign central bank and would pay with its domestic currency.

Third, the payer's bank would have a foreign currency account at the foreign central bank and would pay with this.

The first method is closest to what happens today; the dedicated corridors between central banks will allow the settlement of any transaction. The mBridge pilot showed that the third method is the most efficient because it involves the fewest steps between the two transacting parties.

An important issue that DLT solves is interoperability. The current system does not allow for interoperability because communication needs to happen through secure messages. If countries use different systems, they run the risk of not being able to communicate between themselves.

Figure 6. Commercial banks' CBDC accounts at a central bank



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Source: Bruegel.

Blockchain²⁰ technology has provided solutions that allow communication between parties via corridors. But before such dedicated corridors are created, a number of choices need to be made on technical, legal (and governance) and economic issues.

For the system to function, established rules to provide legal certainty are needed. Would current rules for holding foreign securities be sufficient for wholesale CBDCs, or would a new legal framework be needed?

Global coordination on this issue would be preferable and indeed necessary for wholesale CBDCs to challenge the current ways of settling international transactions. Arguably, the governance of wholesale CBDCs will be the most important obstacle to their uptake.

But bilateral recognition of legal systems would also be sufficient for any two central banks to settle transactions between them. Wholesale CBDCs then have the potential to change the current dollar-based system into one that is more diverse. It is not immediately obvious why two countries that trade in dollars would prefer to trade in their own currencies.

However, if one of them was sanctioned by the US, for example, then the dollar would no longer be available to them. A settlement system that is operational between any two central banks would guarantee the continuity of economic activity. While an alternative settlement system by itself does not automatically reduce the appeal of the dollar as the currency of choice, it does reduce the threshold for using other currencies.

Many countries that are thinking about strengthening their resilience will no doubt examine the geopolitical importance of ensuring functioning settlement system. It is no coincidence that so many central banks, including China's, are eager to develop a digital equivalent of their currency.

It is not difficult to imagine CBDCs being weaponised for geopolitical reasons, as central bank reserves have been since Russia's invasion of Ukraine²¹.

However, many issues remain. On the governance side, choices will have to be made on issues including data privacy, preserving anonymity, monetary sovereignty and conflict settlement. The mBridges pilot showed that the most efficient payment method would be for foreign companies to have accounts at the domestic central bank if they trade domestically.

What would that mean for monetary sovereignty? How would potential conflicts be resolved? Equally, economic issues would also have to be decided. How would countries deal with counterparty risk? Would the domestic central bank agree to carry that risk on behalf of foreign institutions?

5 A digital euro: design options and its future

5.1 The ECB's thinking so far

The Eurosystem is considering the introduction of the digital euro for retail use. The digital euro project is at time of writing in the investigation phase, which will come to an end in October 2023 at which point the ECB will decide on the next steps²². Three progress reports have been issued so far (Box 1).

The first progress report, published in September 2022, focused on the functionalities and limits for users. It concluded that the consumer should be able to pay with digital euros online and offline, and that the digital euro should mimic cash-like features as much as possible.

While privacy is to be ensured, the digital will not be fully anonymous because of worries about money laundering. Also, it should be used exclusively for payments and not as a form of investment.

This choice also reflects financial stability considerations, and particularly the prevention of excessive migration of bank deposits to the central bank, which could disrupt the current financial system. To this end, individual holdings should be limited to between €3,000 and €4,000 (Panetta, 2022b).

The second progress report, issued in December 2022, focused on defining the settlement and distribution roles and ensuring an easy conversion between digital euros and cash/private money. The Eurosystem intends to retain full control over the issuance/redemption and settlement of digital euros, but has not decided on the technology to use – traditional, DLT or a combination of both.

The distribution and direct interaction with end users would be the responsibility of banks and other payment service providers. They would develop the interfaces and services – such as wallets – and perform regular anti-money laundering checks.

The third progress report (April 2023) clarified that payments would be done using technology already familiar to most European citizens, for example, contactless or QR codes, through either the existing apps of intermediaries or a Eurosystem app, depending on the user's preference. The April 2023 report also discussed the possibility of access for non-euro area residents.

The primary focus of the initial releases of the digital euro however will be for euro area residents only (individuals, merchants and governments), even though access to non-residents could be possible if they have an account in the euro area. Access for residents of the European Economic Area and selected third countries could be envisaged in later releases of the digital euro.

A last important point made in this report is that the digital euro will not be programmable money. This means that the ECB would not determine or interfere with where, when and for which purpose the digital euro is used.

Early in the second half of 2023, the Eurosystem will present the overall thinking on how to design a digital euro. Box 1 summarises its thinking so far.

The ECB will also investigate cross-currency functionalities as a way of improving the transparency and efficiency of crossborder payments (as endorsed by the G20). This functionality could be implemented by ensuring interoperability between the digital euro and other CBDCs or by relying on a common infrastructure that could host multiple CBDCs.

5.2 Other advanced economies' approaches to CBDCs

Several countries are more advanced than the euro area in this process and have decided not to issue a retail CBDC in the foreseeable future. This is mainly because they do not see CBDCs as offering added value in terms of payment options or to their citizens.

This is the situation in Canada²³, Denmark (Danmarks Nationalbank, 2022), Japan²⁴, Sweden (Swedish Government, 2023) and Switzerland²⁵. In the United Kingdom, the Chair of the House of Lords Economic Affairs Committee argued that a CBDC was *"a solution in search of a problem."*

Similarly to the euro area, the US is still investigating whether to issue a retail CBDC, but is finding it difficult to justify it. In April 2023, Fed Governor Michelle W Bowman said *"it is difficult to imagine a world where the trade-offs between benefits and unintended consequences could justify a direct access CBDC for uses beyond interbank and wholesale transactions"* (Bowman, 2023).

Box 1. The ECB's thinking on the retail digital euro

- Target users: Primarily euro area residents (individuals, merchants and governments). Possible extension of access to non-residents.
- Intended as: means of payment and not form of investment (avoid excessive migration of bank deposits to the central bank). It will not be remunerated.
- Availability: both online and offline solutions envisaged.
- Limits: €1 trillion to 1.5 trillion total, meaning around €3,000 to €4,000 digital euro per capita. Limits apply to individuals, who can have only one account. Merchants would not have digital-euro holdings but would accept payments in digital euros.
- Privacy: the digital euro should replicate as much as possible cash-like features, but no full anonymity. Possibly, greater privacy for low-value low-risk payments.
- Issue and settlement: responsibility of the Eurosystem; digital euro is direct liability of the central bank (convertible one to one with the euro).
- Onboarding, distribution and services: responsibility of banks and other payment service providers (supervised financial intermediaries). These would perform the regular onboarding procedures (eg. anti-money laundering checks) and can develop consumer-oriented services beyond the core mandatory functionalities.
- Access and use: via existing apps provided by the PSPs or via an Eurosystem app. Payments done using technology such as contactless or QR code.

This does not mean, however, that their respective central banks are not investigating and preparing for a possible future launch, should the conditions and assessment change. Importantly, the idea of a wholesale CBDC is being pursued by some.

For instance, Switzerland is participating in various projects focused on better understanding the wholesale potential: 'Project Helvetia', a collaboration between the Swiss National Bank, the BIS and SIX, a commercial infrastructure operator, and 'Project Jura', which the Banque de France has also joined. Other countries, including the UK and the US, have expressed their potential interest in a wholesale CBDC.

It is important to note that the decision to issue a CBDC is ultimately political, mostly taken by the respective governments, rather than the central bank. Governments' positions can change over time, as developments of CBDCs in other countries advance and they gain a better understanding of the operational, legal, financial and economic implications of CBDCs (whether retail or wholesale).

5.3 The future of the digital euro

A digital euro for wholesale purposes has substantial potential for reducing frictions in crossborder (ie. beyond the euro area borders) payments. As explained earlier, these improvements could bring a fundamental change in the international financial settlement system.

Governance will be crucial. Legal issues, economic choices and technical uniformity would all need to be agreed at global level for CBDCs to challenge the status quo in global wholesale payments. But the Eurosystem cannot afford to be left out of this debate.

Moreover, as the ECB has invested in understanding the workings of CBDCs, it is well placed to contribute to setting the global standard and helping promote global coordination. As a standard-setter, the EU could exert influence as societies adapt to an increasingly digitalised financial ecosystem. As an active participant and contributor to the debate, the EU should aim to protect its global interests.

When it comes to using a digital euro for retail purposes inside the euro area, we do not see a compelling case for issuance at this stage. There are many issues to clarify, and a digital euro might bring significant changes to the financial system that need to be considered carefully.

Privacy vs anonymity

In response to the public's concerns about privacy, the ECB has been very clear about protecting consumer data when using the digital euro. However, privacy is not the same as anonymity and the ECB is also clear that transacting in digital euros will not be anonymous. This makes the digital euro only an imperfect substitute for cash.

As 42 percent (Figure 3) of the value of all transactions in the euro area in 2022 was in cash, there is still a great deal of anonymity in the way that payments are made currently. As one of the motivations for launching CBDCs was the need to provide a digital equivalent of cash, this is a clear shortcoming.

Cash as the anchor of the financial system

Would the elimination of cash in the future destabilise the system? It is often argued that cash is the anchor of trust in the financial system. In a world of fiat money, deposits are only partly guaranteed. For the consumer, the only other money guaranteed in full by the sovereign is cash. Being able to revert to cash at any time is what provides trust in the system.

Can a CBDC that is also guaranteed in full provide the equivalent anchor to the system? The answer to this is important and citizens will need to be assured that digital money is at the very least not programmable (ie. money with built-in rules that impose restrictions on how it is used).

Also, it is difficult to see how digital cash can provide the anchor to the system if consumers are allowed to have only limited holdings of CBDCs (see below).

Limited holdings

If the amount of digital euros allowed per person is small, as is currently the intention (between €3,000 and €4,000 per person), then the digital euro risks never taking off. Why would the euro area consumer opt to have one more account, this time at the central bank, if it is only of limited use? The amount allowed would need to be at least equal to the amount in deposits that is currently guaranteed (€100,000) for the consumer to have a motive to switch.

Moreover, the consumer has ample payment alternatives in the euro area. If the worry is that payment alternatives are country-specific, then imposed coordination (like the IBAN system for bank deposits) would provide an adequate solution. Regulation therefore can achieve the same result with much less effort.

If on the other hand, the ECB were to allow unlimited amounts of digital euros to be held in the form of deposits, that could potentially be a game changer. Having all deposits guaranteed by the state is an attractive proposition for the consumer.

But for her to switch, she would still need to see interest paid on these deposit accounts, or she would be left worse off. But interest-bearing deposits at the central bank would transform the roles of both the central banks and financial intermediaries.

Commercial banks, which are currently mainly funded by deposits, would have to find alternative operating models. What would be the cost to the system of providing such a guarantee? Or would the amount of money in circulation necessarily have to decrease?

The ECB and other central banks have not justified their interest in CBDCs as a way of altering the financial system. Rather, their thinking focuses on imposing as small a distortion as possible. With that in mind, digital euro holdings would remain very small.

European strategic autonomy

Last, the ECB also uses the argument of strategic autonomy to justify its interest in the project. What is the risk in current European payment systems that requires intervention? An ECB report on open strategic autonomy from a central banking perspective (ECB, 2023) mentioned that *“non-European payment-related service providers handle around 70% of European card payment transactions.”*

A retail CBDC could address this concern though, as explained above, it might also distort competition and innovation in domestic payment systems. The strategic autonomy argument adds a layer of protectionism that would need to be very carefully justified economically and politically, or risk going against the EU’s own principles.

De-risking is a much better argument: asking the question of how a digital equivalent of the sovereign currency can prepare society for what cannot be controlled (eg. a system that is potentially fully digitalised and where the global appeal of CBDCs is high).

Communication gap

There is still a gap in the public’s understanding of the extent to which a digital euro is a useful innovation. The ECB

needs to take time to explain the reasons for the digital euro in ways that will make a tangible difference to public perceptions.

Without public support, the project will not take off. Evidence from countries that have launched CBDCs highlights the importance of clear understanding among citizens. In the meantime, the efforts the ECB has made to understand the complexities of a digital euro are very useful.

6 Conclusions

With 114 central banks worldwide at some stage of developing a digital equivalent of their sovereign currency, it is difficult to believe that the idea will not take off or that there is no added value in having a CBDC. However, there is a gap between central banks' motivations for launching CBDCs and the general understanding of what that motivation is.

Central banks in countries where financial exclusion is a first-order problem are keen to use CBDCs to provide wide access to payments. But this is not useful if there is insufficient digital infrastructure and penetration in the country.

Moreover, if the underlying sovereign currencies are weak and the institutions behind them lack credibility, the digital representation of the currency is not necessarily the tool for building trust.

Nevertheless, inclusion and protecting consumers from the pitfalls of cryptocurrencies are good societal objectives that can provide visible welfare improvements.

But for countries or jurisdictions (like the euro area) where these problems are much less prevalent, the case for establishing a retail CBDC is not strong. That does not necessarily devalue the efforts to understand the choices and trade-offs that must be considered in the process of creating a CBDC.

Moreover, as an attempt to prepare for a future in which the global financial system is more digitalised or there is a need to rethink intermediation, the ECB's efforts are worthy investments.

However, more efforts should be made in terms of creating wholesale CBDCs to facilitate cross-border payments outside the euro area. There are immediate and sizeable savings to be had in both time and costs. Wholesale CBDCs also have the potential to change the international financial system and therefore the EU's position in it.

From the perspective of the US (and to a lesser extent the EU), as more countries seek to create wholesale CBDCs, the greater the threat of a fragmented global financial system, with other currencies taking a more prominent role.

It may be early days, but the EU must explore how to reap the benefits of new technology in wholesale payments, while protecting the global cooperation from which it benefits. Given the work it has already done on the retail digital euro and the EU's very advanced payment methods, the ECB is uniquely positioned to help create the global standard, and in the process to help protect the EU's global strategic interests. ■

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Endnotes

1. See the Atlantic Council central bank digital currency tracker: <https://www.atlanticcouncil.org/cbdctracker/>
2. See European Central Bank press release of 28 April 2023, 'Eurosystem to explore new technologies for wholesale central bank money settlement', <https://www.ecb.europa.eu/press/pr/date/2023/html/ecb.pr230428~6a59f44e41.en.html>
3. See Danmarks Nationalbank (2022) for more detail.
4. This is the basic argument, though most central banks agree that CBDC accounts will be managed by private institutions.
5. See <https://triple-a.io/crypto-ownership-nigeria-2022/>
6. See <https://sweden.se/life/society/a-cashless-society>
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20. Blockchain is a form of DLT in which all transactions are recorded and organised in linked digital blocks. For more details on DLT and blockchain see Demertzis and Martins (2023).
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The positive legacy of cryptocurrencies

Crypto-promoters and financial authorities are split on the future of cryptocurrencies. Jon Danielsson argues that the efficiency of the financial system can be improved by adopting the best ideas from crypto

Cryptocurrencies are as divisive as ever. Crypto supporters disagree on whether crypto should remain true to its anti-establishment roots or integrate into the mainstream financial system, while the financial authorities are unsure if crypto should be extinguished, ignored, or harnessed for good.

Regardless of how that plays out, cryptocurrencies are set to leave a fine legacy, having had a considerable and positive impact on the financial system. Before crypto, the infrastructure of the financial system, the plumbing that is so essential and usually ignored, remained a niche area of study.

While that suited the incumbents and the financial authorities, it also meant a highly inefficient payment system and significant rent extraction.

Cryptocurrencies threaten that cosy little world, and the existing setup has come under considerable challenge, witnessed by the financial system's plumbing becoming worthy of study, as manifested by many articles published here on Vox, like Schoenholtz and Cecchetti (2021) and Belmonte *et al* (2022).

The competition from crypto has forced the public and private sector incumbents to address the system's inefficiencies and rent extraction, with Brazil's PIX an excellent example of what the financial authorities can accomplish when sufficiently motivated.

The threat of payments made with tokens, overseen by smart contracts and not under the control of any national government, has compelled many authorities to enhance the payment system and remains the primary motivator of central bank digital currencies.

Along the way, both the public and private sectors face major challenges. The private sector crypto proponents need to decide on whether to embrace the mainstream banking system or stay as far away from it as possible, while the authorities have to decide whether to embrace, ignore, or extinguish crypto.

The threat of payments made with tokens, overseen by smart contracts and not under the control of any national government, has compelled many authorities to enhance the payment system and remains the primary motivator of central bank digital currencies

The phases and politics of crypto

At their essence, cryptocurrencies are a political movement. Satoshi Nakamoto's original Bitcoin paper (Nakamoto 2009) argues that technology can solve the problems of the existing financial system, and the adoption of Bitcoin and other cryptocurrencies has been driven by techno-libertarians who see crypto as the solution to a corrupt and inefficient financial system.

While they remain a small fraction of crypto promoters, they have been critical to its success. Without the crypto-libertarians, cryptocurrencies would never have taken off.

Crypto has undergone two phases in its 14-year history and is entering the third (Danielsson 2022). From the first phase, 2009, when Bitcoin was created, to the end of 2018, crypto stayed outside the mainstream financial system, benefiting from the significant price increases, as the price of Bitcoin rose from four US cents to over \$20,000.

I choose 2018 as signalling a phase change since that is when the extremely rapid crypto price rises effectively stopped. The primary transactional use of crypto in the first phase was criminality because of its purported, but never true, promise of private transactions not monitored by law enforcement.

The only government authority that paid close attention to crypto in its first phase was law enforcement, concerning as even if crypto never posed more danger to macro and micro stability than in 2018, the financial authorities almost entirely ignored it, at least publicly.

Since 2018, crypto has entered the mainstream in its second, more stable phase. Its prices are basically the same today as they were then, and there has been an explosion of technological developments, not the least with stablecoins.

The financial authorities have started to pay notice, requiring most crypto exchanges to adhere to the law-enforcement-like aspects of financial regulations, anti-money laundering, sanctions, and know-your-customer rules.

Crypto is now entering its third and final phase, facing more serious threats than ever. The crypto community is, perhaps irrevocably, split. Crypto businesses are trying hard to fully integrate into the mainstream financial system, seeking to be regulated like any other financial institution.

That is, of course, a red flag to the crypto libertarians, and it will be interesting to observe how the increasingly fractured crypto world evolves. Perhaps crypto will fork into mainstream and non-official versions.

The options for the financial authorities

The financial authorities are divided on what to do about cryptocurrency, with three directions mooted.

One, what might be termed control and extinguish, aims to manage crypto and limit its adoption as much as possible, sometimes discussed as pouring sand in the works, hoping that mainstream investors will abandon crypto.

We see that both with the SEC's outspoken anti-crypto stance in the US and the non-public but more successful European regulations. Europe seems motivated by a strong official aversion to innovation and new entrants into the financial system, while the US appears to have microprudential concerns.

The control and extinguish approach is misguided both politically and technically. Anti-crypto actions give ammunition to the crypto libertarians who drive crypto adoption and see the central banks and the private sector as corrupt and inefficient. Many agree with that sentiment, even if they don't have a view on crypto.

Stifling progress and unfair treatment of crypto will increase support for crypto libertarians, and risk is becoming a totem for populists on the left and the right. A heavy-handed approach to crypto could lead to another Ruby Ridge moment by giving crypto enthusiasts a shared cause and fuelling crypto rather than eliminating it.

The prudent strategy for those wishing to eradicate cryptocurrencies is to ask why crypto continues to gain traction and what policies will reduce crypto's attraction, depriving it of the oxygen that permits it to flourish. That will not be accomplished by putting sand in the works, what the crypto industry refers to as Operation Chokepoint 2.

The constructive policy approach recognises that crypto can be a force for good, even when preferring a fiat monetary system. Crypto drives welcome financial innovation, attracting the attention of high-quality researchers and bringing much-needed discipline to the incumbents, thereby enhancing the efficiency of the financial system while reducing rent extraction.

We are starting to see that work in the competition between stablecoins and central bank digital currencies. Both aim at the same market and have similar technical underpinnings, strengths and weaknesses. The private approach brings nimbleness, while the central banks provide trust. The competition between the two can only lead to a more efficient system of financial intermediation that will benefit everybody except the incumbents and those who dislike change.

Conclusion

Cryptocurrencies are at a crossroads as they enter their third phase. Will crypto enter the mainstream, or will it break into two fundamentally different routes – one mainstream and one in the wilderness? Will crypto libertarians ditch crypto? The government may try to put it out of business or make use of the opportunities it affords.

It would be a mistake for the authorities to suppress crypto, as that will likely be counterproductive and fuel the anti-establishment sentiments so fundamental to crypto success. Even though I remain a crypto sceptic (Danielsson 2018) and would like to see it disappear into irrelevance, the best outcome is to learn from it.

Crypto's greatest legacy is that it opened our eyes to the inefficiencies and rent extraction of the present arrangement, giving new ways of thinking about financial intermediation.

The optimal official strategy is then for crypto to exist outside the mainstream while continuing to challenge it, strongly motivating the incumbents and the financial authorities to improve the payments infrastructure. ■

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Strengthening resilience in a changing geopolitical landscape

A series of shocks have dramatically changed the global landscape. Christine Lagarde argues that the CESEE economies have the resilience to flourish

The CESEE region – which comprises 21 different economies¹ – can overall be considered a European success story in recent decades, having enjoyed rapid convergence towards higher-income countries. Between 2000 and 2021, the economic size of the region almost doubled to 40% of the euro area aggregate².

And this strong growth has led to rising living standards, with average GDP per capita jumping from 36% to 54% of the euro area aggregate in the same period³.

But the world has changed dramatically since we last held this conference in 2019. A series of shocks have upended our old reality and replaced it with new uncertainties.

Devastatingly, one of those shocks has been the outbreak of war in Europe – an event that we once thought consigned to the history books. Russia's unjustified war against Ukraine and its people is a human tragedy. And it has had deep economic consequences for the CESEE region in particular.

In parallel, the world is changing in ways which make the growth models of many CESEE countries more vulnerable, as these models generally involve high levels of trade openness and integration into global value chains.

But as Graham Greene once wrote, a *“feat of daring can alter the whole conception of what is possible.”* And the challenge now facing the CESEE region is how to continue its convergence story and ensure that growth remains resilient in this new landscape.

Fortunately, CESEE economies can already look back on a strong history of resilience – be it mastering the transition from central planning to market economies in the 1990s or recovering from the global financial crisis with impressive speed. I therefore have every confidence that they will be able to adapt to these new uncertainties.

A changing geopolitical landscape

There are two broad shifts reshaping the global economy that may have profound implications for the CESEE region: rising geopolitical tensions and weakening global trade.

After a long period in which the United States was the sole superpower, the world is becoming more multipolar, with greater competition between major powers, less respect for international rules and norms and a waning influence for multilateral institutions.

The prospects for the CESEE region are encouraging. There are clear structural strengths that stand to benefit CESEE economies in the medium to long run, such as well-educated workforces and strong ties with Europe

In this environment, even deep commercial ties may be insufficient to prevent trading relationships from becoming adversarial. This makes the global environment increasingly prone to shocks and the task of macroeconomic stabilisation for all countries much harder.

Unfortunately, the CESEE economies know this all too well. Russia's war against Ukraine triggered a massive shock to the global economy – especially to energy and food markets – and CESEE economies have been particularly exposed, given their geographic proximity to the conflict.

While inflation has now started to come down, over two-thirds of economies in the CESEE region saw annual inflation hit 13% or above last year, with several countries seeing markedly higher price increases. By comparison, annual inflation in the euro area was 8.4%.

Geopolitical tensions risk accelerating the second shift in the global landscape: weakening global trade. Since the global financial crisis, trade growth as a share of world GDP has plateaued⁴. And we are also seeing rising levels of protectionism as countries reconfigure their supply chains to align with new strategic goals. Over the last decade, the number of trade restrictions in place has increased tenfold⁵.

The CESEE region, and Europe more generally, may be vulnerable to such a shift. Last year, trade as a share of GDP was higher than the euro area average for two-thirds of CESEE economies. And while other major economies, such as the United States, have seen trade as a share of GDP fall since the pandemic, in the euro area it reached a record high in 2022⁶.

A new foundation for strengthening resilience

A changing geopolitical landscape means that, in the euro area and the CESEE region, we need to build a new

foundation for strengthening resilience. This foundation rests on further deepening the European Union and its ties to the surrounding region. I see three key elements.

The first is reinforcing openness within our region. Trade fragmentation could see the flow of goods and services increasingly being pulled towards different trade blocs, at the expense of countries outside those blocs. By leveraging our regional strength, Europe and the CESEE region can recreate some of the benefits of globalisation on a smaller scale.

The euro area is already the main trading partner for most CESEE economies. And we can capitalise on this existing momentum. Between the year 2000 and last year, the share of euro area imports from the CESEE region increased from 5% to 10%⁷. And the share of euro area exports to CESEE economies reached 11% last year, almost double that at the start of the millennium⁸.

Moreover, CESEE economies in particular can benefit from changing global trade patterns as companies seek suppliers closer to home. Survey evidence shows that firms in the CESEE region, and especially those based in the EU, are seen as highly reliable trading partners⁹.

The ECB also has a key role to play here as the guardian of the euro. Our monetary policy plays an important anchoring role for the CESEE region, as the euro is widely used in trade invoicing and financing. Euro cash also serves as an important store of value – demand for it surged in CESEE economies following Russia's invasion of Ukraine¹⁰.

The second key element is increasing our collective security. Europe and the CESEE economies have already taken substantial steps to increase their energy security, given the dangerous historical reliance on Russian fossil fuels in their energy mix.

In February 2022, the EU was importing around 36% of its natural gas from Russia. Within the space of nine months, that fell sharply to 13% as the EU reduced its gas consumption and diversified towards imports of liquified natural gas¹¹.

Most, though not all, CESEE economies have also made significant progress in substituting energy imports away from Russia and in building up gas storage levels.

But we cannot stop there. We need to accelerate our efforts to decarbonise and increase our energy independence. That is why initiatives that help to build renewable energy sources are so important – such as Next Generation EU and the EU's recent energy support package for countries in the Western Balkans¹².

The third key element is defending and spreading our common values. The attack on Ukraine was also an assault on European values – such as the respect for international law and human rights.

That is why Europe has imposed unprecedented sanctions on Russia and provided substantial support to Ukraine following the invasion. To date, the EU has made available €38.3 billion in economic assistance and over €21 billion in military support¹³.

The strength of the EU's response demonstrates not only its capacity for action, but also its appeal as a political project that others see the benefit of joining – what the West German Chancellor Konrad Adenauer once described as the 'Magnet Europa' effect¹⁴.

The push for EU enlargement has recently gathered momentum as a consequence of Russia's war. Last year, the EU granted Ukraine, Moldova and Bosnia and Herzegovina candidate status¹⁵. And it launched the process to open

accession negotiations with Albania and North Macedonia, while also becoming open to granting Georgia the status of candidate country, conditional on reforms¹⁶.

Conclusion

A series of shocks have dramatically changed the global landscape in recent years. And today, rising geopolitical tensions and weakening global trade mean that economies in the CESEE region need to build a new foundation of resilience.

But the record of past crises has already demonstrated just how resilient CESEE countries can be. Despite an exceptionally difficult 2022, the prospects for the CESEE region are encouraging. There are clear structural strengths that stand to benefit CESEE economies in the medium to long run, such as well-educated workforces and strong ties with Europe.

So the task at hand is how to channel that spirit of resilience to counteract these new uncertainties. And by leveraging our regional strength and further deepening our economic and political ties, I have no doubt that Europe and the economies in the CESEE region can flourish together. ■

Christine Lagarde is President of the European Central Bank

Endnotes

1. The CESEE region is defined here as Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kosovo (this designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence), Latvia, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia, Türkiye and Ukraine.
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