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Yi Gang

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Development of Digital Economy Platforms in China - Risks and Challenges

International Monetary Institute

RMB Internationalization Report 2021 Press Release

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Special Column Big Tech: Opportunities and Risks

Fintech and the Global Payments Landscape - Exploring

New Horizons^{*}

By YI GANG^{*}

Dear President Jens Weidmann, Ladies and gentlemen,

Welcome to the Conference on Fintech and the Global Payments Landscape co-hosted by the PBoC and the Deutsche Bundesbank. As President Weidmann said, this conference is the fruition of the second China-Germany High Level Financial Dialogue in 2019. It was postponed till today due to COVID-19. Though we cannot travel to the beautiful River Main this time, a virtual format like this enable us to reach out to a larger audience. In addition to the speakers, today we have also invited participants from over 50 institutions, including departments of the PBoC, banks, fintech companies and payment firms. I am happy to take this opportunity to share with you fintech practices in China and give you some of my observations. I really enjoyed Jens Weidmann's speech on CBDC just now. My colleague Mr. Mu Changchun will respond on CBDC in China later on.

1. Fintech can promote financial inclusion

Fintech has developed rapidly in China in recent years. Technologies such as AI, big data, cloud storage and blockchain have been driving the digital transformation of financial institutions. Products and tool applications are increasingly diversified, while financial services have seen a big jump in efficiency and inclusion.

Greater use of electronic payment, mobile payment in particular, has made basic financial services more accessible. In some underdeveloped regions, we have underserved customers who are not covered by traditional financial institutions. Fintech companies can serve them because the marginal cost is low. The compound growth rate of non-bank mobile payment business in China, led by Alipay and WeChat Pay, was 75% between 2015 and 2019, with a mobile payment penetration rate of 86%. At present, deposits, withdrawals and transfers can be done in real-time. Online consumption is booming and life has become more convenient for urban and rural residents.

Fintech has improved lending services to small and micro businesses as well as the self-employed. Empowered by digital technologies, financial institutions can digitalize the whole procedures of credit approval and risk control, which enables them to provide services more quickly, better target risks, and serve more people. Meanwhile, reliance on collateral is reduced, which well meets the financing needs of small and micro businesses. Because they usually borrow a small amount and also they need the money urgently. As of end-July this year, the number of small and micro businesses as well as the self-employed with loans from Chinese banks has

^{*}Opening remarks given at the virtual conference on "Fintech and the global payments landscape - exploring new horizons", co-hosted by the People's Bank of China and the Deutsche Bundesbank, 18 September 2021.

^{*}Yi Gang, Governor of the People's Bank of China

reached 38 million, and those loans help create a lot of employment and their year-on-year growth rate is around 30%.

Fintech also helps with the rural rejuvenation. We can dynamically monitor the production and operation of farming, forestry, livestock and fishing through technologies such as satellite remote sensing, electronic fencing, and blockchain. These technologies can promote deeper integration of fund flows, logistics and product flows, making financing more accessible to agriculture and its upstream and downstream firms, and help modernize the agriculture sector. Given the lack of digital footprints among farmers, digital technologies really help in the rural area and the agricultural sector, and digital technologies can be leveraged to improve rural credit information system. We can use them to help broader rural population.

Fintech has contributed significantly to poverty reduction. The PBoC guided financial institutions in adopting digital technology such as AI and cloud computing to analyze daily corporate operations, financial risk and credit profile. This aims to explore targeted relief methods, channel financial resources to key areas and weak links in social and economic development, and boost financial services for key groups, such as small and micro businesses as well as private enterprises. As of end-July this year, micro loans for poverty relief totaled more than 710 billion yuan and NPL is overall controllable. Basically, I think we can keep the NPL ratio at a pretty low level with small amount of government subsidies. That kind of loan to the poverty-stricken people is sustainable.

Fintech has supported China's response to COVID-19. An urgent need arose for contactless financial services after the outbreak of COVID-19. Fintech has enabled the shift from physical meeting to virtual communication, which has softened the negative impact of COVID-19 on small and micro businesses and the vulnerable groups, as financial consumers are still able to enjoy uninterrupted financial services.

Going forward, we will continue to improve and share our practices in digital financial inclusion. China and Germany are both key members of the G20 Global Partnership for Financial Inclusion (GPMI). We are willing to enhance communication on financial inclusion with German counterparts.

2. Fintech's implications for the traditional banking sector

The global boom of fintech has fundamentally changed banking sector competition while significantly improving the services and operation efficiency. The traditional advantages of commercial banks in service scenes and channels, customer information as well as funding sources are challenged. More and more financial transactions are intertwined with customers' consumption, work, and life. With massive data on customers' behavior, platform companies can extrapolate the financial need and financial situation of their customers. The rapid development of innovative online financial products has also accelerated diversion of bank deposits.

In response to rapid changes, many big banks are investing heavily in fintech and its application. Mobile Internet, biometric identification, big data, artificial intelligence and many other technologies can help banks expand service channels, reduce human labor, strengthen whole-process risk control, and lower compliance cost.

Small and medium-sized banks are facing daunting challenges. Due to limited resources, these banks have no choice but to rely on the platforms and technologies of bigtech companies for customer maintenance, credit analysis and risk control. This may weaken their product competitiveness and the ability to gain customers on both asset and liability sides. Therefore, we must pay attention to the implications of rising dependence on bigtechs for small- and medium-sized banks as well as the operating and network risks arising from excessive concentration of fintech service. In China, we have more than 4,000 small- and medium-sized banks, and I think

their future position, financial service provision and deposit taking face huge challenges from the fintech revolution.

3. We must keep strengthening fintech regulation to prevent risks

China is a forerunner in fintech. In fintech's early days, our financial authorities put in place a prudent yet inclusive regulatory environment for fintech development. However, some issues became prominent amid the rapid rise of fintech, including higher possibility of cross-product and cross-sector risk contagion, as payment institutions started to provide insurance, micro credit, fund management and other financial products, and possible market monopolies as well as lower efficiency in innovation due to the winner-takes-all effect of large fintech companies.

Against this backdrop, China's regulators are striving to strike a balance between encouraging fintech development and preventing financial risks. First, we insist that all financial activities must be regulated and licensed. Meanwhile, we require payment institutions to refocus on original payment business and separate payment instruments from other financial products. Second, we doubled anti-monopoly effort by publishing the Anti-Monopoly Guidelines for Platform Economy and mandating the platform companies to ensure consumers' right to choose payment options. Third, we ask platform companies to improve corporate governance and to implement prudential regulatory requirements in conducting Internet lending and deposit, insurance, and fund businesses.

Going forward, we will continue to strike the delicate balance between development and regulation so as to support healthy innovation and steady development of the platform economy. On the one hand, we will unleash the dynamism of market entities and their capacity for technological innovation, prompt platform companies to upgrade financial services, and thus strengthen their international competitiveness. On the other hand, we will pursue strict and fair regulation, protect data ownership right and privacy, and safeguard a level playing field.

On top of that, fintech and platform economy's cross-border, cross-sector and cross-regional nature means that regulatory authorities around the world should work together. We will further strengthen cooperation in fields such as antitrust, data regulation and consumer protection with the international community, including German counterparts, enhance regulatory coordination, and jointly build an open, inclusive and safe fintech ecology.

Digital economy has become a key driver of global economic recovery and development. Fintech should focus on supporting the real economy and create an enabling environment for the digital transformation of the financial sector. I believe this conference will generate more ideas on how to promote better coordinated development of finance and technology.

I wish the conference a great success. Thank you.

FinTech Developments, Challenges and Supervision in China*

By GUO SHUQING*

Ladies and gentlemen, dear friends,

It is a great pleasure to attend the Singapore FinTech Festival 2020. I would like to share the latest FinTech developments in China and some of our observations.

First, updates on FinTech developments in China.

Over recent years, FinTech has been developing rapidly and robustly in China. Financial institutions made continued efforts to promote digital transformation. Financial products and tools became more diversified, and financial services more efficient and inclusive.

With wide coverage of e-payment, in particular mobile payment, basic financial services are now available across the whole country. Even in the most remote areas, every adult has his or her own bank account. China now ranks high in terms of the coverage and volume of mobile payments. This enables real time processing of deposit, withdrawal and remittance. Online shopping is booming, providing more convenience to daily life.

Digital credit has fundamentally improved the financial services for micro and small enterprises, the self-employed and farmers. Banks use big data for smart risk management, which reduced reliance on collateral and made loans more accessible. By the end of October this year, micro and small firms with banking credit have reached 27 million, loans for these firms and the self-employed grew by over 30% year on year, and loans to farmers grew by 14.3%.

Digitalisation remarkably expanded insurance's coverage. In China, basic pension has covered 1 billion people, and basic medical insurance has covered more than 1.3 billion, with cross-province fee settlement achieved. By video and remote authentication, key parts of the insurance business have been moved online. In the first half of this year, internet life insurance premium grew by 12.2% year on year, internet property insurance companies' premium grew by 44.2%.

Financial digitalisation has made huge contribution to poverty alleviation. With multiple digital tools, financial institutions can well target their funding support to poor households. By the end of September this year, small loans for poverty alleviation totaled 504 billion yuan, benefiting 12 million households. Financial institutions also set up online platforms to connect producers with consumers. Through online marketing, credit reference, guarantee and payments, those platforms help poor households sell their agricultural products to everywhere.

FinTech also strongly supports our fight against Covid-19. Since its outbreak, financial institutions rapidly optimized their mobile Apps and other on-line services. They provided safe and convenient 'at home' financial products, to make sure basic financial services remain available. Many institutions offered online fast tracks, which greatly enhanced service efficiency and effectiveness, and supported rapid economic recovery.

Second, the experience and lessons of FinTech.

*Video speech given at the Singapore FinTech Festival (SFF) 2020, 8 December 2020.

*Guo Shuqing, Party Secretary and Deputy Governor of the People's Bank of China and CBIRC Chairman

The developments of our laws, rules and regulations on FinTech were just like "feeling the stones while crossing the river". We met some problems, learned lessons and gained experience. Here I would like to mention four cases.

The first case is the P2P. It was originally supposed to be just an information intermediary. However in practice, many P2P platforms engaged in lending and wealth management. For the past 14 years, the total number of P2P was over 10 thousand in China. At the peak, there were over 5000 companies operating at the same time. The annual trading volume were about 3 trillion yuan. The NPLs and losses were very high. By mid-November, all the operating P2P platforms have been closed down.

The second case is the third-party payment platforms. In the past, some third-party payment companies provided investment service for customers' online shopping reserve funds. The yield was much higher than banking deposits, and money could be redeemed anytime. Therefore, it greatly rattled the banking deposits and asset management business. Such investment was very much like money market mutual fund (MMMF) products, but was unregulated to the same extent. Thus, it might violate laws, rules and even potentially engage in money laundering. Now, those payment companies have been asked to deposit the reserve funds with the central bank, and the related investment has been put under supervision.

The third case is the internet financial companies. Some of them tended to induce overspending through various scenarios and over-marketing of loans or overdraft. They even offered loans to students without repayment abilities. When default occurred, they pursued coercive loan collection, which caused many social problems. Hence, we insist on applying unified regulation by business activities, and stand firmly against regulatory arbitrage.

The fourth case is the data privacy. Some tech companies used their market advantage to improperly collect, use and even sell user data. Without users' authorization, those activities seriously violate business interests and individual privacy. Chinese government has made efforts to plug the holes. The Civil Code provides legal protection for individual information. The Individual Information Protection Law is also being drafted. Financial data security regulation is being developed by the regulators. All these aim to build an effective protection and prevent data leak and abuse.

Third, some issues need to be further discussed.

Facing the rapid growth of FinTech, we will adopt a positive and prudent approach. We will encourage innovation while enhancing risk control, so as to address the new problems and challenges.

Firstly, paying high attention to cyber security. At present, over 90% of China's banking transactions have moved online. Compared with conventional risks, cyber risks spread faster and wider with impacts greater. Cyber security emergencies also call for better contingency response and management.

Secondly, promoting fair market competition. FinTech is a "winner takes all" industry. With the advantage of data monopoly, BigTech firms tend to hinder fair competition and seek excess profits. Traditional anti-monopoly laws focus on Cartel, market abuse and operator concentration. However, FinTech industry leads to many new phenomena and problems. We might need to pay more attention to the following questions.

- a) Have the BigTech firms blocked newcomers;
- b) have they collected data improperly;
- c) have they refused to disclose information that should be made public;
- d) have they engaged in conducts misleading users and consumers?

Thirdly, watching out for the "too big to fail". Now the micropayment market is dominated by a few tech companies. They have the feature of being key financial infrastructures with public interest at stake. Besides, some BigTechs operate cross-sector businesses, with financial and

technology activities under one roof. It is necessary to closely follow the spillover of those complex risks, and take timely and targeted measures to prevent new systemic risks.

Fourthly, clarifying data ownership. Chinese government has recognized data as a production factor together with labor, capital and technology. And clear ownership is fundamental to market-based allocation and pricing of data. At present, few jurisdictions have specified the ownership of data property, and BigTechs have de facto control over data. It is necessary to clarify data rights of different parties soon, and improve data flow and pricing mechanism. It is also important to fully and fairly utilize data, and protect the lawful interests of all players.

Fifthly, strengthening international coordination for cross-border data flow. China has recently put forward the Global Data Security Initiative, calling for respect of sovereignty, jurisdiction and data security management rights. It is a basic principle to balance development and security. And we will enhance cross-border coordination to jointly promote a more open, fair and non-discriminatory business environment.

Ladies and gentlemen,

The booming digital economy connects us more closely than ever before. Let's join hands together to promote the healthy development of FinTech.

To conclude, I wish this event a great success. And wish you all good health.

Thank you!

Regulating Big Tech in the Public Interest^{*}

By AGUSTÍN CARSTENS^{*}

Welcome to the BIS research conference on "Regulating big tech: between financial regulation, antitrust and data privacy".

It is a pleasure to have you all here to discuss issues of key importance to our economies and financial systems. We have an outstanding group of central bankers, public officials, academics, civil society and private sector participants. Ideally, we would have liked to invite you to join us in person here in Basel, but we could only do the next best thing and meet virtually.

The ascent of big tech

One of the most striking features of the digital economy is the rise of large digital platform companies – or big techs.¹ Big techs are increasingly a part of our daily lives. Just look at the billions of people affected earlier this week by a temporary outage of some of these platforms. Many of us here have used a big tech service today, perhaps by checking our email or sending a message on social media. At other times, we might be ordering a product on an e-commerce platform.

Big techs are also entering financial services. We at the BIS have been following closely how big techs offer payments, credit, insurance, wealth management and more in every major region of the world.² These trends are all the more remarkable as big techs were virtually non-existent in financial services only a decade ago. But thanks to network effects, where users attract more users, big techs have achieved scale rapidly.

For example, big techs have come to account for 94% of mobile payments in China in the space of just a few years.³ Big tech credit grew by 40% in 2020 alone, to a global total of over \$700 billion.⁴ Beyond credit, big tech stablecoin proposals like Facebook's Diem may soon go live, likely with rapid adoption around the world.

Certainly, big tech services in general, but also in finance, have brought numerous benefits.⁵ BIS research has studied how big tech lenders can use new data and machine learning to efficiently allocate and price credit to small businesses, reducing the need for collateral.⁶ They have lowered the cost of onboarding new clients, and have helped to overcome geographic barriers to reach previously underserved customers.

In this way, big techs have lowered costs and enhanced financial inclusion around the world.⁷

Yet big techs in finance raise at least three new challenges. Some of these are familiar to financial regulators, and some are decidedly not.

Challenges of big tech in finance

For central banks and financial regulators, the first and most direct set of challenges from big tech centres on financial stability.

Big techs have advantages stemming from their user data, leading to vast networks and a huge range of activities. This advantage flowing from data gives rise to the so-called data-network-activities, or DNA, feedback loop. With this, big techs can move very quickly from "too small to care", to "too big to ignore" to "too big to fail".⁸

Just four big techs provide nearly two thirds of global cloud services, which are becoming a critical service for the financial sector.⁹ Cloud services certainly bring advantages in terms of

^{*}Speech given at the BIS conference "Regulating big tech: between financial regulation, antitrust and data privacy", 6–7 October 2021.

^{*}Agustín Carsten, General Manager, Bank for International Settlements.

efficiency for individual institutions, but the dependence of the entire financial sector on just a few players makes the system more vulnerable to large-scale operational failures, insolvency or cyber attacks.¹⁰

A second challenge from big tech is preserving fair competition. This is relevant especially for competition or antitrust authorities. Big techs have several competitive advantages over other firms by virtue of their business models, technology and networks. In many cases, this is compounded by inadequate regulation and the possibility of regulatory arbitrage.¹¹

This combination can be harmful for competition since digital markets are subject to "tipping" in the favour of one player who takes most of the market.¹²

Mergers and acquisitions can exacerbate this problem. There is evidence that some acquisitions by big techs neutralise competitors – so-called "killer acquisitions".¹³ This may end up reducing funding for innovative market entrants – a situation known as the "kill zone".¹⁴

A third set of challenges is around data governance. This is particularly relevant for data protection authorities. Big techs have an incentive to collect as much personal data on their users as possible. This is because data resources are key to their business.

When big data are parsed with advanced techniques like artificial intelligence, they can predict user actions in ways that users may not grasp. Big techs may even exploit behavioural biases to manipulate consumers' preferences.¹⁵ Recent research, which will be presented at this conference tomorrow, argues that this can result in a range of harms, from undermining consumer privacy and choice to damaging political discourse.¹⁶

Beyond the economic consequences, ensuring privacy against unjustified intrusion by both commercial and government actors has the attributes of a basic right.

Scenarios for future growth

Looking further ahead, one question to ponder is what the future financial system could look like with big techs. Such an exercise necessarily involves some leap of the imagination. But recent experiences with big techs suggest that, without a public policy response, two scenarios – which are not necessarily mutually exclusive – could be more likely than others.

In the first scenario, big techs could establish a large footprint in retail payments by providing their own means to pay. In the current system, big techs provide "front-end" payment services for fees, but "back-end" clearing and settlement use public infrastructure anchored on the central bank's balance sheet. However, big techs' large networks and data could allow them to develop their own payment systems that combine front- and back-end services. Currently, regulatory barriers to establishing private payment networks are low. This is why the rapid emergence of closed-loop payment networks operated by just a few big techs is a real risk. It would lead to a fragmentation of payments and represent a threat to the public good character of the payment system.

In the second scenario, big techs would not only operate their own payment system, but also issue a stablecoin for exclusive use in their system, like Facebook's Diem proposal. The implications of this scenario would be even more profound. Let me mention three of these implications.

First, big techs' large networks could lead to a rapid and large-scale adoption of stablecoins. Data from payment transactions would enhance their ability to exploit the DNA loop. This could further concentrate market power in the hands of a few, and threaten financial stability, fair competition and data governance.

Second, stablecoins could challenge bank business models, especially if those new instruments affect the demand for banks' deposits. As alternative sources of bank funding may be more costly and less stable, this would hamper banks' ability to perform their credit intermediation function.

And third, stablecoins could lead to a fragmentation of the monetary system, as they could result in "walled gardens". Funds collected by big techs by issuing stablecoins could become quite large,¹⁷ and could be moved around rapidly by users, including across borders. In this type of scenario, stablecoins could erode a jurisdiction's monetary sovereignty and its unit of account through "Diem-isation", whereby a large platform denominated in foreign currency comes to dominate digital payments. This would constitute a new form of dollarisation, which is familiar to some emerging market economies.¹⁸

Possible public policy responses

So, if these scenarios appear likely, what should public policy do? To be clear, the goal of public authorities is not to halt useful innovation in the financial sector. Rather, policy should serve the public interest, balancing overall benefits with potential risks.

To achieve this balance, authorities should consider three possible responses, which are also not mutually exclusive.

The first is managing big tech through the adaptation of existing regulations and oversight.

Recent BIS publications have laid out the rationale for regulation in this area and have described policy initiatives in China, the EU and the United States.¹⁹ A particular focus lies on the areas of competition, data governance and financial stability. These initiatives seek not only to address the risks posed by big techs but also to overcome gaps in existing regulatory frameworks. Let me briefly give you some more details.

Competition policy is the most active area. Here, a paradigm shift is emerging. Authorities aim to preserve market contestability by strengthening ex post enforcement tools. But they are also developing new entity-based regulation that would constrain business practices of big techs ex ante. Examples are the proposed European Digital Markets Act, the Chinese Platform Antimonopoly Guidelines and a number of legislative proposals in the United States. Last July's UK government consultation on a pro-competition regime for digital markets is a further example. This builds upon the Furman Report, about which Jason will certainly say more in a few minutes.

In terms of data governance, policy initiatives emphasise protecting personal data rights, in particular personal consent and data portability. Many initiatives are modelled after the European General Data Protection Regulation. An important example here is the enactment of the Personal Information Protection Law in China this year. This will change how data can be collected, used and shared by Chinese big techs. Meanwhile, open finance proposals aim to give users more control over their data.

In the area of financial stability, individual jurisdictions have followed different paths. Let me take the example of China. In the light of the big techs' dominance, it may not come as a surprise that Chinese authorities have instituted a range of financial stability requirements. A key one is that some entities may need to be licenced as financial holding companies under the supervision of the People's Bank of China. This is a novel entity-based approach for regulating and supervising the operations of big techs.

All these initiatives constitute important steps in addressing risks posed by big techs. And there are more in other jurisdictions. Some of them introduce activity-based requirements that indirectly affect big techs. Others impose specific entity-based obligations directly on them.

Going forward, big techs' growth will require additional regulatory responses. Most likely, this will include entity-based rules. Relying only on activity-based requirements will not be enough.²⁰

A second policy response is to give a further spur to the improvement of current payment arrangements in several dimensions, making them cheaper, faster, more transparent and more reliable. Central banks could broaden access to their payment systems and improve domestic and cross-border interoperability. This could be achieved through application programming interfaces and the use of international standards.

Around the world, 59 retail fast payment systems are in place. Examples include TIPS in the euro area, the Unified Payments Interface in India, PIX in Brazil and CoDi in Mexico. The bottom line is that efficient, open payment platforms can prevent dominance by any one big tech provider.

The third response is perhaps the most far-reaching: central banks could introduce digital currencies, or CBDCs.²¹ As we emphasised in our Annual Economic Report this year, CBDCs present an opportunity to design a technologically advanced representation of central bank money with core features of finality, liquidity and integrity.²²

CBDCs could also serve as a common, interoperable platform that would promote innovation and competition. By offering as high a level of privacy as feasible to users, they could provide an additional public good.²³

For each of the components of this three-pronged approach, there is a strong case to strengthen regulatory cooperation. By this, I mean cooperation not only among central banks and financial authorities, but also with competition and data authorities. In the light of the cross-border nature of big tech activities, such cooperation should also have an international dimension.

As you can see, a lot of work lies ahead of us. This brings me to today's conference.

Structure of the conference

The conference today and tomorrow offers us a chance to hear more on these issues, from both a policy and a research perspective.

We will hear from central bank Governors, leading academics, senior policymakers, private sector representatives and more. We hope that this conference will open a dialogue across all key players, which is indispensable to coordinate financial regulation, competition policy and data protection policy.

Now allow me to move directly to our keynote speaker, Jason Furman.

Jason is best known as the Chairman of the US Council of Economic Advisers under President Obama. In this capacity, he was the chief economist to President Obama, and was a member of his cabinet.

Currently, Jason is the Aetna Professor of the Practice of Economic Policy at the Harvard Kennedy School and the Harvard Department of Economics. He is also a senior fellow at the Peterson Institute for International Economics. Jason has conducted very influential research in a wide range of areas, and he recently spearheaded the Furman Report on unlocking digital competition for the UK government.

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The Impact of Technological Developments on Banks

By NOUT WELLINK*

Introduction

Technological developments not only affect banks and other institutions delivering financial services (such as insurance companies), but also central banks and regulators/supervisors. An important issue is how the financial sector and the authorities operating in this sector should deal with fintech/big tech companies. The meteoric rise of these companies raises also broader and more fundamental issues as to their role and position in our societies.

Focusing on banks, the first question that arises is whether the several thousands of fintech companies that have now been established will ultimately undermine the business model of traditional banks or whether these companies will be absorbed by the banking system. Many small fintech companies will eventually fail. They may not develop enough scale or are not able to mobilize enough financial resources to pose a real threat to the banking system. Life is not easy for these newcomers to the financial sector. Under existing legislation, they must comply with all legal conditions that are imposed on banks. That means, for example, that they must meet all requirements for the gatekeeper function regarding money laundering. These requirements are financially very heavy for a small company (high compliance costs). That is why these companies are often absorbed by banks, who thus try and make the innovative strength of the fintech's part of their business.

We are indeed seeing more and more mergers and partnerships between established financial institutions and fintech startups, but these are not always happy marriages. The integration of a fintech startup into a traditional bank is less simple than is often thought, partly because of cultural and management differences. These "marriages" are, therefore, regularly followed by a divorce.

The real competition for the banking industry doesn't come from small independent fintech companies, but from the explosively growing internet giants. There will be, of course, exceptions, because small companies can become big by operating very successfully or by merging with other fintech companies. As of the beginning of this year the number of unicorns fintech's (companies with a valuation over \$ 1 billion) is still relatively limited. Therefore, the focus in the following is on the (very) large, technologically advanced companies, with a wide range of activities, that increasingly also provide financial services.

Disappearing competitive advantages

A major strength of banks was their close relationship with the customer. Since a large part of the services of banks is seen as a public good, their business is highly regulated and protected from outside competition. Consumers derive confidence in the banks from this, but it made banks cost-inefficient. They also had somewhat forgotten their primary focus on the customer. That became abundantly clear during the financial crisis. Angry consumers looked for alternative providers of financial services (fintech companies) and alternative money (crypto currencies). Technological developments contributed in many countries to an increasing erosion of the close relationship between banks and their individual customers too. In the past, in financially developed countries large banks had a dense network of local branches and, in addition, there were also many small banks that were close to the citizen. Forced by competition and made possible by new technologies, banks in these countries had started to shrink their network. At the same time, many smaller banks had merged into larger ones.

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While the market position of traditional banks relatively weakened (there are of course always exemptions), big tech companies gained in strength. At this moment the cumulative market cap of the seven “biggest techs” is already much larger than of the top 200 (highly regulated) banks. That was different a few years ago, for various reasons. Big Techs operate in many fields, getting information about their customers from all corners of the internet. The core of the fintech approach is to understand what the customer wants and to deploy technological solutions to fulfill these wishes. Therefore, Big Techs exploit to the fullest, in a cost-efficient way, their large data files with artificial intelligence. The corona crisis has given a strong, further boost to technology firms, but undoubtedly also their improved performance and more active involvement in financial services have played a role. Big banks have large data files too, but these are less diversified. In addition, banks not always realize the value of their data and are also more restricted in the use of them. Unlike the banks had become, big tech companies are very customer-oriented, sometimes operate on or beyond what is legally permissible, and they are less hindered by regulations

For banks, part of the answer to these developments was entering into partnerships not only with small fintech’s, as mentioned above, but also with these big tech companies. This is kind of a two-edged sword. Already as early as 2016 the World Economic Forum warned that these partnerships also carry risks. Banks could become too dependent on Big Techs; their fees could come under pressure, and they could also lose much of their own identity because of the strong(er) brand of the big tech company. For banks, finding the right balance between cooperation and competition is a very delicate process.

Survival of the fittest

Bill Gates proclaimed as early as 1994 that: "banks are dinosaurs, (...). We can bypass them." For the banks today, as I once read, the task is "how to make the dinosaurs run". In any case, banks need to get rid of the IT legacy of the past. Much of the banking industry still struggles with outdated mainframes and software. The maintenance of the old IT configuration (often with different program languages and machines) is complex and costs a lot of money. Unfortunately, this also applies to the transfer of data and applications to the cloud. But once all that has happened, the costs will drop significantly. The transition to new systems is not only a question of money, but often also, technically, extremely complex because of "spaghetti connections": everything is interlinked. These are all reasons why the introduction of new technologies can be faster in financially less advanced countries. These countries can start from scratch.

The threat to the traditional banking system lies primarily in the payment system and directly related services. That threat has now become even greater for technologically lagging banks, because the corona crisis has given a significant, further impulse to digital and contactless payments. Fintech, defined as innovative digital technology solutions aimed at optimizing financial services and banking, is advancing mercilessly as part of the activities of big tech companies. Not only in China, but also internet giants in the West are eager to jump into the payment system, and in insurance, money management and lending. The entire payment system field is changing rapidly. Bad luck for those small banks that - often supported by politics - want to focus as much as possible on the utility function (payment, saving and safe investment). Without full swing innovating and digitalizing, this utility function eludes them, and the so cherished security of these banks will eventually turn out to be a bad dream.

The threat from the fintech angle extends to the entire package of banking activities. This is what see happening now. In some countries, such as China (Alibaba, Tencent) but also in the US (Google, Apple) this development is more advanced than in others. It is the combination of new technologies and changing consumer preferences that is driving the transformation process in the financial sector. An important corollary of these developments is that, thanks to the new business models that are emerging, a much more inclusive financial system is emerging.

If the fintech approach, which is taking hold in many areas of the banking business, continues - and there is no reason to suppose that it should not - only the business model of the bank, which is also a sufficiently advanced high-tech company, will have in the somewhat further future still life chances. Banks that want to remain viable must have an encompassing data strategy and will have to move from just IT-based banking (the simple use of computers) to smart banking. They will have to use artificial intelligence to fulfill as many (of the continuously changing) wishes of its customers as possible, not only doing things better and faster than in the past but also and especially by product innovation (e.g. products that consumers believe will improve their financial health). All these developments require new organizational models for banks as well as a different kind of workforce. "Adapt or die," writes Brett King in his fascinating book "Bank 4.0". The ability to adapt a bank's organization is a condition of life.

Policies of the authorities

Innovation should not be nipped in the bud and big tech is an important source of innovation. But it should also not endanger the stability of the financial system, threaten privacy and undermine the necessary level playing field in the economy. Fintech has had a positive impact on the financial sector, as it has shaken up the banking sector and made this sector aware of the need to better serve the customer and to work more efficiently. Because of the easy profits that could be made in the past, banks kind of forgot about that.

Life was perhaps too easy for central banks too. The banknote monopoly, their monetary policy instruments, their formal and informal command over the banks and their authority more generally had made them a bit sleepy. In addition, many central banks in countries with well-developed payments systems initially remained rather skeptical (some of them still are) about the value added of an official digital currency. Fortunately, the mood at the majority of central banks has changed. Facebook's Libra-initiative (Facebook has nearly 3 billion monthly users) has undoubtedly been instrumental in this regard. Most central banks are now working hard to develop a digital currency that is also legal tender and, therefore, has a competitive advantage over cryptos. They realize that current technological developments can hit the heart of their activities. Hopefully, central banks will combine forces and also work on common, international standards.

China is well ahead of most other central banks with the development of its digital currency and is already in the pilot stage. The US Fed is still evaluating whether to launch a digital currency, but the ECB officially launched in July 2021 its digital euro project, because it wants to protect its monetary sovereignty and to preserve its citizens' access to central bank money in case cash would disappear. But it will be years before there is a digital euro.

While providing an official alternative, central banks and regulators worldwide should also regulate (or ban altogether) cryptocurrencies and stable(value)coins. Stablecoins suggest more stability and safety than they can actually deliver, due to insufficient and/or illiquid reserves to serve as a backing. A chaotic situation is developing with respect to cryptos. Cryptocurrencies, "created by the people and for the people" as the slogan goes - there are now around 12.000 of them - can infect the financial system the moment the crypto- and the official money circuits come into contact. Crypto's facilitate criminal payments, their production is extremely energy intensive, they may be prone to runs and do not offer any protection to unsuspected owners. The Chinese central bank recently stated that all transactions related to crypto's - also those provided by foreign platforms to Chinese residents - are illegal, which I believe is completely justified. An alternative for banning them completely would be to try and bring them under existing regulation regarding banks and/or securities.

Financial regulators/supervisors have their own role to play, but there are, of course, overlapping fields of activity with central banks. While central banks mainly focus on the integrity of the value of money (price stability), the efficiency of the payments system and the stability of the financial

system, the attention of financial regulators is primarily focused on the health and integrity of individual financial institutions. But the problem of the big techs is broader than the financial sector. There are also issues related to consumer protection, privacy, monopolistic practices, data governance (ownership, collection, storage), etc. In fact, a strategy that encompasses all these aspects is necessary. Regarding banking supervision, a great deal of harmonization has taken place internationally. As to the other aspects mentioned, international views often differ quite a bit and national solutions, therefore, also differ. Authorities should try and work on harmonization of these aspects too.

Big Tech companies operate with the help of existing infrastructures or via systems proprietary to them. This is a stylized representation of reality. In practice, these models overlap. In the first approach the tech firm is a third party, for which the bank bears responsibility and supervision is entirely conducted through the bank. In the second approach supervision on the financial activities is activity based, but much more complex because of opaque governance structures.

Developments now are moving at an almost lightning speed, for example regarding the role of technology companies in bringing online banking to the cloud. China has four rapidly growing cloud giants, and they are instrumental in the upgrading of the traditional industries, including the financial sector. This is a welcome development. The cloud approach is very efficient, but what if a cloud company runs into problems? Then banks, and perhaps also the financial system, will get into big trouble. Therefore, the risks involved in reliance on third parties (in this context big tech companies) for very essential services, have become a major concern for supervisors. No wonder that the EU – other jurisdictions are moving into the same direction - has published in September 2021 a legislative proposal aimed at bringing “critical ICT third party providers”, including cloud service providers, within the regulatory perimeter, so as to strengthen the operational resilience of the financial sector and of the individual firms within it. This is an important step forwards, because it brings certain “critical” activities of the big techs under kind of direct supervision. This is an inevitable move, seen also in other jurisdictions, from activity based to entity-based supervision on providers of financial services outside the regulated financial sector. That said, banks remain, of course, responsible for their control environment.

Even more complex is finding a solution for a big tech company that operates in many areas, including financial ones, via its own systems. Technological developments make it easier – via Application Programming Interfaces – to embed banking services into any product a tech company wants to sell. To come to grips with such a company and to create a situation in which their financial services can be regulated and supervised adequately, a transparent structure is a necessary condition, whereby on the one hand banking activities are separated as much as possible from other services and on the other hand efficiency gains and consumer preferences must be taken into account. An interesting example is the restructuring of Ant’s Alipay. This restructuring not only addresses typically financial sector issues, but also competition- and data governance issues (ownership, access, privacy, usage). The approach regarding data governance has China specific characteristics. The user data, collected via super-app Alipay, will be turned over to a partly state-owned joint venture. This joint venture will apply for a consumer credit scoring license and future lending decisions by Alipay will be based on data from this credit scoring firm. This is in line with the policy of the central bank that credit decisions should be based on data from approved credit scoring companies.

A closing remark of a general nature

Big Tech companies bring efficiency gains and (financial) inclusion. But the question remains to what extent they distort fair competition, misuse data and can be trusted to serve the public interest. Do they focus sufficiently enough on solving the major issues of our time, such as the climate, healthcare, infrastructure, etc. Nowadays, in many countries essential parts of the critical

infrastructure (including the financial sector) are in the hands of the private sector, often without sufficient supervision and without regulation that adequately protects the interests of the society.

If we do not want Big Techs to rule the world unchecked, something should be done. Internationally, not only in China but also in the US and Europe, the authorities have become more active by closely scrutinizing Big Tech amid potential anti-competitive and financial stability concerns and by introducing legislation to address these concerns. These policies are an important step in the right direction, but only part of the solution. There is also a need to strengthen the position of those operating the public interest. Various solutions are conceivable here. I will just mention one.

In the past, governments were often the driving force for technological innovations. The internet originated in the defense world and the spin-offs of the race to the moon has been enormous: NASA identified more than 2000 of them since 1976. Today, this innovation role seems to be taken over in many countries by Big Techs and its leaders who are nowadays sending rockets into space. Their companies derive their dominant position from the collection and analysis, with artificial intelligence, of huge data files. This immediately points to a direction in which important progress could be made. If the public sector is to compete with the Big Techs, it must encourage data sharing, for example between scientists, within a country and cross-border, and therefore create national and international research clouds that allow academics and others to access massive, public datasets. Recently, interesting initiatives in this area have been taken in the US. Legislation in that country requires a federal task force be established “to study and provide an implementation pathway to create world-class computational resources and robust government datasets by researchers across the country in the form of a National Research Cloud”. This kind of initiatives are a useful, positive response to the growing power of the Big Techs. They strengthen the position of those who primarily work in the public interest and don’t weaken the innovation capacity of others.

These initiatives should not remain just national endeavors. There are important areas where a cross-border approach would be helpful and/or urgently needed. Health, for example, is one such area. Research data on health should be seen as a global public good. I am fully aware of all the complications involved, especially with respect to privacy and security. The stronger the privacy legislation in a specific country, the more difficult it becomes to share information, especially cross-border. A good example is EU’s General Data Protection Regulation” that collides with legislation in other jurisdictions in which privacy issues are regulated differently. Security considerations are also a good example. The fewer countries trust each other, all the less they are inclined to exchange information on security grounds. But that said, there are many cross- border areas for which a (perhaps not perfect) solution must be sought and can be found. A positive example is the COVID-19 Data Exchange platform that acts as a trusted third party and in which all kind of guarantees are built in to comply with existing national regulations.

Common problems can only be solved together. In doing so, public authorities should take the lead, create a level playing field and not blindly trust on the private sector, of course without impairing the capacity of that sector to contribute to the solution of the enormous challenges in front of us.

Transformative Powers of Technology

By WANDA TSENG*

Technology was already pervasive in our lives, spurred by advances in artificial intelligence (AI), robotics, big data, super computing, and cryptography. But the covid-19 pandemic has accelerated the technology transformation. Technology most certainly reduced the disruptive effects of the pandemic. People are doing more than ever from home—buying, learning, working, and socializing. Businesses are learning that they have to go digital or go out of business, migrating their operations and workforce to a virtual environment. Governments are using technology to battle the pandemic—testing, contact tracing, vaccinations, and to deliver much needed fiscal support to vulnerable populations. Technology innovation, adoption, and adaptation will become even more important in adjusting to a post-pandemic world.

I. Technological Innovations: Benefits and Risks

Technology brings clear benefits in terms of wider consumer choice, economic inclusion and efficiency, and new business opportunities and jobs. An example is fintech. With access to smartphones and internet connections, fintech has propelled financial inclusion at affordable cost in many developing countries. This enabled access to micro loans, market information, cross-border payments and remittances, and reduced counter-party risks. Another example is Alibaba's e-commerce platform that expanded market access especially for small and medium sized businesses in remote areas. Technology has also improved public services and government accountability, for example, in revenue collection and expenditure targeting of social assistance, and making government services more inclusive, fair, and transparent.

But the disruptive impact of technology, creating uncertainties about the future, also brings risks. Countries are confronting growing concerns in many areas: social disruptions and rising inequalities, competition, the market power of giant technology companies (big tech), cyber risks, how data is collected and used, and how technology companies are taxed. To reap the opportunities from technology transformation while containing the risks, countries would have to implement new policies for the digital age. This paper discusses three areas of risk and how they might be addressed: rising inequality, the regulatory framework, and fintech and financial stability.

II. Rising Inequality

Foremost among the risks are the impact of technology on jobs and income and wealth inequality. John Maynard Keynes was already concerned about the job destroying effects of technology in the 1930s. He foresaw that technological disruptions create technology unemployment that has broader social and political consequences. A study by Sedik (2018) finds that in Asia, automation has a slight negative impact on overall manufacturing employment in heavily automated sectors like electronics and automobiles. Workers with medium-level education are more vulnerable than workers with either low or high education because jobs most susceptible to automation involve routine tasks done by workers with mid-level skills.

In his famous study on income inequality 'Capital in the 21st Century', Piketty (2014) finds that economic growth has become much less shared since the 1980s. In the United States in 1980, the top 1 percent of the population held about 10 percent of national income; by 2016, the top 1 percent held 20 percent of national income. In 1980, the bottom 50 percent of Americans held more than 20 percent of national income, but its share shrank to 13 percent in 2016. So, there has

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been a transfer of 7 percent of national income from the bottom 50 percent to top 1 percent. Several factors contributed to the rise in income inequality in the United States: massive educational inequalities, the compensation system in American companies where the average salary of a CEO increased to more than 300 times that of an average worker by 2017 compared with 20 times in 1965, a tax system that grew less progressive over time, and the erosion in the bargaining power of labor unions.

Inequality has risen in many countries around the world, including China, putting inequality at the top of the global policy agenda. Acemoğlu (2021) finds that since the 1980s, technology accounts for much of the rise in income inequality, together with other factors such as globalization and the declining power of labor unions. He argues that automation has been excessive and has not produced gains in total factor productivity. This is because when businesses consider whether to replace workers with machines, they do not take into account the social disruptions caused by job loss, especially good jobs, resulting in an excessive bias toward automation. Instead, Acemoğlu recommends that businesses should consider productivity gains that could come from changes in tasks, organizational forms, and technology breakthroughs that are more complementary to humans. He suggests that the government has a role to play to incentivize “human friendly” technological advances that produce good jobs.

While some income inequality is inevitable in incentive-based economic systems, a study by Ostry et al. (2014) finds that excessive inequality is detrimental to growth. This is because inequality fuels discontent and social polarization, erode social trust, and threaten national cohesion, making it difficult to implement policies needed to adjust to shocks that are necessary for sustainable economic growth. The study finds that fiscal redistribution to reduce income inequality is associated with higher and more durable economic growth.

The pandemic crisis has amplified inequalities within and across countries. Within countries, the IMF (2021) finds that the burden of the crisis has been felt unequally across different groups. Unequal access to technology drove unequal outcomes in education, opportunities, and access to health and financial services. Workers with less education, youth and women, and those informally employed in gig jobs have suffered disproportionate income losses. Because the pandemic has accelerated the transformative forces of digitalization and automation, many of the jobs lost are unlikely to return, requiring worker reallocation across sectors, and often the new jobs people find pay substantially less than their previous jobs.

To “build back better” from the pandemic, a more inclusive sharing of the opportunities offered by technology should be a priority. This requires policies to cushion the labor market impact of new technologies and reduce inequality. Education and training, including lifelong learning and continuous training, should aim to give today’s workers the means to thrive in the digital age. Education should focus not only on STEM (science, technology, engineering, math) subjects but also those fostering creativity and empathy, as jobs requiring these skills are least likely to be replaced by robots. The specific policy requirements are different in different countries. But consideration could be given to ensuring a living minimum wage, a more robust and expanded social safety net, and universal basic income; taxation could be made more progressive to achieve a more equitable income distribution. The goal should be to achieve a more equitable sharing of prosperity.

III. Upgrading the Regulatory Framework

Policymakers need to examine the regulatory framework to make sure they are appropriate for the digital age. The regulatory framework encompasses many facets; four areas are highlighted here: competition, data privacy, accountability, and cybersecurity.

Competition. When the technology sector first emerged, the marketplace was fiercely competitive and many startups failed. However as the technology sector expanded, “winner takes

all” outcomes became more prevalent. McKinsey (2017) projects that in China digitization promises to shift and create value equivalent to 10- 45 percent of total industry revenues in four key sectors by 2030 (consumer and retail, automotive and mobility, health care, and freight and logistics). Such major disruptions will create losers and winners and disproportionate value will go to the winners.

Competition policies need to be updated for the technology era. Innovations should not become the property of a few large firms that came first in a winner-take-all sweepstake. Regulations need to focus on ensuring innovation, the entry of smaller firms, and to ensure that established firms do not gobble up the next Google, Facebook, or Alibaba. Countries have taken different approaches. The United States has generally accepted market dominance earned through competition in the marketplace as long as it leads to greater efficiencies, benefits consumers, and promotes innovation. The European Union, in contrast, has focused anti-trust enforcement on protecting entry of potential competitors, even if existing market leaders managed to outperform their competitors and earned their dominant positions. China recently also took actions against anti-competitive practices of big tech companies in areas, including online retailing and access to data assets.

Data privacy. Data on our daily lives is the essential ingredient for quantum computing and AI analytics. Data has been invaluable in the fight against the covid-19 pandemic. Locational apps allowed authorities to know the movements of people, helping with decisions about whether lockdowns are needed to contain the virus spread. Contact tracing apps notified people who may have been close to those infected so that they can quarantine. Experience during the pandemic show that data collection and analysis can play a beneficial social role.

At the same time, revelations about the misuse of data for private gain, such as the infamous case of Oxford Analytica and Facebook, heighten concerns about how data privacy is protected and how the data collected is monetized. Until recently, many countries had lax data privacy protection, merely asking consumers to check the consent box after reading a long legalistic text. The entity that collects the data gets to keep them and use them largely to its own benefit, and data has become a very valuable asset.

Carrière-Swallow and Haksar (2021) suggest that commercial interests and incentives for innovation must be balanced with the need to build public trust through protection of privacy and data integrity. The European Union’s 2018 implementation of the General Data Protection Regulation (GDPR) advances in this direction. The GDPR was designed to improve how data is stored and used by giving more control to individuals over their information and by obliging companies to handle the data collected more carefully. EU residents now have the right to access their data and to limit how it is processed, and these rights are being enforced with increasingly heavy fines.

Carrière-Swallow and Haksar suggest consideration be given to creating public data utilities—similar to credit registries—that could balance public needs with individual rights. An independent agency could be tasked with collecting and making anonymous certain classes of individual data, which could then be made available for analysis, subject to the consent of interested parties. They pointed to possible uses for such data utilities, such as contact tracing to fight pandemics, better macroeconomic forecasting, and combating money laundering and terrorism financing.

Carrière-Swallow and Haksar further suggest the need to help data sharing, circumscribed by clear rules, so that consumers are not confined to specific data ecosystems, thus contributing to competition. For example, third-party interoperability is being used in healthcare to allow doctors to have quick access to patients’ lab results. The European Union’s late-2020 proposals for the Digital Markets Act and the Digital Services Act advances in this direction; it includes third-party interoperability requirements for big tech “gate-keepers”—including social media and online marketplaces—in certain situations and rules to make it easier for consumers to port their data to different platforms.

Accountability. Technology has transformed how people get information, even raising questions about what are facts. The detrimental effects of the proliferation of fake news, conspiracy theories, information silos have been demonstrated across many countries--from election of extremist leaders, to attacks against certain groups, to skepticism about life-saving vaccines. Yet, how to ensure accountability of information is a fraught with difficult choices. Should private entities, using algorithms to detect hate speech and fake news, be responsible for policing information flows or should this be the purview of the state? There is not a one size fits all solution. The respective responsibilities of the private sector and the state need to be defined by societies themselves, taking into account their own political systems and societal preferences. The aim of policies should to allow the free flow of information while preventing the spread of rumors and fake news; easier said than done.

Cybersecurity. Cyber threats increase with greater reliance on technology. The consulting company Deloitte (2021) reports that cyber security threats, including data breaches, hacking, spear phishing, ransomware, etc. increased tremendously during the pandemic as activities moved online. The pattern of threats has become more global and has affected a broader range of industries, even raising concerns about national security. A secure digital infrastructure, cybersecurity standards, and regulations are essential pillars in today's digital economy. As technology and data move across borders, international cooperation and trust are needed to develop global standards and enforcement mechanisms. China can contribute to the global discussion on how to govern and secure the digital world.

IV. Fintech and Financial Stability

Technology is rapidly transforming the financial industry. Innovations such as mobile payments, P2P loans such consumer financing and microloans, wealth management, insurance have all contributed to expanding financial inclusion, reducing transactions cost and time, and increasing incomes and productivity. The Economist (February 25, 2017) cites China as the world leader in fintech, noting that China is the world's biggest market for digital payments, online lending, and home to 4 out of the top 5 most innovative fintech firms.

However, the rise of fintech also brings new challenges and risks. As more and more transactions move to fintech, new risks arise for consumers, investors, monetary policy, and more broadly to financial stability and integrity. Fintech disrupts the business models of established financial institutions and leads to a migration of activities outside the regulated system. For example, fintech firms partner with banks and make huge loans with little capital or liquidity requirements, incentivizing excessive risk taking. Their partnerships with established banks in activities such as lending, wealth management, and insurance create moral hazard. Crypto currencies, which are developing quickly in Asia, pose risks for money laundering, tax evasion, criminal activity, and circumvention of capital controls.

The growing role of big tech in the financial sector presents further regulatory challenges. Unlike their Western counterparts, big tech companies in Asia, especially China, have become key providers of financial services, replacing traditional financial institutions. Big techs operating in finance are subject to a combination of specific financial industry regulations that apply to banking, extending credit, and transmitting payments, and to general laws and regulations on data protection and competition.

However, Crisanto and Ehrentraud (2021) point out that the current regulatory approach does not pay due attention to the unique features of big tech business models and the corresponding risks. Big tech's activities blur the lines between the financial sector and other industries. Finance-specific and cross industry regulations are geared toward individual legal entities within big tech groups for the particular activities they perform. However, big tech usually includes numerous group entities that perform highly interrelated activities, making it particularly difficult to assess

their risk profile. Moreover, big tech's business models are continuously evolving. The lack of transparency of big tech groups and the multitude of regulators overseeing different aspects of big tech operations further complicate the picture. Furthermore, international frameworks for data governance, operational resilience, and group-wide risks are fragmented, leaving room for regulatory arbitrage, policy gaps, and a build-up of financial stability risks across borders.

How should fintech be regulated? Countries are experimenting with "sandboxes," where firms can test innovations under close regulatory scrutiny, to find answers. The challenge to policymakers is to find the right balance between enabling financial innovations and reinforcing competition on the one hand and addressing risks to consumer protection, data security, and financial integrity and stability on the other. Coming up with the right balance is a work in progress.

Taylor et al. (2020) pointed to four areas in fintech where concerns are growing: increasing reliance on cloud computing giants, safety of deposits, risks of credit provision, and increasing reliance on supotech by financial supervisors.

- **Reliance on cloud computing providers.** Fintech, as many other industries, increasingly rely on the outsourcing of IT services for core operations. However, outsourcers have become very dependent on cloud computing service providers. Cloud providers often move the source of their services around their networks so there is no longer a place for a customer or a regulator to go to monitor and mitigate risks. Cloud providers may also be reluctant to open up the inner workings of their systems to a regulator's scrutiny. Furthermore, the cloud industry is very concentrated globally, limited to a few giants, so that any failures or disruptions in their operations create systemic risks. Oversight of cloud service providers is needed.

- **Safety of customers' deposits.** Countries are grappling with how to ensure the safety of customer funds held by fintech companies. Should the safety net enjoyed by bank customers be extended to fintech customers? Some countries have ruled this out; others are asking deposit-taking fintech companies to make corresponding deposits in regulated banks, or to create their own deposit insurance pools. These approaches are still being developed. Bankruptcy procedures for fintech remain to be worked out.

- **Capital and liquidity requirements.** Fintech companies lend without capital or liquidity requirements, offloading the risk to regulated financial institutions they partner with. Sufficient capital and liquidity can absorb losses and incentivize providers to take risk management seriously. More generally, licensing practices can be changed to encourage or require fintech to come within the regulatory framework so their risks can be monitored.

- **Risks faced by supervisors embracing fintech in their own operations.** Supervisors increasingly are embracing supotech to manage the ever-increasing data flows from regulated entities, improve analytical capabilities, and to take advantage of big data. This can offer benefits in improving oversight and surveillance, but also carries risks related to the capacity of supervisors, operations, and data.

The IMF and World Bank developed the Bali Fintech Agenda in 2018 to provide a framework for countries to consider in designing policies to harness the benefits of fintech while keeping the financial system sound. These include how to facilitate the safe entry of new products, activities, and intermediaries; how to mitigate the risks of criminal misuse of fintech, using technologies to strengthen compliance with anti money laundering measures; how to ensure the stability of domestic monetary and financial systems; how to assess the implications of fintech innovations to central banking services and market structure.

V. Concluding Observations

The transformative powers of technology have helped the world confront the most serious health crisis in a century. Technology offers many benefits, but it also comes with disruptions and risks that must be addressed and mitigated. Policies can change the impact of technology to serve

society better. Countries need to consider policies to protect vulnerable groups from technology dislocations, help workers adjust and adapt to the digital age, and reduce inequality. Regulatory frameworks need to be upgraded to facilitate competition, protect data privacy, ensure accountability for dissemination of information, and protect cybersecurity. Regulation and supervision of fintech need to be strengthened for financial stability, while facilitating innovations. Policies should be designed with care and coordination, and communicated clearly to stakeholders and markets. Dialogue can help in designing the right policies, within countries among interested groups, and among countries facilitated by international financial organizations. With the right policies, technology can be a new driver for growth and shared prosperity.

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Regulation of Financial Activities of Big Techs

By HERBERT POENISCH*

Big Techs such as Amazon, Facebook, Microsoft in the West and Fin Techs such as Ant Finance and Tencent in China are some of the biggest companies in the world, much bigger than banks and they increasingly venture out into financial activities or leverage off individual products such as payments. The recent example is Facebook which is planning to launch its own cross border digital currency, Diem (before Libra). There are also dedicated FinTech companies, such as Ant Finance which offer a variety of financial services, such as interwoven activities which lead to complex structures which are not easy to regulate and supervise.

The current organisation of regulation and supervision of financial players is based on the old structure. There are dedicated organisations for banks, insurances, securities etc. There have been cross business activities for a while, such as banks offering insurance products. This led to the creation of financial services authorities as regulators and supervisors of entities dealing across financial sectors, such as the Financial Conduct Authority in the UK. Regulation has also covered non financial holding companies offering financial services.

However, regulating and supervising entities which are big in non finance, such as social networks which venture out into finance are a new challenge. Their forte is DNA, Data collection, operating Networks and interwoven Activities. Equally, dedicated FinTech companies like Antoffercross business financial products, thus crossing regulatory lines. In this article two case studies will demonstrate the regulatory dilemma and efforts by authorities to come to terms with them. The first one will be Facebook with its Libra (now Diem) digital currency project. The second one will be Ant Finance with its complex palette of financial services.

This article will not cover the other main concerns about Big Tech such as financial stability risk, operational risk, cyber risk, competition concerns as well as data governance which are addressed by previous contributors. It concentrates on how to capture the financial activities of Big Tech with existing regulatory and supervisory approaches.

1. Principles of financial regulation and supervision

As Governor Yi Gang recently stressed in recent speeches that there should be no unregulated financial services on offer, regardless of whether it is an established bank or a non-bank entity providing it. Similarly, payments instruments should not be linked with other financial services. While is a commendable stance, regulation can be light or tight depending on the systemic importance of agents. For example treating telephone companies offering payment services like a bank is an overkill and decoupling payments from other financial services might stifle necessary innovation. After all, the advantage of a smartphone is that it leverages off the technology to offer a myriad of functions.

Another principle is same business, same risks, same rules. However, rigidly enforcing such a principle would stifle innovation, by subjecting providers of stablecoin to the same regulations as issuers of e-money, such as banks. However, heeding the creation of a level playing field is commendable as it would be less rigid in application.

All current financial services can be divided into the following six categories according to the FSB. Only one regulatory and supervisory authority is charge of each product. (i) Issuing digital currency is put firmly in the court of the central banks as they have the monopoly of providing legal tender and are charged with monetary stability. (ii) Regulating payment services is also

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responsibility of central banks who are in charge of overseeing the functioning of the payments system. (iii) Extending credit such as through P2P platforms is the responsibility of the banking regulator. (iv) Crowd sourcing is a collective investment vehicle and is responsibility of securities supervisors. (v) Wealth management is also an investment activity and thus responsibility of the securities supervisors. (vi) Provision of internet insurance is certainly responsibility of the insurance regulator and supervisor. Like this, all possible financial activities are assigned to specific authorities for so called activities based regulation (AB). However, as the first case study, Diem will show, even clear responsibilities are not easy in application. Secondly, cross financial sector links makes the assignment to one regulator more difficult as the second case study, Ant will show. In this case regulation is moving towards entity based regulation (EB).

2. Issuing a stablecoin by Facebook

The world of central banks has been shaken by the Facebook project to issue a stablecoin, not a cryptocurrency, accessible to its 2.7 billion subscribers.

The project caught the attention not only of these subscribers but of common people all round the world as well. Facebook planned to issue this digital currency by its Libra Association, which counts other organisations as members, such as blockchain companies. The Libra (now Diem) would be linked to a basket of major currencies, with daily value calculations like the SDR. The Diem would readily be convertible back into the underlying currencies, calculated on a daily basis.

The advantage would be online payments and transfers, as well as store of value including for those who do not have a bank account. Thus financial inclusion would be a main beneficiary. The underlying central bank assets would be invested in low risk securities, thus similar to the forex management of central banks. Using existing major currencies, Diem would be importing the trust in central bank issued money. However it is uncertain whether the underlying forex assets have the same credit risk as those underlying present day central bank currencies.

Facebook also promised to respect all present supervisory parameters such as AML-ATF-KYC verification to avoid having Diem misused for illegal activities. Originally the Libra Association applied for approval with FinMa, the financial market regulatory authority of Switzerland. In 2021 it changed location to the USA together with the change of name to Diem. The application is still pending and the approval process is handled by the FED, the US Treasury and the SEC.

The Financial Stability Board (FSB), at the request of the Group of 20 has produced guidelines for the issue of stablecoins, which would also apply to Diem.

The report includes 10 recommendations, characteristics, risks and vulnerabilities of stablecoins as well as regulatory and supervisory issues connected with the issue of such coins.

Regarding the characteristics, stablecoins would fulfil all three basic functions of money, denomination, transfer as well as store of value. The core issue of balancing the supply and demand would be either through asset management of the underlying portfolio or by algorithm. The challenge will be stabilising the value of the stablecoin by either creating or destroying coins. The transfer of coins without a central authority would require a mechanism for validation. The best technology would be distributed ledger technology with blockchain. This would allow permissioned transfers at the beginning as well as permissionless transfers later on. There could also be a division into small permissionless amounts and big permissioned amounts. The cross border use would require cooperation and coordination between national authorities. The FSB and its sub groups would be the right forum to investigate such issues.

The risks and vulnerabilities mentioned in the FSB report address both, the transfer function as well as the store of value function. The value of the stablecoin would fluctuate, just like the SDR, causing a wealth effect on coin holders. Used for payments, would the system be robust enough to function under stress, such as a large volume of transactions, to ensure the smooth functioning without having access to a lender of last resort.

Some countries which issue weak currencies might be worried about currency substitution and capital flight, as its citizens might prefer holding stablecoins rather than the national currency. The issue of monetary sovereignty, which looms large has not be addressed by the report.

In a survey various regulatory authorities responded that some legal provisions for stablecoins exist such as on e-money, collective investment vehicles, or just plain deposits. There is legal uncertainty of whether Diem would be a claim on the Diem Association or the underlying assets. As there are no capital or liquidity requirements planned for Diem, the banks, the issuers of e-money would claim unfair competition, thus violating the principle of same business, same risks, same rules.

Bearing in mind these uncertainties, the approval of the first stablecoin, the Diem is still a while off, possibly not before CBDCs with a cross border application are launched. Ever since the challenge from stablecoins appeared, central banks have intensified their research, trials as well as pilot projects, such as the PBOC and the eCNY.

3. Complex financial institutions such as Ant Finance

China is unique in that it allowed a top of the art FinTech institution to emerge and grow organically without stifling its development. The regulatory regime was rather permissive until 2015. This experiment has created useful innovations but also had downsides as many researchers predicted. This has prompted the authorities to step in, by initially curbing some of the excesses and more recently by starting to disentangle the complex structure and unbundle individual products.

What started by Alibaba as an e-commerce platform, TaoBao spun off a financial subsidiary called Ant Finance. It established it own payments platform called Alipay. This system uses commercial bank money but operates its own payments infrastructure, which is not interoperable with other platforms such as by Tencent or banks and it does not have access to a lender of last resort. The researchers called this the lock-in effect for a captive clientele. Using the float of the payment system, the largest money market fund, Yu'eobao emerged. The big data collected in the course of operating the payment system has given Ant an advantage over established banks. This allowed it to establish a credit rating system, called Zhima which had a lower default rate than traditional bank operated credit scoring systems. Ant used its exclusion power to put pressure on borrowers to service their debts.

The superior information on borrowers allowed Ant Finance to operate a P2P platform, called Zhao Cai Bao where, in the true adherence to information transformation, it managed to put borrowers and lenders together. The lenders were mostly small and medium sized banks which were restricted in their lending due to geographic limitations imposed by the major banks. They provided the funds which were pooled by the platform and channelled to trustworthy borrowers. In case of default, Ant could enforce its exclusion power. Thus the financial transformation was in the hand of banks, with Ant Finance adding a small share of its own funds.

Leveraged on the big data of more than 500 million clients, Ant Finance also established its own digital bank, MYbank, took deposits and lent to consumers and small businesses, called Jiebei without geographic restrictions. MYbank had lower costs as it did not have to run a branch network. At some stage, MYbank provided 20% of consumer loans, with lower costs and a lower default rate than banks. It also issued its own virtual credit card, called Huabei.

Later on it leveraged on its technological prowess, such as facial recognition. It added wealth management within Ant Fortune, financed green investment in Ant Forest. It also sold its own insurance products as well as mutual health insurance, called Xianghubao. It also started a cooperation with the PBoC on the introduction of the digital renminbi eCNY.

In late 2020 Ant Finance planned its IPO in Shanghai and Hong Kong, the largest one ever. However, the authorities stopped the IPO, citing cyber security and data protection. In 2019 the authorities also clamped down on the money market fund by subjecting the payment float to a

100% reserve requirement. On the reverse side they were not allowed access to the liquidity window of the PBoC. Instead a special institution for clearing and settlement between payments platforms HyUnion Clearing was set up under the PBOC. As from beginning of 2021 all customer funds of payment platforms need to go through PBOC accounts. This cuts the ability of these platforms to leverage other financial products off customer deposits.

Governor Yi Gang praised the achievements of FinTech companies in providing financial products to those neglected by major banks, such as micro and small and medium enterprises (MSME) at lower costs, less collateral and lower default rates.

However, on the downside he expressed concern about the collection of vast data, the cross sectoral risk, as customer funds were invested in other financial products. The monopoly position has led to a winner takes it all uncompetitive behaviour. The privacy of data and information security is at risk. Its lending posed serious challenges to established big banks. It was the small and medium sized banks which benefitted from additional business through platforms.

In its regulatory response since 2016 the PBOC tries to fill regulatory gaps, create transparency and a level playing field. The main pillars are that all financial businesses should be licensed and that there should be firewalls between financial products. The monopoly on credit information has to be broken and subjected to guidelines by the PBOC, increase competition of payments providers, remove the algorithm bias and ensure personal privacy through the cybersecurity law.

China has passed an updated regime for regulating financial holding companies to submit all financial service providers under one umbrella as well as to compile consolidated balance sheets. Since early 2021 Ant Financial has been registered as a financial holding company (FHC). The State Administration of Market Regulation (SAMR) is drafting regulation, covering financial regulation, competition regulation as well as data governance. In future, the dynamic FinTech sector will be subjected to tighter regulation and supervision of a mixture of both types, activity based as well as entity based. This casts a shadow over this dynamic experiment which has dramatically changed the financial landscape in China, which was truly unique in disrupting an established structure.

Conclusion

As recent forays of Big Tech and the advanced experience of China in FinTech have shown, national regulators have been caught off guard and are getting organised to address the challenges to financial regulation, competition regulation and data governance. The landscape is still dominated by silos of different authorities, without an established exchange of views and centralised decision making. This is a classical case of recognition lag and reaction lag to evolving technology. To be on the safe side, financial regulators have resorted to what they have been doing, regulating certain financial products.

However, the unique experience of China with the rapid growth of an integrated financial service provider in the form of FinTech, enabled by a permissive regulatory regime can provide society with advanced financial products more efficiently at the expense of creating a monopoly and exercising monopolistic powers harming social harmony. The reaction by the authorities has been an entity based regulation of FHC as well as unbundling of highly intertwined financial services. What seems a regulatory storm not only in finance, but also in other digital products should not turn into a stifling of innovation and returning to past unchallenged positions once the dust settles.

While national regulators struggle to meet the challenges of Big Tech on a national scale, many of these Big Techs are global providers straddling countries and products. There is yet no coordinated international effort to meet these challenges, as several fora address various aspects, such as competition and data protection. In the area of finance, the Financial Stability Board would be the right forum to address the gaps in regulating digital finance. AUN type of world organisation

such as a World Digital Organisation WDO is still a while off while Big Techs use their global freedom to advance their digital products, including digital finance.

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Development of Digital Economy Platforms in China - Risks and Challenges

By JAYA JOSIE*

Since the beginning of the fourth industrial revolution the digital economy has become the foundation of economic development and economic growth. In a comparative paper that refers to developing economies Singh (2017) defines the digital economy as an economy where data and digital intelligence are the chief economic resources, which are employed for sector wide reorganisation of economic activity. The paper distinguishes between the digital industry from the earlier software industry and the internet industry. Singh (2017) shows that the digital economy can extend beyond information, communication and media to all sectors of economy including the service industry, health and education. The paper presents a comparative examination of the digital industrialization strategies of the US, China, India and the EU, and concludes with some recommendations. The author argues that the US currently dominates the digital economy with China a close competitor and, together the two economies present the two successful models of the digital economy.

On the one hand the US strategy is domination by its digital corporations through free and unregulated flow of data both globally and domestically (Singh, 2017). On the other hand, China's approach of state directed capitalism and investment in research and development and innovation in the digital economy have been extremely successful. India and the European Union (EU) have a mixed economy rules-based approach in which the public sector role is important (Singh, 2017). The paper further makes the point that corporations collect data from sources that are considered from a 'commons' pool that often includes personal data and data for natural resources where governments act as legal guardians and managers for such data (Singh, 2017). It is for this reason that most governments around the world have raised serious concerns about the current unregulated mining and use of personal and strategic big data by private corporations.

In recent years India, China, the EU and even the United States (US) are moving towards a more regulated approach towards the digital economy in the face of public concerns of the greater public good and personal privacy. Preempting this tendency in 2017, Singh (2017) presented five key elements for a sound digital industrial policy that China, the EU, India and even the US are seriously considering implementing over the next few years. The five principles for a sound industrial policy include: (1) providing enabling legal and regulatory frameworks, including for easy and secure e-transactions, (2) supporting a start-up ecology and other domestic digital businesses, (3) building public digital and data infrastructures, (4) shaping regulatory frameworks for digital monopolies that are set to control whole sectors, and, (5) as required, developing public/community digital platforms in some key areas (Singh, 2017).

The request for this paper asked for an analysis of the development of so-called 'big tech' in China. However, 'big tech' does not exist in the real world. In the digital economy you only have consumer service platform companies and innovative software companies. In China, consumer service platform companies are inappropriately referred to as 'big tech' because of their tendency towards becoming monopolies. It is a tendency that Singh (2017) predicted in his paper. It is this monopoly and anti-competitive tendency that governments in China, India, the EU and the USA

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now wish to regulate. The paper will briefly assess the development of consumer service monopolies in China.

In recent years China's e-Commerce digital economy platforms have evolved into monopoly companies and started investing and diversifying into the financial sector with a particular focus on mobile payments, car-hailing, online education and food delivery services. Digital economy e-commerce firms such as Alibaba and Tencent, Baidu and Didi have come under scrutiny and fined for monopolistic and anti-competitive behaviour. There is much speculation in the media that China wants to excessively regulate and stifle its digital economy platform companies. This type of speculation started after China stopped the initial public offering (IPO) of Ant Financial on the Shanghai and Hong Kong stock exchanges. There is a sense that much of the speculation is driven by the new anti-China sentiment that is currently pervasive in the western media. However, there are more sober analyses that take into account the principles advocated by Singh (2017).

In a recent article Chorzempa (3 August 2021) recognizes that China has legitimate public policy reasons for regulating its e-commerce consumer service platforms. The author argues that China is motivated by similar reasons advocated by India, the U.S and Western Europe. The reasons demonstrate that in the face of uncontrolled growing consumer platform monopolies, governments must exercise their right to assert their authority in the interest of the public, consumers and free and fair competition. It is in this respect, that the Politburo of the Communist Party of China (CPC) announced that it would "prevent the disorderly expansion capital".

Apart from Ant Financial's challenges, DiDi Global, Alibaba, Tencent Holdings and Baidu have been fined for anti-competitive practices. These actions were reinforced by new regulations for overseeing e-commerce consumer service platforms. The regulations include antitrust and personal data protection (Chorzempa, 2021). In fact many of China's digital industry regulations are exactly in keeping with the elements proposed by Singh (2017). Globally, there is growing concern about the risks that digital economy e-commerce companies present with respect to data collection, personal privacy and anti-competition behaviour. A greater risk is platform companies concentrating excessive power in the digital economy. The new US administration has prioritised the same concerns that regulators in China have expressed and the US is most likely to introduce similar regulations.

The regulators in China have become aware that the private digital economy sector has become extremely powerful as they move away from providing only e-commerce services and now enter and attempt to dominate the finance service sector through super applications (app) based on new sophisticated algorithms. It was reported in the media recently that Tencent, the major social media company in China, prevented its users from using its WeChat app for sending links to Tencent's rival Alibaba's e-commerce websites. The power of both Tencent and Alibaba meant that small merchants and start-ups were forced to enter into exclusive distribution agreements with these two companies because they have users that use their apps. Another example of monopoly control of data was the DiDi ride hailing company in China refusing to divulge data to the authorities after customers of DiDi's service were murdered. The aims China has for all the sectors in its digital economy are no different from other countries grappling with concentration of power and the protection of personal data.

At least one author believes that these e-commerce platforms should not be called 'Big Tech', Wheeler (2021). The author argues that the label 'Big Tech' is misleading and believes that the label promotes the American policy misconception that the consumer market dominance of the digital economy by e-commerce platform companies is essential for their ability to innovate in the interests of national security (Wheeler 2021). The author further suggests that China's policy stance is a recognition that there is a difference between "consumer tech" innovation that produces new consumer services and, the "deep tech". China recognizes that there is a difference between 'consumer tech' innovation for consumers and 'deep tech' cutting edge innovation needed for national security. The so-called 'Big Tech' companies are primarily concerned with servicing their

customers by matching information from users with advertisers. So what we call ‘Big Tech’ in China should in fact be called “consumer tech” e-commerce platforms because although they use internet technology developed by other software companies at taxpayers expense they do not add value to national security. They develop and innovate for their own profits and shareholders and not in the interests of the country (Wheeler, 2021).

China’s new regulations open up the data bases kept by the e-commerce platform companies and these companies will be required to share data they have collected with the state and other companies to use for competitive purposes. The State Administration for Market Regulation (SAMR) of China proposed additional regulations that include prohibiting the use of “data, algorithms and other technical means” to influence user behaviour or “hijack traffic, interfere or impose barriers” to the operation of other internet services (Wheeler, 2021). Many other countries and regions are contemplating similar policies. For example, the EU’s recent Digital Markets Act and Digital Services Act also recognise the anti-competitive and anti-consumer behaviour of the monopoly e-commerce digital platforms.

All governments should be able to assert their roles to protect public interest. However, as the U.S. has been unable to establish independent monitoring and oversight of the internet platforms many of the platform companies act like governments and create and impose policies that benefit their shareholders. The latest system of regulations introduced by China is an important and essential oversight and monitoring policy to balance the control of the platform companies. China has recognized that supervision and regulation of the “consumer tech” platform monopoly companies will promote consumer welfare, worker rights and technological advancement in support of national security.

The protection of consumer welfare and worker rights is written into the DNA of the Communist Party of China (CPC) and was always part of the history of CPC. However, western commentators such as Sha Hua (2021) in the Wall Street Journal (17 September 2021) argue that the recent call by the CPC for common prosperity and unionization of workers is nothing but Beijing’s strategy for ultimate control. Given this level of ignorance, it is perhaps important to place the call of the CPC in context. The notion of “Common Prosperity” for China was first articulated in the 14th Five Year Plan that was drafted in October 2020, approved, and adopted on 11 March 2021, and finally published in June 2021 by the Communist Party of China (CPC). The search for Common Prosperity follows China’s acknowledgement that with the elimination of absolute poverty in China by 2020 the country is now on the way to becoming a “moderately prosperous society”. Much of China’s rapid movement towards a moderately prosperous society is due to the principle of New Democracy adopted by CPC in the early fifties. This New Democracy gives the masses of the people the ultimate decision in the trajectory of socialism with Chinese characteristics. New Democracy is a ‘system of real universal and equal suffrage, irrespective of sex, creed, property or education, ... In economic terms, large industrial, financial, and commercial enterprises would come under state ownership... the republic will neither confiscate capitalist private property in general nor forbid the development of such capitalist production.’ (as cited by Marc Blecher, 2019, Chapter 25 New Democracy ANU (pp. 155-160)). Today China has recently declared that it has finally eradicated absolute poverty in the country, and is on the way to achieving the UN’s Sustainable Development Goals SDGs.

China has developed phenomenally over the past 30 years it has shown how the Socialism with Chinese Characteristics under the New Democracy can foster innovation, research and development, technological advances and peaceful coexistence at home and internationally.

In 2020, during the Fifth Plenary session of the 19th Central Committee of the CPC, it was noted that common prosperity of all the people has made substantial progress and should be promoted as an important objective of the CPC as part of the long-term 2035 goals set out in the 14th Five Year Plan. This decision was endorsed on 11 January 2021 at a CPC seminar where it

was emphasized that common prosperity is not just about economic growth but also about bridging the income gap between the rich and the poor; overcoming regional disparities between the urban and rural districts; addressing sustainable industrialization for a cleaner climate. The Statement from the seminar called for the promotion of all-round social progress and all-round human development, social equity and justice; and to ensure that the fruits of development benefit all the people in a more equitable way to enhance their sense of gain, happiness and security and move beyond a mere slogan. However, Sha Hua (2021) views the recent implementation of the CPC policies as an effort to control the ever growing digital economy monopoly e-commerce platforms.

The recent (September 2021) engagement between the e-commerce platform companies and the Government is seen as forcing the companies to improve the conditions of the millions of contract workers servicing the digital economy. In the article the writer (Sha Hua 2021) acknowledges, however, that the engagement addressed the need to improve worker pay and benefit and adjust algorithms that breached antitrust, data security and worker's rights. Despite the negative tone of the article the writer admits that the new policies are a new stage in China's policy to redistribute the enormous wealth generated over the recent past. The writer further admits that the CPC's focus on labour and worker's rights is likely to benefit workers given that about 600 million workers earn about US\$140 a month. The writer also reports that many digital economy firms are trying to organize worker unions.

The digital economy presents a great opportunity for inclusion of the population that has been marginalized over the years. China and developing countries have an opportunity create frameworks for financial inclusion and also balance the needs of the consumer against the regulations faced by the digital industries and financial service providers. As financial technologies advance, the range of suppliers include traditional banks, mobile network operators, financial technology entrepreneurs, nonbank financial institutions, rural banks, savings and credit cooperatives (SACCOs), payment providers, credit unions, insurance managers, wealth managers, investors and other operators, with each serving a segment of the financial sector. In China many e-commerce platform companies are also financial service providers successfully supporting the needs of the low-income segment by introducing appropriate business models that factor in the abilities of the low-income consumer. These financial service providers understand that there is a willingness amongst the poor to pay for financial services that meet their needs. Sustainable product usage is achieved when both the consumer and supplier of financial services benefit from the structure and institutions supporting the sector. Policies and regulations must support the drivers of financial inclusion from the consumer's perspective that include:

- Access to a financial product and awareness of how and where to access the product or service and by having an appropriate device to access the product/service and the network infrastructure.
- Affordability reflects the true transaction cost affecting the consumer that is inclusive of the transaction charge; the cost of internet access and cost of transport (if necessary). Also, when promoting affordability, one must recognize the earning patterns of the low-income segment who receive income on an irregular basis.
- Consumer education is inclusive of the level of literacy, numeracy, digital skills and financial literacy.
- The influence a range of concerns such as awareness, the ubiquity of service, trust in the product/service, and having the necessary documentation influence the consumer's ability to adopt the service.
- There is a need to expand product offerings from payments services to a broader range of products such as credit, savings, insurance and wealth management.

From the supply perspective, policies and regulations must as well support the needs of the digital economy service providers to take into account the fact that:

- The innovators must be technologically capable of having both the technical knowledge and financial knowledge to understand how their business idea solves a social problem. The financial service provider also requires infrastructure and tools to perform their craft.
- The entrepreneur requires access to capital or collateral to gain entry to the market or secure a banking license.
- The regulatory framework must be conducive to innovation, balancing innovation opportunities and risks to consumers.
- In order to ensure that products are designed to meet the needs of the low-income segment, knowledge of local conditions and practices is required. Such knowledge is especially important given the lack of available data describing the conditions and behaviours of those in the low-income segment.

China's new policies and regulatory frameworks attempt to address the issues of inclusion, innovation, consumer and worker rights and in the quest for common prosperity. The paper suggests that the model that China presents is seen as a threat to capitalist domination, and China and other socialist countries have become the target of a new cold war. The developing world and other emerging markets see through the smoke screen of the New Cold War. With the Belt and Road Initiative (BRI) China is showing the world that there is an alternative way to development. China's People's Democracy has allowed for some capitalist growth under socialism, but it has prevented the wholesale development of monopoly capitalism with an effective system of state regulations to ensure common prosperity.

Although the focus of the new development agenda and common prosperity is national in nature it is now apparent that the success of the country's new growth path is inextricably linked to China's role in the global economy and a multilateral approach to development and global governance "to build a more equitable and just architecture that meets the common aspirations of all countries." (President Xi Jinping; Wall Street Journal, 22.09.2015). The new transformation agenda for a China's economic transformation and upgrading will focus domestically on expanding domestic consumption, new types of industrialization, IT application, urbanization and agricultural modernization while pursuing green growth and creating new opportunities for balanced development for common prosperity. For developing and emerging economies multilateralism in the form of cooperation and an expanded role for new forms of trade and investment is fast becoming an integral component of China's new development model. Consequently, as China takes on a more leadership role in the world the multilateral element of its new approach is set to become the catalyst for promoting international investment and the interconnected economy that will promote common prosperity within the new policy captured in the Belt and Road Initiative (BRI)

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China

Renminbi Internationalisation Getting Back on Track^{*}

By HERBERT POENISCH^{*}

The issue of whether the internationalisation of the renminbi is a good idea is being discussed both in China and the rest of the world. Domestically, opinions are divided between hotheads, who want to see the renminbi replace the dollar as soon as possible, and realists, whose views are similar to Japan's prudent policy-makers in the 1980s. The prevailing sentiment of Chinese authorities is that it is a good idea in the long run but not an urgent priority. 'Internationalisation' wasn't mentioned in a major 2013 manifesto and the word has only recently cropped up in official documents.

Internationally, actions speak louder than words. According to the 2021 OMFIF Global Public Investor, central banks have expressed an intent to increase the share of renminbi in foreign exchange reserves. Private holders have flocked to buy renminbi securities, tempted by appreciation, inclusion of Chinese markets in various indices and diversification of capital allocation.

There are two reports that give a clear, up-to-date picture of where internationalisation of the renminbi stands. The first is by the International Monetary Institute in Beijing, published in July, and the second came from the People's Bank of China in August.

The overall message of the IMI report is that renminbi internationalisation is back on track, as measured by the renminbi internationalisation index. According to this index, business in renminbi expanded rapidly between 2009-15, stagnated between 2016-19 and resumed growth in 2020. The index contains measures on trade in goods and services as well as on finance. The flows in finance are made up of the balance of payments components, foreign and outward direct investment, portfolio flows, and other investments, mostly loans and derivatives. Holdings of renminbi are either private or in official foreign exchange reserves.

Payments for trade in goods and services are major contributors to the index. The share of Chinese exports and imports settled in renminbi has increased steadily to 20%. The share of renminbi receipts and payments were roughly balanced. The SWIFT RMB Tracker cannot be compared as it measures various payments beyond trade, though here the renminbi's share has gone up to 2.46% from 1.76% in mid-2020.

Financial flows have contributed substantially to the index. The share of FDI in renminbi is around 30% whereas the ODI share is around 40%. Portfolio investment by foreigners in China has picked up markedly in 2020, both in the Chinese bond market and Chinese equities. By the end of 2020, foreigners owned about 5% of each of the domestic bond issues, though a smaller share of equities. The only substantial foreign holdings are in Chinese government bonds, which are close to 10%. The share of cross-border lending in renminbi as a proportion

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of total renminbi bank lending is only 0.35%. The renminbi makes up less than 5% of private multicurrency portfolios. Similarly, global official holdings in renminbi are still small, but increased to 2.28% from 1.88% during 2020. Holdings of offshore renminbi deposits and certificates of deposits in Hong Kong amounting to Rmb800bn in early 2021 are still well below the peak of Rmb1.2tn at end of 2015.

During 2020, when the renminbi appreciated by close to 10% against the dollar, the authorities promoted capital outflows in view of the strong capital inflows. The process is still highly engineered and a far cry from market adjustment. With the reticence of authorities to open up the capital account, and access to renminbi for foreign investors tightly controlled, renminbi internationalisation cannot be compared to other international currencies, which are freely used bilaterally as well as multilaterally, as evidenced by the euro-dollar market.

China's Post-Pandemic Growth: Reaching Out and Developing Internal Markets and Wellbeing

By PETER KOENIG*

“Post-Pandemic” for many countries, especially western countries, is a dream. The west will have to wake up fast, if it doesn’t want to fall prey to a destructive plan of chaos, unemployment, bankruptcies, and, yes, famine – shifting of capital from the bottom and the middle to the top – and leaving misery at the bottom.

Not so for China. For China, the post-pandemic era is well under way.

When SARS-CoV-2, later renamed by WHO to Covid-19, hit Wuhan in January 2020, China was prepared. Chinese authorities proceeded with warp-speed to prevent the spread of this new corona disease, by a radical lockdown of Wuhan and extending it to Hubei Province. Later, other areas of risk were locked down, including about 80% of China’s production and manufacturing apparatus. The result was astounding. Within a few months, by about mid-2020, China was in control of Covid, and gradually started opening up crucial areas, including the production process. All the while maintaining strict protection measures.

By the end of 2020 China’s economy was practically working at full speed – and achieving, according to IMF’s – very conservative account – a 2.6% growth for the year. Chinese own and perhaps more realistic projections were closer to 3.5%. IMF growth projections for China in 2021 stand at 8.4%. China’s economic expansion in 2022 is projected at 5.6%. This is way above any other country in the world.

Compare this with 2020 economic declines way into the red for the US and Europe, of 25% to 35%, and 10% to 15%, respectively. These are real figures. Not necessarily the published ones.

Future expansion in China takes into account that much of the projected growth over the coming years will be internal “horizontal” growth – helping China’s interior and western provinces catching up with infrastructure, research and development, as well as education facilities – increasing the overall level of well-being to reduce the gap with the highly-developed eastern areas.

China’s economic recovery and her industrial apparatus working at full speed, is good for China and good for the world, because China had become in the past four decades or so, the western principal supply chain, mainly the US and Europe. We are talking crucial supplies, such as medical equipment, medication and ingredients for medication – about 80% - 90% used in the west comes from China.

China’s rapid economic growth may be mostly attributed to two main factors: large-scale investments – financed by predominantly domestic savings and foreign capital – and rapid productivity growth. These two features appear to have gone hand in hand.

China remains attractive for investors. In addition to medical equipment, China supplies the west and the world with electronic equipment and is meant to become one of the key developers and exporter of Artificial Intelligence (AI) to accelerate and facilitate research and manufacturing processes, while minimizing negative environmental impacts.

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China's outlook for the future is bright. However, a number of abnormal factors have to be considered, like

(i) The unresolved covid issues in the west, which may be reducing demand naturally or by force – possibly import restrictions for goods from China as a way of constant pressure on China;

(ii) Continuation of a direct and indirect trade and currency war on China. To the detriment of the US-dollar, China's currency, the yuan – and soon the digital yuan as an international payment currency, independent from western controlled monetary transfer modes, is gaining rapidly in status as an international reserve money. According to some estimates, in five years the yuan may account for up to 30% of all world reserves. As a parenthesis, the US-dollar in the early 1990s amounted to more than 90% of worldwide reserve denominations; today that proportion has shrunk to less than 60%; and

(iii) The west, led by Washington, is intent to harm China in whatever way they can. It will not succeed. Washington knows it. But it is a typical characteristic of a dying beast to lash around itself to destroy as much as possible in its surroundings, before it collapses.

Just as an example which the world at large is probably unaware of, China is presently surrounded by about 1,400 US military bases, or bases of other countries which host US military equipment and personnel. About 60% of the US navy fleet is currently stationed in the South China Sea.

Just imagine what would happen, if China or any other super-power, would be surrounding the US with military basis and an aggressive Navy fleet!

China is constantly harassed, sanctioned and slandered with outright lies. One of the prevalent examples of defamations, is her alleged inhuman treatment of the Uyghurs in Xinjiang province. Total population of the Xinjiang Uyghur Autonomous Region in Northwestern China is about 26 million, of which some 12 million are Uyghurs, mostly of Muslim belief.

Uyghur Muslims are regularly recruited by US secret services from across the border with Afghanistan, sent to fight the Jihad in the Middle East, and when some of them return, China makes an effort to re-school and re-integrate them into society.

Could the real reason for this western aggression be, that Xinjiang province, the largest and western-most province of China, is also a principal hub for the two or more main routes of the Chinese Belt and Road Initiative (BRI) – trans-Asia Routes, by rail through Pakistan to the Gwadar Port in the Persian Gulf, and possibly by road through the newly to become autonomous Afghanistan, connecting China with Iran?

China is perceived as a threat to western hegemonic thinking – to western-style globalization, which is the concept of a One World Order over a borderless western corporate and banking-controlled world – and because China is well positioned to become the world's number one economy in absolute terms within a few years.

These are challenges to be kept in mind – in planning China's future economic development.

In fact, already today China is number one in PPP-terms (purchasing power parity), which is the only indicator that counts, namely how much of goods and services may be acquired with a unit of currency.

Taking these challenges into account, and following her non-aggressive and non-expansive moving-forward style, China may be embarking on a three-pronged development approach. Overarching this tactic may include China's 2025 Plan and 2035 / 2050 vision: A strong emphasis on economic and defense autonomy.

(i) Outreach and connecting with the rest of the world through President Xi Jinping's Belt and Road Initiative, also called One Belt One Road (OBOR) which is patterned according to the ancient Silk Road, more than 2,100 years ago, a peaceful trade route connecting Eastern China, through Asia, Europe and the Middle East.

On a global scale, OBOR embraces currently more than 130 countries and over 30 international organizations, including 18 countries of the European Union. OBOR offers their partners participation – no coercion. The attraction and philosophy behind OBOR, is shared benefits – the concept of win-win. OBOR may be the road to socioeconomic recovery from covid consequences and cross-border cooperation for participating countries.

OBOR is also aiming at a multi-polar world – where partner countries would equally benefit through infrastructure, industrial joint ventures, cultural exchange – exploration of new renewable sources of energy – research and education projects – working towards a joint future with prosperity for all.

Here is the distinction between the western and Chinese meaning of “globalization”. In the west, it means a unipolar world controlled by one hegemon, the US of A, with one army called NATO which forcibly holds the west, mainly Europe, together. NATO, with its 2.5 billion-dollars official budget – unofficially a multiple of this amount, reaching into the trillions – spreads already with its tentacles into South America, Colombia.

Together the west, or Global North, is a conglomerate of NATO-vassal-countries with little autonomy, as compared to Chinese globalization – meaning a multi-polar connection of countries, all the while OBOR-linked countries maintain their sovereignty. This is “globalization” with Chinese characteristics.

(ii) In a precautionary detachment from western dependence, China is focusing trade development and cooperation with her ASEAN partners. In November 2020, after 8 years of negotiations, China signed a free trade agreement with the ten ASEAN nations, plus Japan, South Korea, Australia and New Zealand, altogether 15 countries, including China.

The so-called Regional Comprehensive Economic Partnership, or RCEP, covers some 2.2 billion people, commanding about 30% of the world’s GDP. This is a never before reached agreement in size, value and tenor.

China and Russia have a longstanding strategic partnership, containing bilateral agreements that also enter into this new trade fold. The countries of the Central Asia Economic Union (CAEU), consisting mostly of former Soviet Republics, as well as members of the Shanghai Cooperation Organization (SCO), are likewise integrated into the eastern trade block.

The RCEP’s trade deals will be carried out in local currencies and in yuan – no US dollars. The RCEP is, therefore, also an instrument for dedollarizing, primarily in the Asia-Pacific Region, and gradually moving across the globe; and

(iii) China will focus much of her future development on her internal and western regions – increase the standard of wellbeing of populations, infrastructure, research and development – industrial development, joint ventures, including with foreign capital. To achieve a better equilibrium between eastern and western China is crucial for socioeconomic sustainability.

This dual development approach, on the one hand, external trade with close ASEAN associates, as well as with OBOR partners; and on the other, achieving internal equilibrium and wellbeing, is a circular development, feeding on each other, minimizing risks and impacts of western adversary aggressions.

China’s achievements in her 71 years of revolution speak for themselves. They are unmatched by any nation in recent history. From a country largely ruined by western-influenced colonization and conflicts, China rose from the ashes, by not only lifting 800 million people out of poverty, but also by becoming food, health and education self-sufficient.

Coinciding with the 4 March 2021, opening of the Chinese People’s political Consultative Conference (CPPCC), Robert F. Kennedy Jr., late President John F. Kennedy’s nephew, asked the pertinent question, “Can We Forge a New Era of Humanity Before It’s Too Late?” – His answer

is simple but lucid: “Unless we move from a civilization based on wealth accumulation to a life-affirming, ecological civilization, we will continue accelerating towards global catastrophe.”

This understanding is also at the forefront of China’s vision for the next 15 to 20 years – and beyond. A China-internal objective is an equitable development to well-being for all; and on a world-scale, a community with shared benefits for all.

Global Economy

The Lessons We Are Learning from the COVID-19 Pandemic: An FSB Perspective^{*}

By DIETRICH DOMANSKI^{*}

Thank you for inviting me to Finance China 2021.

Vaccines are rolling out across the globe, even though at different pace across countries and regions. And while there are mounting signs of global recovery, some risks to financial stability still remain elevated. Economic uncertainty is still high and negative surprises could test the liquidity of financial markets. Moreover, while borrowing served as an important lifeline during the pandemic, in some jurisdictions solvency risk remains an issue amid higher corporate debt levels. And, collectively, we face the challenge of managing the potential spillover effects from an uneven pace of recovery across regions.

While remaining vigilant to emerging vulnerabilities, the FSB is beginning to draw lessons from the pandemic for financial stability. I would like to share a few preliminary reflections on those lessons with you today.

The COVID-19 pandemic is the first major test of the global financial system since the G20 regulatory reforms were put in place following the financial crisis of 2008. The global financial system has weathered the shock so far, thanks to two factors: a determined and bold international policy response; and greater financial system resilience.

The policy response to the pandemic was unprecedented. Authorities acted swiftly to sustain the supply of credit to the real economy, support financial intermediation, and preserve global financial stability, using fiscal, monetary, and prudential policy levers. These combined actions were effective in easing financial strains and in ensuring the continued supply of financing to the real economy.

Crucially, this policy response was supported by the stringent regulatory standards put in place by the G20 and coordinated through the FSB following the 2008 financial crisis. Because of these reforms, the financial system entered the pandemic in a more resilient state than during the 2008 financial crisis. Large banks hold more capital, have more liquidity and are less leveraged. This allowed them to cushion, rather than amplify, the macroeconomic shock.

Financial market infrastructures, particularly central counterparties, functioned as intended. Taken together, one overarching lesson from the pandemic concerns the crucial importance of a resilient global financial system. Let me elaborate on four areas of policy work that will be important to promote financial resilience going forward.

First, it is important to complete the implementation of the remaining elements of the G20 reform agenda. Indeed, those parts of the global financial system where implementation of post-crisis reforms is most advanced displayed the greatest resilience. The financial stability benefits of the full, timely and consistent implementation of the reforms, including with respect to Basel

^{*}This is the keynote speech on the Asian Banker Finance China 2021 Conference: New Era, new finance and new collaboration from BIS.
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III, over the-counter derivatives or resolution frameworks, remain as relevant as when they were initially agreed.

At the same time, we need to ensure that the reforms are working as intended. The evidence we have gathered thus far already suggests some specific elements of the regulatory framework that warrant further examination. These include the role and usability of capital and liquidity buffers; the performance of countercyclical elements in prudential regulation; and potential remaining sources of excessive procyclicality, whose impact may have been dampened or delayed as a result of the official sector support.

Second, there is a need to strengthen resilience in the non-bank financial intermediation (NBFI) sector. In March 2020, key funding markets experienced acute stress. This highlighted vulnerabilities in particular activities and mechanisms in the sector stemming from liquidity mismatches, leverage and interconnectedness, which may have caused liquidity imbalances and propagated stress. In response, the FSB has developed a comprehensive work programme to enhance the resilience of the NBFI sector while preserving its benefits.

As a first deliverable under the NBFI work programme, we have developed policy proposals to enhance the resilience of money market funds. These proposals are currently out for public consultation. We will use this feedback to develop our final proposals, which will be delivered to the G20 for approval in October. We also have work underway on open-end funds, margining, bond market structure and liquidity, and cross-border dollar funding. Once we have completed this work on individual risk drivers, we will focus on the issue of system-wide risks in NBFI and ways to address them.

Third, the pandemic experience has also reinforced the need to promote resilience amidst rapid technological change in the economy and the global financial system. Financial institutions and FMIs moved to a remote working environment without major reported incidents. No major cyber incidents have been reported in the financial system but the number of cyber attacks has increased. More generally, working from home arrangements propelled the adoption of new technologies and accelerated digitalisation in financial services.

While outsourcing to third-party providers, such as cloud services, seems to have enhanced operational resilience at financial institutions, increased reliance on such services may give rise to new challenges and vulnerabilities. Effective management of such risks across the supply chain is essential to mitigating operational and cyber risk. This is an important part of the broader FSB agenda to address financial stability risks from digital innovation while harnessing its benefits, including work on crypto assets and new entrants into the provision of financial services.

Last but certainly not least, we need to address the financial risks of climate change. Work in this area has gained considerable momentum in multiple forums, and – given the global and cross-sectoral nature of climate change – the FSB has a natural role to play in helping to coordinate, shape, and seek agreement on a path forward in this space. To this end, the FSB has developed a roadmap for addressing climate-related financial risks. The roadmap, which we published at the start of the month, identifies where climate-related work on financial risk is underway, and what work is needed, in four closely related areas: (i) firm level disclosures; (ii) data needs for the assessment of climate-related financial risks; (iii) the assessment of financial vulnerabilities from climate change; and (iv) the development and application of regulatory and supervisory tools.

The FSB's focus is on addressing financial risks related to climate change, rather than promoting green – or 'sustainable' – finance. But the two are complementary. Financial resilience, is a precondition for the stable provision of sustainable finance. By the same token, sustainable finance based on sound risk management contributes to financial resilience.

Let me conclude. The FSB's work since the beginning of the pandemic demonstrates the

continued commitment of the international community to take the necessary steps to ensure the resilience of the financial system and support continued financing of the real economy under extraordinary circumstances. This international cooperation will be critical as we navigate our way out of the COVID pandemic, supporting a resilient financial system and ensuring a strong, sustainable global recovery.

IMF Shifts Approach to Low Income Countries and Special Drawing Rights*

By MARK SOBEL*

Before its summer recess, the International Monetary Fund board tackled two key operational issues – future concessional support for low income countries and ‘channelling’ special drawing rights. By initial appearances, the Fund is moving boldly forward, but the fanfare exceeds reality, with more grant resources being sorely needed.

IMF concessional LIC lending is extended through the Poverty Reduction and Growth Trust (PRGT), an endowment largely funded through national contributions and built to sustain annual lending of \$1.75bn interest free, essentially under IMF programmes.

Last year, the IMF provided large scale, welcome PRGT emergency liquidity support of around \$9.5bn. The scope for rapid liquidity support is now largely exhausted. Still, the Fund has made substantial PRGT commitments, mainly under its programmes, of \$6.5bn this year.

Given this pandemic funding, and ongoing LIC Covid-19 needs, the Fund sought and received members’ backing to raise contributions and boost future LIC access to programmes and financing.

IMF estimates of future PRGT demands may be plausible. But over the years, they have been high and disbursements have inevitably lagged given that programmes pay out over years and often go off track or are cancelled.

To compensate for heavy 2020-21 lending and for demand estimates to be met, higher creditor contributions are required – especially grants, so PRGT loans can continue without interest. For the near term, the IMF is seeking over \$3bn in creditor grant contributions. This is an enormous amount. For example, the US – accounting for nearly one-fifth of the Fund’s weight – sought \$100m in its latest budget request for possible PRGT subsidies, one-thirtieth of the Fund’s hoped for amount. This underscores how heroic the task may be and that the US should do more.

The IMF also wishes to lift the self-sustained PRGT lending capacity from \$1.75bn per year to \$2.3bn, necessitating even further loan and subsidy resources. But the Fund is kicking the can down the road, noting it will review whether this increase is needed in a few years and then explore financing options, which may include limited gold sales. Mobilising grants is not easy and selling limited amounts of IMF gold, even if worth considering, has proven historically challenging.

The IMF’s \$650bn general SDR allocation is now a done deal. Supporting it was a no-brainer for the Biden administration. President Donald Trump’s team was isolated in opposition and President Joe Biden’s support offered a quick win for US multilateralism.

But the vast bulk will end up on balance sheets of countries with little need for SDRs – perhaps accounting for up to \$500bn of allocations. LICs will receive only \$21bn. Past use of allocated SDRs has been modest.

To address these challenges, the focus now is on deploying allocated SDRs for global public goods or development, especially for LICs. Hence, the membership is discussing ‘channelling’ SDRs. The G7 proposed doing so up to \$100bn. The US Treasury has requested authorisation to lend up to \$21bn to the PRGT or other IMF facilities.

Lending SDRs to a trust to augment conditional PRGT programmes is straightforward. So is such lending to other emerging markets or developing countries to top off IMF programmes.

*This article first appeared in OMFIF Commentary on August 10, 2021.

Mark Sobel is US Chair of OMFIF.

Operational issues would be raised but are manageable. Co-financing multilateral development bank guarantees seems operationally complex and could raise the question of why MDBs are not doing more in these areas already.

The IMF is also discussing creating a resilience and sustainability trust, to lend channelled SDRs to countries alongside plans to combat the pandemic or promote climate resilience. Doing so raises nettlesome issues.

Many speak of such contributions as ‘donations’. They are not. The channelled SDRs will be loans, not grants. LICs need grants, not more debt.

Will channelled SDRs be lent alongside an IMF macroeconomic programme? Doing so could reinforce macroeconomic stability but diminish demand.

The Fund is a short-term macroeconomic lender. The World Bank and MDBs are project and structural lenders. Fund resources are catalytic. Addressing climate change has major macroeconomic ramifications. But what role should the IMF play and what share of the burden should it assume?

What form of conditionality, if any, should be included? Fighting the pandemic is hopefully a near term task. Fighting climate change will take decades.

IMF maturities extend up to 10 years. Would that be the case for channelled SDRs?

Creditors will want channelled SDR loans treated as liquid reserve assets, insured against credit risk.

Though the Reliance and Sustainability Trust (RST) has been heavily touted by Kristalina Georgieva, the IMF’s managing director, and many leading policy officials, these issues are nowhere near close being resolved. The RST is a long way off.

The Fund’s aspirations to support the poorest countries are noble and laudable. Budgetary, political and operational realities facing creditor governments, however, pose heroic challenges. So far, despite much fanfare, the Fund and its members are off to an uncertain start.

New Approach to MSME Financing in Asia Pacific*

By TAMARA SINGH*

For some months now, the People-Centred Internet has been working with the Indonesian National ICT Council and the Digital Divide Institute on how to bring meaningful financial participation to micro-, small- and medium-sized enterprises. The aim is to develop an ecosystem under which MSMEs are incentivised to both improve their financial and digital literacy, and begin their journey towards meeting the United Nations sustainable development goals.

The UN Economic and Social Commission for Asia and the Pacific's Rethinking MSME Finance in Asia and the Pacific: A Post-Crisis Policy Agenda report put forward the concept of a 'digital enso'. 'Enso' is a term taken from Zen Buddhism, meaning a circle that is drawn in one brushstroke, leaving the drawer's mind and body free to create. In this context, the report explains that 'the bundling of access to finance with other service offerings could create an opportunity for an MSME to focus on its core competencies, and not be distracted by the additional burden of having to make do with more traditional, ill-fitting financial offerings.'

For example, a business that produces food could win financing for a clean stove that would improve that business' fuel consumption and carbon footprint. The financing for this stove might come with a requirement to adopt simple digital bookkeeping solutions, so that financiers (and MSMEs alike) can monitor the commercial health of the borrower. The MSME could partner with a financier who, on completion of certain milestones, would provide a second clean stove to another MSME – effectively creating a digital savings circle. The MSME could be awarded carbon credits, which it could use to create a secondary revenue stream via voluntary carbon exchanges through platforms such as Climate Impact X, or exchange with its financier for incentives.

The same concept could be proven with agriculture businesses. MSMEs with tree planting practices in palm, jamu (traditional Indonesian medicine) and coffee, for example, may naturally lend themselves to an ecosystem in which they can access financing at preferential terms to incentivise carbon-positive outcomes. This approach respects what the MSME is good at, identifies which of those activities can be remunerated and considers demand for what the MSME produces. The possibilities are vast.

These are not pipe dreams either. The concept has been proven in part. In Honduras, a clean stove non-profit organisation digitised its operations to win gold standard-verified carbon credits. In Singapore, the Infocomm Media Development Authority's SMEs Go Digital programme has seen 75,000 SMEs adopt tools to help them in their digitisation journey since 2017.

However, for MSMEs to access financial products in a digitised economy, their data must first be digitally available to providers. Historically, fintechs and other technology innovators have either generated financial data relating to MSMEs or acquired this through commercial negotiation. This limits the ability of alternative providers to readily access that data and better assess the creditworthiness of the MSME. But as Mei Lin Fung, chair of the People-Centred Internet, points out, there is little incentive for change: 'Those currently holding the biggest data reservoirs have least incentive to share, and doing this across borders adds still new complexity to the policy challenges.'

However, the UNESCAP report rightly suggests that the move towards endemic living provides an opportunity to recalibrate existing approaches to MSME finance. To truly enable MSMEs to embrace digitisation, creation of primary data must be intuitive and unimpeded.

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*Tamara Singh is Adviser and former Head of Asia Pacific at OMFIF.

The time has come for data to be created and made available on equal terms. The expensive burden of securing this data should be determined by the data accessed rather than the business purpose of data users. Finance providers would then be better placed to integrate financing products into their services without taking unnecessary risk or affecting user experience.

MSMEs should be incentivised to experiment with adopting digital solutions that may open doors to a wider spectrum of products, services and revenue streams. This use of digital tools is necessary to support wide-scale adoption of digital currencies and is a long-term inevitability. By taking action now, we might avoid further widening inequality as we progress towards more digitised futures. ‘A massive and meaningful mobilisation of micro, small and medium enterprises could be a main driver of post-Covid economic recovery for Indonesia and other mid-level developing countries,’ said Ilham A Habibie, director of Wantiknas.

Covid-19 has left us with many scars and a fresh perspective. We have seen the tried and true try and fail, and we are ready to be bold and redesign the financial ecosystem, with equity and opportunity for all.

Monetary and Prudential Policy

The Role of Macroprudential Policies during Economic

Crises*

By AGUSTÍN CARSTENS*

Introduction and overview

Thank you, Mr Chairman (Your Excellency Mr Al Maraj), for the introduction and many thanks to the Arab Monetary Fund for this invitation to be with you at this meeting of the Council of Governors. At the Bank for International Settlements (BIS) we know the benefits of creating opportunities for central bankers to compare experiences.

Today's topic is macroprudential policy. In particular, how it can be helpful in fighting an economic crisis that may not have originated in the financial sector but, as all crises ultimately do, has a financial stability dimension. I am happy to offer some thoughts from the perspective of someone who has closely observed a number of crises and who has learnt from the challenges which the real world manages to present to central bankers.

Over the past twenty years, policymakers have been paying increasing attention to the macroprudential approach to financial stability policy, an interest that can be traced back to the insights of Andrew Crockett, one of my predecessors as BIS General Manager. This approach involves the use of prudential policy instruments from a system-wide ("macro") perspective. It is fair to say that the Great Financial Crisis (GFC) has given a major boost to this perspective, as a complement to the previously dominant microprudential perspective, which focuses on the resilience of individual institutions considered on a stand-alone basis.

That said, as originally conceived, macroprudential policy paid special attention to mitigating systemic risks that either build-up over time because of the procyclical behaviour of the financial sector or relate to the concentration of risk in a few systemically important components. Its main focus has been on risks arising from financial factors.

The policy response to Covid-19 has added a new angle. It has shown how the macroprudential perspective and the corresponding deployment of tools can also be useful in addressing the financial strains that can originate from an unpredictable shock ultimately caused by non-economic factors. That is why today's meeting, designed to derive lessons from this recent experience, is especially timely.

In this spirit, I would like to touch on three questions. The first is backward-looking: what has the contribution of macroprudential policy been to the overall response to the pandemic-induced crisis? The second is forward-looking: what are the macro-financial risks in the recovery phase of this crisis? The third is more timeless: what are the more general messages we can draw about the

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use of macroprudential policy? I will address these three questions paying specific attention to the perspective of emerging market economies (EMEs).

The use of macroprudential tools during the Covid episode

Macroprudential policy is a relatively new toolbox. It would be fair to say that theory was lagging behind practice prior to the GFC. To be clear, the tools themselves are not particularly novel. Many, such as bank capital requirements, have been the workhorse of microprudential policy. Others, such as loan-to-value ceilings, had already been deployed extensively in some jurisdictions. The new element is the toolbox itself, that is the framework within which tools are organised for deployment and the perspective guiding their calibration.

A major element of the post-GFC policy reform agenda was the formalisation of the macroprudential framework, both domestically and internationally. This came with the introduction of new tools, such as countercyclical capital and additional buffer requirements for systemically important institutions. Together with the development of a coherent perspective guiding their use, theory caught up with practice. However, the focus of policy remained primarily on dealing with financial shocks and mitigating the risks to systemic stability.

The Covid shock presented unique policy challenges that pushed the use of macroprudential policy for new goals. The pandemic had neither economic nor financial origins but brought about a massive and sudden hit to both aggregate demand and supply. The policy response was extraordinary: it involved the rapid deployment of the full range of instruments (including some central bank tools used for the first time in some countries) on an unprecedented scale. Another important aspect was that, thanks to the post-GFC major financial reforms, not least Basel III, the banking sector was in a strong financial position when the crisis struck. Far from being the problem it could be part of the solution, by absorbing the shock and continuing to support the real economy.

Indeed, the recession would have been much deeper and longer without the provision of credit to households and firms seeking to bridge the sharp drop in their income. Minimising the immediate damage to production processes and to working relationships also reduced the economic scars and prepared the ground for a swift rebound. In line with these objectives, prudential policy interventions were two-pronged: to facilitate credit extension and to ensure that banks remained resilient.

Macroprudential policy interventions played a key role. Policymakers sought to maximise lenders' ability to supply funding. Many, like the Central Bank of the United Arab Emirates, allowed institutions to tap into their macroprudential capital conservation buffers and those for systemically important banks to leverage their capital base. Similarly, liquidity rules were relaxed in view of the financial system's strong starting position and central banks' resolve to supply abundant liquidity.

Importantly, banks were given incentives and assistance to participate in purpose-designed programmes in support of the hardest hit economic segments. Funding of households and small and medium-sized enterprises (SMEs) is an area where banks have been historically strong. Risk weights for SME loans were modified and exposure limits increased. Banks in some jurisdictions were incentivised to supply bridge loans to help firms to pay salaries. Similarly, loan-to-value ratios and other exposure ceilings to mortgages were increased to facilitate households in managing their balance sheets, in addition to debt repayment moratoriums offered to those who became unemployed (eg in Saudi Arabia). And the schedule of implementation for new rules relating to the accounting recognition of loss was pushed into the future.

At the same time, policymakers wanted to ensure that the financial system continued to remain robust and a contributor to the process of recovery after the crisis. For one, banks were asked to refrain from discretionary payouts to shareholders in order to preserve capital and liquidity resources. Also, where applicable, authorities sought to specify the perimeter of measures to target

those most affected. For instance, relaxing the rules regarding banks' recognition of non-performing exposures only for those borrowers experiencing demonstrable difficulty in servicing their loans due to the impact of Covid. Importantly, the announced measures were introduced for a limited period and linked to the development of the crisis.

Overall, the financial system responded in the desired way. It avoided a catastrophic credit crunch, which would have deepened the crisis, and remained resilient. In the economies in this region, the role of macroprudential policy was particularly important, given the dominant role of banks in intermediation. The central bank purchases of corporate bonds used in other jurisdictions would have had only limited effects on the real economy.

Of course, prudential policy could hardly achieve this success alone.

One key factor has been the substantial support from fiscal and monetary policy. The public purse underwrote, to a substantial extent, banks' exposures to pandemic-hit borrowers. Guarantees, together with other more direct fiscal support measures, helped to contain banks' credit risk and provided an incentive for lenders to keep credit flowing. And central banks mitigated banks' liquidity risks through ample funding support. They also cut policy rates substantially and, for the first time in many jurisdictions, actively used their balance sheets.

Another factor has been the generally good cyclical position in which economies (in particular EMEs) entered the crisis. When the pandemic shock hit, EMEs were generally on a positive growth trajectory and inflation was under control. Central banks' persistent past efforts to strengthen their policy frameworks paid handsome dividends: they provided monetary policy with extra room for manoeuvre.* Fiscal space was less ample in some countries, but the universal nature of the pandemic helped to quell the concerns of foreign investors. As a result, there was little stigma associated with policymakers undertaking extraordinary policy action, with the main risk being perceived as "doing too little". The initial capital outflows were quickly reversed, supported by the immediate response by major currency area central banks to provide other central banks with foreign currency liquidity, including through swaps agreements.

What are the risks going forward?

Keeping with the system-wide and through-the-cycle perspective of macroprudential policy, I would now like to turn to the risks ahead because they are important in understanding the role of policy in crises. These risks are related to the lingering effects of the pandemic on private and public balance sheets and on the pace of economic recovery.

The low point from the pandemic shock may be behind us but its effects and associated risks are not. Lockdowns are still a possibility and the economic recovery seems uneven. This reflects, in part, the relative strengths of individual economies and in part the differential pace of vaccination. Even if some of the economies in this region are leaders in the vaccination effort, they can still be affected by lack of progress, or setbacks, elsewhere. Marked uncertainty will continue to characterise the way this unusual global economic cycle unfolds.

Monetary policy is facing some tough trade-offs. Inflationary pressures may be building up globally. Bottlenecks in production and logistics networks, higher commodity prices and labour market frictions have pushed up prices in food, energy and some manufacturing products. While several central banks are changing monetary policy tack, the overall stance remains broadly accommodative – rightly so given the need to nurse the recovery. Sustained higher inflation will require a policy response as would a build-up of financial imbalances.

Fiscal space is also more restricted. The major crisis-induced fiscal stimulus has resulted in substantially higher debt-to-GDP ratios. Sovereign risk could become much more prominent in the years ahead, and could severely constrain monetary and prudential policy, especially if the pace of recovery disappoints. In this scenario, unstable government finances and weak banking sector balance sheets could give rise to powerful damaging spirals. Banks have direct exposures

to the government through bond holdings and public guarantees on pandemic-related loans. And they also have indirect exposures through the major influence of the state of public finances on the economy and on the private sector's cost of funding, including from international sources.

The pandemic is also leaving higher private sector debt in its trail. Households and firms that borrowed to manage the economic hit will have to service this debt as relief measures and moratoriums are gradually lifted. For those already in a weak position at the onset of the crisis, the burden might not be sustainable, especially in the hardest-hit sectors, whose longer-term prospects have deteriorated. Historically, bank losses lag severe recessions by about a couple of years, even in the absence of specific support measures to borrowers – and in view of the uncertainties inherent in the pace of recovery, tail risks are particularly elevated at present.) Banks will have to manage this challenge while the gradual lifting of the emergency prudential measures will also raise the bar of the standards they will have to meet.

For small open economies, the external sector can add to the domestic risks. Global financial conditions – on balance very easy given the nature of the shock – could suddenly reverse, especially if central banks in major currency areas tighten policy and international investors become concerned with country risk. The weaker banks in economies dependent on foreign funding could come under stress unless their economy has already fully recovered.

Therefore, macroprudential authorities must strike a delicate balance. On the one hand, banks' capital and liquidity buffers must be replenished where needed, and the transition towards the full adoption of new prudential and financial reporting standards resumed when the crisis is over. On the other hand, pandemic-hit borrowers may need continuing support in view of the inherent uncertainties along the recovery path. Indicative of these trade-offs are concerns with imbalances fuelled by exceptionally accommodative financial conditions. Elevated valuations of risky assets and soaring property prices are two examples. In several economies, rapid growth of property prices on the back of low borrowing costs together with a surge in household savings as a result of the contraction in consumption are becoming a potential risk to stability. In fact, some central banks, such as the Bank of Korea, are taking measures to lean against them.

Striking the right balance requires different policies to act in a concerted way and look beyond the short-term. Macroprudential tools can play their role in gradually nudging the financial sector to rebuild its buffers and in making sure that the balance sheet scars of Covid heal properly and promptly.

Conclusions / messages

In the last part of my remarks, I would like to reflect on the previous points, which focused mostly on the pandemic crisis, and draw some more general lessons for the macroprudential toolkit and its use. We learnt the hard way during the GFC that macroprudential tools are needed to mitigate the adverse effects of the financial cycle. What we are learning now is how they can be used in response to a different set of circumstances.

My high-level conclusion is that macroprudential policy is a very useful addition to the policymakers' arsenal in dealing with non-financial crises, but it is no fairy tale magic wand. Let me elaborate.

Macroprudential tools are good complements to other policies when a sudden non-economic shock requires a rapid and forceful policy response. Macroprudential policy measures can be part of a stimulus package and help to mitigate a damaging credit crunch. In this way, macroprudential policy offers more strategic options and flexibility to policymakers. They can reinforce the efficacy of other policies. Relaxation of buffers strengthens transmission channels of policy through the balance sheet of financial institutions, allows fiscal stimulus to quickly reach more corners of the real economy and leverages the capacity of the banking system to make credit allocation decisions at the micro level. Moreover, macroprudential measures that limit distributions by banks can ensure that stimulus resources are not diverted away from their main

target. Finally, judicious use of macroprudential instruments can help to protect the domestic financial system from capital flow volatility during crises and thus provide useful space for other policies by mitigating side effects and attenuating trade-offs.

These strengths also point to some preconditions and limitations: macroprudential tools cannot be introduced during a crisis, they are most effective as part of a holistic package and when carried out against the backdrop of robust overall policy frameworks.

Buffers can only be built in good times and they cannot be relaxed in a crisis if they were not sufficient at its onset. Pre-crisis preparation and a prompt response are essential for success. This is self-evident when financial vulnerabilities arise during a boom, when tightening of prudential policy can have the additional desirable effect of throwing some sand in the wheels of finance. But it applies also in the case of a sudden exogenous shock. The existence of buffers is reassuring and their release is most effective when credibility is maintained that they will be used wisely and rebuilt promptly.

Macroprudential policy cannot be the main tool in the response to a crisis like the one triggered by the pandemic. The natural protagonists are fiscal and monetary policy with macroprudential measures playing an important supporting role in complementing the overall package. In addition, interventions releasing capital and liquidity buffers may have limited effect if they are not coupled with fiscal authority guarantees or with liquidity provision by the central bank. Banks will be reluctant to dip into their buffers when facing high macroeconomic risk, not least out of concern about the way rating agencies, creditors and counterparties may perceive this action.

Success depends critically on credibility, and the successful use of macroprudential tools in crises is greatly dependent on the coherence and robustness of the overall policy framework, including all stabilisation policies.

These last two points suggest a more general lesson to me. Many were positively surprised by the efficacy of EME central banks' interventions in response to Covid-19 and in the policy space they seemed to have available. This did not surprise those who had, over the past several years, observed EMEs making strides in building coherent policy frameworks with a longer-term decision-making perspective. They were able to act countercyclically in response to Covid in large part because their house was "in order" and they had built credibility capital over several years. The same factors allowed them to successfully deploy macroprudential tools as an integral component of the overall effort to fight this sharp recession.

They will need to keep building on this record going forward. The same coherence of the overall policy framework must be maintained (and enhanced) in the recovery period, using the flexibility that a multi-pronged approach affords in replenishing the fiscal, monetary and prudential resources that will fight the next battle.

A good policy is the one that is always looking ahead and uses the space available to prepare for the next challenge. We know challenges will arise even once we have put the pandemic behind us. Credibility of the overall policy framework, like prudential buffers, is gradually built-in good times in order to be most usefully tapped in bad times.

New Avenues for Monetary Policy*

By OLLI REHN*

Welcome to this conference on New Avenues for Monetary Policy, which is jointly organized by the Bank of Finland and the Centre for Economic Policy Research. Our collaboration with CEPR in organizing annual conferences has a long and successful history.

We are very happy and honoured to have several leading experts in the field to address us at this conference, including Alan Blinder, Markus Brunnermeier, Mikhael Golosov, Ethan Ilzetzki, Loretta Mester and Michael Woodford. The scientific committee have done an excellent job in putting together a high-quality programme for the next two days.

This conference takes place against the backdrop of the COVID-19 pandemic, from which the global economy is now recovering rapidly, if unevenly. In the euro area yesterday's fresh projection by the ECB foresees, the economy is rebounding significantly this year on the back of the expected re-opening of the economy, strengthened policy support and economic recovery in the rest of the world. Real GDP is projected to grow by 5% this year and 4.6% next year. The key underlying assumption for the current view is that containment measures can be relaxed rapidly in the second half of the year.

With regard to inflation, the Harmonized Index of Consumer Prices is forecast to peak in the fourth quarter of this year, with annual inflation reaching an average of 2.2% this year, supported by temporary factors, such as strong base effects caused by energy inflation and the German VAT rate reversal, and an increase in input costs related to supply bottlenecks. In 2022, inflation is expected to be 1.7% as the temporary factors fade, and stay at 1.5% in 2023.

After the worst crisis phase was over, the ECB Governing Council continued its once-postponed review of monetary policy strategy. The review, the first since 2003, was concluded in July this year. High-quality analysis and extensive dialogue between research and policy-making were crucial for reaching pertinent conclusions.

We reviewed the definition of price stability, monetary policy instruments and their effects – both the main effects and potential side effects – as well as our communication practices. We also assessed the importance of digitalization, financial stability, globalization and climate change from the perspective of monetary policy. Needless to say, these themes continue to be important topics for future research. Many of these themes will be also addressed at this conference.

The most important revision to our strategy is the new definition of our inflation target and how it will be applied in our future decision-making; that is (in 'centralbankese') the reaction function. According to the new strategy, price stability is best maintained by pursuing at a 2% symmetric inflation target over the medium term.

The old inflation target of 'below, but close to 2%', which was valid until July 2021, was less precise, and open to interpretation. In particular, this former definition had a streak of asymmetry, and the quantification of 2% may have appeared more of a ceiling than a central target.

The new 2% inflation target is symmetric and unambiguous. Symmetry means that the Governing Council considers both slower and faster inflation to be equally undesirable.

This change is clearly reflected in our forward guidance. As decided at our monetary policy meeting yesterday, the Governing Council expects the key ECB interest rates to remain at their present or lower levels until it sees inflation reaching 2% durably, and it judges that the progress

*Opening remarks by Mr Olli Rehn, Governor of the Bank of Finland, at the Bank of Finland - Centre for Economic Policy Research (CEPR) Joint Conference "New avenues for monetary policy", 10 September 2021.

*Olli Rehn, Governor of the Bank of Finland

realized in underlying inflation is consistent with inflation stabilizing at 2% over the medium term. This may also imply a transitory period in which inflation is moderately above target.

Thus we maintain our very accommodative monetary policy stance, appropriate for the rebounding eurozone economy and the still remaining uncertainties.

We also deemed that favourable financing conditions can be maintained with a moderately lower pace of net asset purchases of PEPP than in the previous two quarter.

In order to assess how much the new strategy is likely to change the ECB's policy preferences, a recent study 'Reading between the Lines' by Bank of Finland staff estimates the ECB Governing council's objective function, or loss function.) This is done by applying text analysis to extract the tone, or sentiment, from the ECB's introductory statements, and combining this information with the ECB's real time macroeconomic projections.

The results suggest that under the now old definition of price stability the ECB's loss function indeed was asymmetric, suggesting the Governing Council disliked high inflation more than low inflation, and the de facto inflation aim – the bliss point of the loss function – was below 2%.

The ECB's new inflation target implies that from now on the ECB's loss function is indeed symmetric, with a bliss point at the (annual) inflation rate of 2.0%. These findings indicate that the ECB's new target brings about a clear change in policy preferences.

The symmetric 2% inflation target under the new strategy thus serves as a buffer against deflationary risks and provides monetary policy with more space to react to a sharp decline in inflation. We also want to rein in the costs to the economy from a too high rate of inflation.

A medium-term orientation for the inflation target also makes it possible, where necessary, to smooth out other economic shocks, such as shocks related to employment or financial stability. If actual inflation is slower or faster than targeted, monetary policy will respond to deviations gradually, considering the nature of the economic disruption. Deviations estimated to be temporary may not be responded to at all, but seen through.

Another topical and important theme in economic research and central banking is the interaction between monetary policy and inequality.

Inequality is mainly explained by structural factors, and therefore policies other than monetary policy play a key role in addressing it. We know that monetary policy impacts inequality through two main channels: the income channel and the wealth channel.

Concerning the income channel, it is critical to note that the wages and employment prospects of low-income households are typically more sensitive to business cycles. Therefore, monetary policy easing – by stimulating economic activity and creating jobs, increasing wages and enabling savings – can reduce income inequality. This was an important channel after the previous crisis, the Great Recession, and has been again in the present COVID-19 crisis.

On the other hand, households' business and financial income are more responsive to monetary policy than labour income, and this impact of the income channel in monetary policy easing tends to benefit wealthier households more than low-income households.

As to the wealth channel, monetary policy easing generally makes the life of borrowers easier, but it can impact negatively on better-off households' savings. However, the overall net effect depends on the composition of household balance sheets. A fall in the interest rate affects different assets and liabilities differently, depending on their type and maturity.

It will be interesting, not least to a monetary policy-maker, listen to what the latest research has to say about these various channels.

Finally, there is the issue of climate change. While governments and parliaments have the primary responsibility for climate policy, the ECB, within its mandate, also needs to promote these objectives. Among other things, the ECB aims to expand its analytical capacity to incorporate

climate issues in its economic models and to promote the measurement and disclosure of risks related to climate change, so that they can be taken into account in risk management, investment activities and monetary policy operations. At this conference, we will also hear a presentation on climate change and monetary policy.

Back to the Future: Intellectual Challenges for Monetary

Policy*

By CLAUDIO BORIO*

I would like to thank the organisers for the privilege of giving this year's David Finch Lecture – a lecture that unfortunately had to be postponed by one year due to the circumstances we know all too well. I am particularly fond of Australia. My connections with the country go back a long way, not least because of illustrious co-authors with whom I have done some of my most rewarding work. It is sad that I cannot be there with you in person.

Today, I would like to take you on an intellectual journey. The lands that we will be exploring together may appear unfamiliar, possibly uncomfortably so. However, at least in some respects, they should not be. So-called “truths” in economics are learned and unlearned at irregular intervals, as events unfold forcing people to question their convictions. I would like to revisit critically beliefs that nowadays permeate our perception of the economy so deeply that we don't even notice them – beliefs that are sometimes taken as self-evident truths. But they have not always been treated this way. In this sense, we may need to travel back to the future.

The motivation for our journey is that the central banking community is facing daunting challenges – challenges that, I suspect, may well define the future of the central bank as an institution for years to come. In the 30 plus years of my professional career, most of which was spent working for the central banking community, I do not recall more taxing times. The challenges are of three kinds. First, an economic challenge: the economic environment is becoming increasingly difficult. A summary statistic for this – if I may use that term – is the unprecedented loss of room for policy manoeuvre. Second, an intellectual challenge: facts on the ground are increasingly testing the long-standing analytical paradigms on which central banks can rely to inform their policies. And third, an institutional challenge: peering into the future, central bank independence may come under threat.

On previous occasions, I have addressed in some detail the first and the third challenges. Today, I would like to focus primarily on the second – the intellectual one. That said, to set the stage, I will need to briefly discuss the economic one. After all, it is unfolding economic events that motivate changes in the way we think the economy works.

Before I continue, let me clarify two important points.

First, the focus. I will not focus on the inevitable complexities and subtleties of policy making. Policy decisions must be taken in a world of great, some would say radical, uncertainty – a world in which judgment is essential and a wide array of considerations must be taken into account. This is what is commonly known as “the art of central banking”. Rather, my focus is on the far simpler and more rarefied world of analytical paradigms in which you and I, wearing our academic hats, can take refuge – the world of ideas, which, after careful filtering, can nonetheless influence policy.

Second, the perspective. In addressing these questions, I will draw largely on research carried out over the years. What I will provide, therefore, is very much a personal view. This will allow me to be more provocative and stimulate debate. In addition, I hope you will excuse me if the reference list is rather lop-sided. You will be able to find much richer ones, outlining

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*Claudio Borio, Head of the BIS Monetary and Economic Department

comprehensively the evidence for different viewpoints, in the pieces of work to which I will be referring.

The bottom line? In the years ahead, rebuilding room for policy manoeuvre – monetary buffers – will be essential. At the same time, a number of beliefs that underpin the prevailing analytical paradigms may complicate this task.

Our journey is structured as follows. You and I will first briefly visit the lands, describing how the global economy has evolved and sprung monetary policy challenges from unsuspected quarters. We will then explore very familiar territory to examine how we now see the world we live in. We will then try to see the same world through different eyes. It may be the case that those eyes are better equipped to understand current realities.

I. The economic challenge

The main challenge currently faced by central banks is the limited room for policy manoeuvre. Policy rates are exceptionally low globally, especially in advanced economies. They are close to zero and, in some cases, even below, which is historically unprecedented. Partly as a result, real interest rates have never been negative for as long as they have been in recent years. And central bank balance sheets have soared to levels seen only during wars, in the range of 40–60% of GDP for the main central banks and even higher for some others.

To clarify, the loss of policy headroom is not technical in nature. Central banks can decide to push policy rates further into negative territory, and there is no or hardly any ceiling to how much liquidity they can inject or assets they can buy. The limits are economic and political. Even if the zero lower bound on cash was overcome – and technically it can be – we don't really know how economic agents would react. Further, as central banks purchase a growing amount of assets, they risk being perceived as eroding the basis of a market economy.

From a longer-term perspective, why has this loss of policy headroom occurred? To be sure, we had two major crises (the Great Financial Crisis (GFC) of 2007–09 and Covid-19). Central banks had to pull out all the stops to successfully stabilise the financial system and the economy – in the best lender of last resort tradition. But that cannot be the whole story. Crises are just episodes, even if their effects may be long-lasting. What are the deeper factors at work?

I would suggest that two economic factors have played a role. One is well known, the other is probably less appreciated. The two, despite appearances, are closely linked.

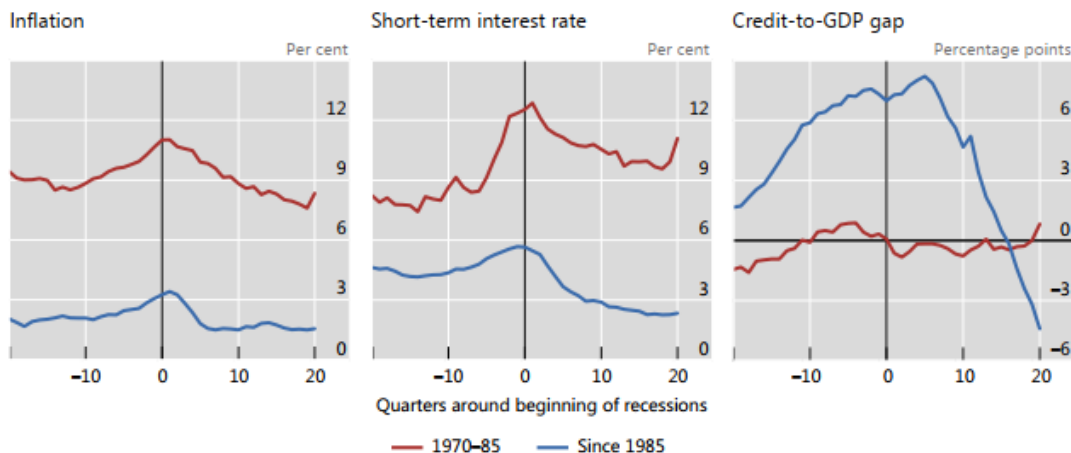
The first, well known factor is that inflation has proved rather insensitive to monetary policy easing, thereby thwarting central banks' efforts to push it up to target post-GFC. The proximate cause is well understood. On the one hand, inflation has proved unexpectedly unresponsive to economic slack – the Phillips curve is very flat (and indeed hard to estimate). In fact, in its recent review, the Federal Reserve downplayed the role of an unobservable equilibrium rate of unemployment in setting policy (Powell (2020)). On the other hand, there are growing concerns that inflation expectations may be rather backward-looking or at least unresponsive to policy announcements: if, despite central bank efforts, inflation remains very low, it will be hard to dislodge them. Hence also central banks' concern about expectations drifting down and becoming unanchored.

The second, probably less appreciated factor, is the rise of the financial cycle as a prominent economic phenomenon. By “financial cycle” I mean the financial expansions and subsequent contractions driven by the self-reinforcing interaction between funding conditions, asset prices and risk-taking. Starting in the early 1980s, a subtle change in the business cycle took place (Graph 1). Until then, recessions were triggered by an increase in inflation, which elicited a round of monetary policy tightening that helped drag the economy down. Since then, recessions have often been triggered by a turn in the financial cycle – deviations of the credit-to-GDP ratio from long-term trend is a proxy here – as expansions have ushered in contractions with little change

in inflation and hence in the monetary policy stance (Borio, Drehmann and Xia (2019)). Naturally, the Covid-19 crisis is an exception driven by an exogenous, non-economic event.

More prominent role of financial factors in business cycle fluctuations

Graph 1



The horizontal axis denotes quarters around recessions in the business cycles, with the peak date set at zero (vertical lines). Lines show the median evolution across 16 advanced economies and events in the respective time period.

Source: C Borio, M Drehmann and D Xia, "The financial cycle and recession risk", *BIS Quarterly Review*, December 2018, pp 59–71.

Why do I believe the two factors – unresponsive inflation and the rise of the financial cycle – are related?

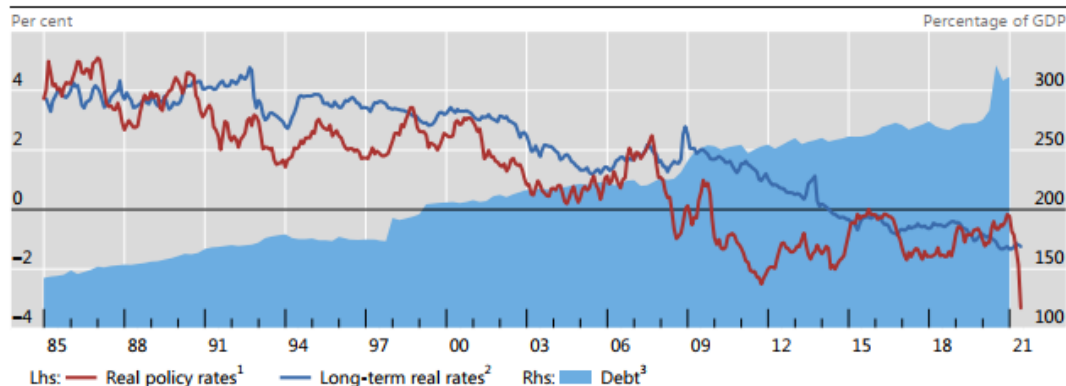
There is no question that a key reason for the rise in the financial cycle has been financial liberalization. Starting in the early 1980s, it provided ample room for the self-reinforcing interaction between funding liquidity, risk-taking and asset prices. But changes in the inflation process and monetary policy regimes have also played a role. The globalization of the real economy has arguably put persistent downward pressure on inflation. It is hard to believe that the inflation process could remain immune to the entry of 1.6 billion lower-paid workers in the global economy, as the former Soviet bloc, China and emerging market economies opened up. Arguably, globalisation eroded the pricing power of labour and firms, making the wage-price spirals of the past ("second-round effects") less likely. At the same time, with central banks focusing increasingly on near-term inflation and downplaying the role of monetary and credit aggregates, there was no reason to tighten when inflation remained low and stable during economic expansions. Monetary policy was no counterweight to financial booms.

To my mind, these two factors can help explain the gradual decline in interest rates and the loss of policy manoeuvre. The story could go something like this. In the wake of Volcker's efforts, central banks worldwide succeeded in taming inflation, allowing them to reduce interest rates. Then, gradually, globalisation acted as a powerful tailwind, allowing central banks to keep interest rates low for longer. When booms turned to busts, central banks naturally significantly eased the stance and – since inflation did not appear again – persisted in this course of action, thereby pushing interest rates down further. Partly as a result, the policy headroom had shrunk substantially by the time the Covid-19 crisis struck.

In addition, this raises the risk of a "debt trap". As interest rates fall – nominal and real – debt-to-GDP ratios climb and the economy becomes more vulnerable to higher interest rates, which in turn makes it harder to raise them. In other words, low rates beget lower rates (Borio and Disyatat (2014)). There are indications that this is a material risk (Graph 2).

A debt trap?

Graph 2



¹ Nominal rate less headline consumer price inflation. Unweighted average of United States, euro area and Japan. ² Simple average of index-linked 10-year government bond yields of the United States, France, Japan and the United Kingdom. ³ General government debt and non-financial sector debt, in percent of nominal GDP. Weighted average of G7 economies plus China based on GDP and PPP exchange rates.

Sources: Bloomberg; Datastream; national data; BIS calculations.

If this is a reasonable approximation to the nature of the problem, what could be a solution? Part of the solution would be to follow a more counter cyclical policy also during business expansions. Hence the importance of analytical paradigms that could help guide policy.

II. The intellectual challenge: how do we see our world today?

This takes us to the intellectual challenge? By intellectual challenge, what do I mean?

I mean that certain ingrained economic beliefs at the core of the prevailing analytical paradigms may have facilitated the loss of policy headroom and may complicate the quest to regain it to the extent that they influence policy. If my analysis is broadly correct it would be worth re-examining these intellectual macroeconomic paradigms in order to see the world differently.

I would characterise those paradigms by three beliefs. Some beliefs have a long intellectual pedigree, others less. But all manifest themselves most forcefully and clearly in the workhorse model on which the current generation of macroeconomists have been trained. This is the New Keynesian model built on a real business cycle core by adding temporary nominal rigidities (typically prices and/or wages). So, to simplify the analysis, let me take this model as the starting point.

I will consider, in turn, the characterisation of the beliefs and their evolution post-GFC before turning, finally, to their evaluation. Let me stress that I will characterise those beliefs in intentionally very stylised terms. Portraying them in stark, black and white terms has the merit of ensuring that the message is not lost in the inevitable shades of grey that nuance and enrich perspectives.

Characterisation

The first belief is that economic fluctuations reflect exogenous shocks rather than inherently unstable dynamics. Myriads of shocks are possible, with those involving preferences and technology being particularly prominent. Once hit by these shocks, the economy returns rather smoothly to its steady state. Financial factors can and do play a role in the model's many refinements. But they influence only the persistence of the impact of the shocks – amplifying and lengthening the effects – not the smooth return to a steady state (eg Bernanke et al (1999)).

Taken literally, this perspective rules out business cycles in which expansions sow the seeds of subsequent contractions. By extension, it also rules out the possibility that accommodative policy

during expansions can generate the conditions for a subsequent downturn. In this approach, policy can generate recessions only if it allows inflation to rise and then slams on the brakes, or if it runs out of room and fails to respond sufficiently once a shock strikes. For example, again taken literally, price stability is a sufficient condition for macroeconomic stability. This is the much celebrated “divine coincidence” result.

The second belief is that monetary policy has but a transient impact on the real economy – money neutrality. This view has a much longer tradition. It is deeply engrained in the history of economic thought. It is also embedded in the real business cycle core of New Keynesian models, which describes the long-run equilibrium once nominal rigidities dissipate. This influential perspective assumes away frictions in the process of exchange. With perfect coordination across agents and time, monetary factors play no role in driving economic activity in the long run.

An important implication is that monetary policy has no influence on real interest rates in the long run. The real rate is pinned down by equilibrium in the goods market independently of monetary policy. This rate is the so-called natural rate of interest, or “r-star”.

This concept is intimately linked to the issue of the room for policy manoeuvre: it implies that the only way for monetary policy to gain headroom is to raise inflation, so that nominal interest rates can increase alongside it. Central banks must cut rates (ease monetary policy) today to raise inflation tomorrow. Paradoxically perhaps, to gain policy headroom on a sustainable basis tomorrow requires lowering it today.

Taken at face value, this notion can greatly constrain central banks. It can also encourage the adoption of a strategy that is itself not devoid of risks. If, as the evidence indicates, inflation is rather unresponsive to monetary policy, the risk of depleting buffers is material. The post-GFC experience could be read as illustrating this.

The third belief is that the costs of persistent falls in the price level – deflation – are large. This adds to the urgency of accommodative policies. The concerns were already embedded in traditional models. Imagine that aggregate demand contracts at the zero lower bound, for whatever reason, and disregard balance sheet policies, for simplicity. Central banks can do little to offset the contraction. This raises real interest rates, which depresses aggregate demand further – a dynamic that does not have an obvious floor. New Keynesian models embody a similar fear. At the zero lower bound, economies can get stuck in a deflationary equilibrium with low output. So called “Japanification” embodies this fear – although, in fact, in per capita terms, GDP growth in Japan compares rather favourably with that in many other advanced economies.

Evolution

Beliefs are grounded in evidence. This is also true of the three I have just described. A large body of work supports them.

At the same time, views in economics have come and gone. As is well known, evidence cannot be foolproof. Its interpretation requires a good dose of judgement, in which priors, consciously or unconsciously, loom large. In addition, relying on unobserved variables helps to fit facts into one’s own worldview. Moreover, the economy is not a stationary system. In particular, it evolves, sometimes radically, in response to policies. Arguably, this explains why the paradigm embodied in New Keynesian models had difficulties coming to grips with the GFC. It seemed to work well during the so-called Great Moderation: if you held it to be a sufficiently close approximation to reality, you would not see any contradictory evidence. However, by playing down the role of financial factors and overestimating the self-equilibrating properties of the economy, it could not identify the build-up of risks ahead of the crisis nor replicate its dynamic.

How has the GFC influenced those three beliefs? In some cases, it has weakened them; in others, it has had little impact. Either way, it has not fundamentally altered the overall picture. Let us consider each belief in turn.

Take the first belief – the shock-cum-return-to-steady-state view of the business cycle. There is an increasing recognition that the endogenous component of economic fluctuations is substantial and cannot be ignored. This actually harks back to the origins of business cycle theory. There is also a growing recognition that financial factors are important. Indeed, Jay Powell (2020) noted in his Jackson Hole speech how the nature of business fluctuations has changed because of those very factors, along the lines I mentioned earlier. (By the way, this is the speech in which he announced the key features of the new monetary policy framework.) More generally, the concept of the financial cycle is at the very heart of the macroprudential frameworks implemented post-GFC (eg Constâncio (2019)) – frameworks that seek to address the procyclicality of the financial system, ie the tendency for the financial system to amplify economic fluctuations.

That said, there is still a certain divide within central banks and among their researchers. On one side, you have the macroeconomists who advise on monetary policy, for whom the shock-cum-return-to-steady-state is the paradigm of reference. On the other side, you have the economists who advise on financial stability policy, for whom the financial cycle plays a similar role, and who focus on it purely as a cause of financial crises (tail events), not as a factor behind recessions in general. It is left to the senior policymakers, who take the decisions that ultimately matter, to synthesise and reconcile these perspectives, based on a large dose of judgement.

Why have these differences of perspective survived among the economists that prepare policy decisions? For one, professional experience matters. Cross-fertilisation, which has been strongly encouraged, should reduce the gap and has already started to do so. But closing the gap will inevitably take time. In addition, another obstacle to a wider adoption of the cycle view of business fluctuations is that we don't yet have adequate operational models that can reconcile the perspectives, eg for counterfactual policy analysis. Doing so is very hard. As a result, analyses often still proceed along separate, sometimes entirely parallel, tracks. Finally, even as the role of financial vulnerabilities in business fluctuations has received much more attention, there is significant scepticism as to whether monetary policy is suited to deal with it: prudential tools are generally considered much better suited. This, in turn, can reduce the incentive to bridge the gap in perspectives.

If the first belief has started to be questioned, the same is not true of the second and third, ie that monetary policy is neutral, so that the natural rate of interest is exogenous to monetary policy, and that the costs of deflation are invariably high. To be sure, mainstream economists have built models in which monetary policy neutrality does not hold. Similarly, a handful of economists have raised doubts about the costs of deflation: Feldstein (2015) and Rajan (2015) have gone as far as referring to the “deflation bogeyman”. However, these are exceptions. Most statements, as well as empirical and theoretical analyses, still embody those beliefs. For instance, it is still common practice to assume that monetary policy is neutral when imposing identification restrictions on econometric models (eg vector autoregressions).

In fact, in some respects those beliefs have become more prominent. As interest rates have approached the effective lower bound, central banks have often invoked the concept of the natural rate of interest as the main explanation, whereas the concept had hardly been mentioned pre-GFC. In addition, concerns about the costs of deflation have been a reason for keeping an accommodative policy.

III. The intellectual challenge: how could we see our world differently?

A different pair of eyes

Why have these two beliefs remained so prominent in analytical paradigms? Maybe the monetary policy neutrality view is too deeply rooted in economic thinking. Maybe the Great

Depression has left a deep imprint on people's minds: the image of long queues of the unemployed juxtaposed with that of sharply falling prices is as vivid as ever. Moreover, Fisher's (1933) "debt deflation" has engraved the image on the intellectual furniture of many an economist.

But let's examine the two beliefs more critically, taking each in turn.

To my mind, the proposition that money is neutral derives much of its force from thought experiments in which the question posed is: what happens if one doubles the quantity of money in the economy? Or in experiments that even hint at an equivalence between this question and the redenomination of contracts and prices, ie changing the number of zeros.

The proposition is less self-evident if one realises that in the real world changing monetary policy does not amount to changing the quantity of money, but to changing interest rates. The elasticities of various types of expenditure, not least expenditures on capital goods, which have a persistent, if not permanent, impact on the economy, vary a lot. More to the point, once it is recognised that monetary policy has an impact on the financial cycle, it is hard to believe that for any relevant policy horizon monetary policy could be neutral. There is substantial evidence that financial booms and busts leave very long-lasting if not permanent scars on the economic tissue, especially if banking crises follow. This type of "financial" hysteresis is different from, albeit complementary to, the more standard one in the literature, in which persistent shortfalls of aggregate demand erode labour's skills or hinder investment and innovation.

This brings me to the concept of the natural rate of interest. There are a number of concepts in economics whose validity has never been questioned; for instance, demand curves slope downwards, or the price of a good is somehow related to its relative scarcity. The natural rate of interest is not one of them. Just to name one famous economist, the natural rate of interest was at the heart of Keynes's *Treatise* (1930), harking back to Wicksell (1898), but he had discarded it by the time he got to his *General Theory* (Keynes (1936)). It was not at the core of academic curricula on money in the 1970s–1980s and, as noted, it was hardly invoked in practical policy making pre-GFC.

I see two sets of issues with the notion of the natural rate of interest: one conceptual; the other empirical.

Conceptually, it is odd to state – as many do – that what is regarded as an "equilibrium" interest rate can cause major macro economic damage at some point in the future by contributing to financial instability. Output should be in equilibrium both today and tomorrow. A better treatment of the financial system in the models would surely lead to a different measure of the equilibrium rate.

Indeed, in some recent work with colleagues we have tackled this issue head-on. Our theoretical model has three key, real-life features. First, the central bank sets the real interest rate at each point in time. Second, banks create money through their lending; they do not just allocate resources/savings as in standard models. The additional purchasing power helps clear the goods market, so that the real interest rate is no longer pinned down by saving and investment, ie there is no unique natural rate of interest. The economy adjusts to the interest rate the central bank sets. Third, banks take more risk during financial expansions than during contractions, depending on how much capital they have. This generates endogenous financial booms and busts. Therefore, boosting output in the near term comes at the expense of larger recessions down the road. Moreover, if in the model one realistically constrains the central bank to move the policy rate gradually, over time the interest rate will tend to fall as recessions become deeper and longer-lasting. This is one possible formalisation of the "debt trap" mentioned above.

Empirically, the evidence in favour of a decline in the natural rate of interest driven by saving and investment is not as overwhelming as sometimes believed. The two approaches to evaluate the proposition have limitations.

The first approach calibrates models that assume the factors driving saving and investment also drive the natural rate of interest. It then checks whether their evolution is qualitatively consistent with the data over the period in which real interest rates have declined – that is, and significantly, since the early 1980s. One problem here is that the period need not be representative. Moreover, the researcher has plenty of degrees of freedom to fit the data.

The second approach does not look at the drivers of saving and investment directly and uses the behaviour of inflation to infer the level of the natural rate of interest. The Phillips curve tells us that, if there is slack, inflation falls; and if there is excess demand, it rises, so that the natural rate of interest is below or above the market interest rate, respectively. The problem here is that the method is no more reliable than the Phillips curve itself, and we saw earlier that this relationship is weak and hard to estimate precisely.

In fact, all the studies that let the data speak more freely and look at the relationship between saving/investment drivers and real interest rates beyond the 1980s have a hard time finding any strong link. A co-authored study, which goes back to the 1870s for several countries, reaches the same conclusion (Borio et al (2017)). In addition, it finds evidence of a relationship between real interest rates and monetary policy regimes.

This brings me to the third belief: the costs of deflation. How justified is this tight link between deflation and output weakness? The answer is “less than one might think”.

Conceptually, as is actually recognised, the link is not that tight. To simplify, the answer depends on whether falling prices are supply- or demand-driven, even if wages and prices are inflexible. Globalisation, technology and demographics fall in the supply-side category. Think, for instance, of the textbook aggregate supply/aggregate demand model. An increase, for example, in the labour force or improvements in technology shift the aggregate supply curve outwards: prices fall and output rises.

Moreover, if we go beyond one-good models (or their equivalent), the distinction between fundamental changes in relative prices and inflation is important: it means that falling deflation may actually be optimal, even in the New Keynesian models. Why? The prices of the goods for which productivity grows more slowly should fall relative to the rest. In the new Keynesian model, to minimise adjustment costs, it is necessary to stabilise the prices that are more rigid. But, empirically, the prices that are more rigid are also those of the products for which productivity grows relatively more slowly – think, in particular, of the prices of many services relative to those of manufacturing goods. As a result, keeping those prices stable means a reduction in the rest. That is, it means deflation. This echoes the behaviour of inflation in the wake of globalisation, which has kept a lid on the evolution of the prices of tradeable goods.

Empirically, it is hard to find a systematic relationship between deflation and output weakness – the Great Depression is more the exception than the rule. Several studies confirm this view (eg Borio et al (2015)). They also suggest that what matters is not so much the damaging interaction between debt and the prices of goods and services (Fisher’s (1933) debt deflation), but that between debt and asset prices, as the GFC has confirmed. None other than Friedman and Schwartz (1967) in their US monetary history talked about a more than decade-long period of deflation and sustained growth in the 19th century, questioning the standard view of the link. Moreover, one does not have to go far back in history to find episodes of “benign” deflation. In recent years, China, Norway and Switzerland, among others, are cases in point.

This raises the more general question of the behaviour of inflation at very low levels. I would suggest that there may be reasons why, all else equal, there could be a stronger tendency for inflation to remain range-bound once monetary policy has driven inflation down thanks to a credible monetary policy regime. This could be the case – and this is a conjecture – even if expectations of inflation are not very responsive to central bank pronouncements.

A key reason is that expectations may well play a smaller role. On the one hand, they may be less responsive to actual inflation; on the other hand, they may have a weaker impact on it.

Inflation expectations may be less responsive to inflation because agents are likely to pay less attention to it, as it makes little difference to their decisions. This is what some economists have termed “rational inattention” (Sims (2010)). Indeed, Alan Greenspan aptly defined price stability as “that state in which expected changes in the general price level do not effectively alter business and household decisions” (Greenspan (1994)). We may not be far away from that state in many countries.

Inflation expectations may have a weaker impact on inflation if one reason for the absence of second-round effects is loss of bargaining and pricing power. For instance, regardless of what workers may expect inflation to be, they would be reluctant to demand higher wages as a result of concerns about losing their jobs. Structural forces would play a bigger role.

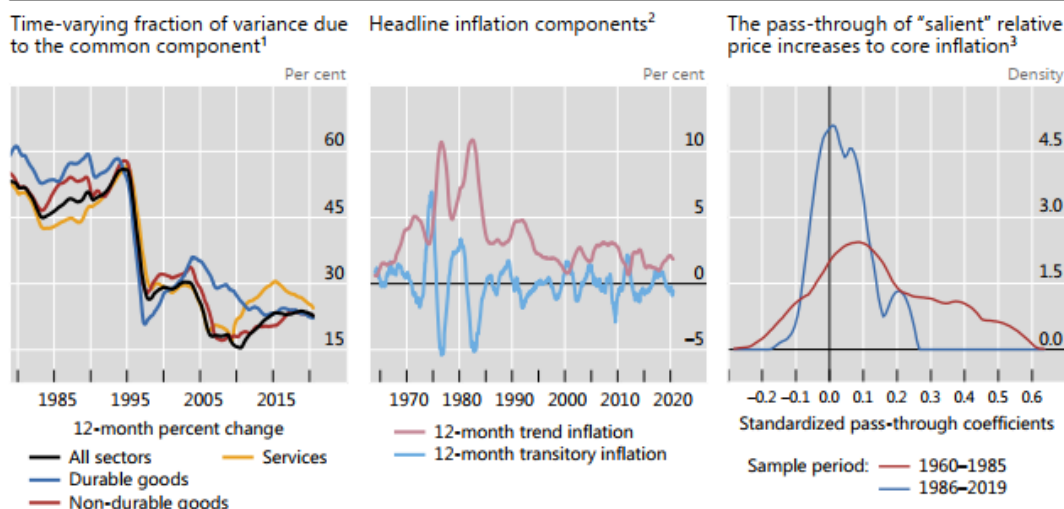
All else equal, this would mean that inflation would have a stronger tendency not to become unmoored. It would be largely buffeted by idiosyncratic – ie good or sector-specific – price changes, whether these are transitory or result in more persistent relative trends. As long as the factors driving idiosyncratic price changes do not result in accelerating trends, inflation would have a stronger tendency to oscillate within a range.

Indeed, there is growing evidence in this respect. At low inflation rates, the component common to all price changes, which is arguably closer to the theoretically correct definition of inflation, appears to be much smaller than the good-specific/relative one.

Graph 3, taken from a forthcoming paper (Borio et al (2021)), illustrates the point with US data. We see that the common component of inflation – here proxied by the first principal component – dropped drastically as inflation became low and stable starting in the mid-1980s following the “Volcker shock” (left-hand panel). Correspondingly, the idiosyncratic component became more important and larger than the common one. This occurred alongside the well-known decline in inflation persistence, here illustrated by the fact that the transitory component of inflation has become more important relative to the trend one (centre panel). Consistent with all this, the pass-through of outside (“salient”) relative price changes to inflation has declined: the mass of the distribution of their impact has shifted towards zero (right-hand panel). Evidently, second-round effects have become more muted.

The common component of inflation drops: the US example

Graph 3



¹ The common component of 12-month percentage changes in prices across all sectors and within each specified broad sector is estimated using a 15-year moving window. ² The trend and transitory components are estimated using a modified version of the Hamilton filter (Hamilton (2018)) proposed by Quast and Wolters (2020). ³ Each line shows the weighted kernel density estimate (ie a smoothed histogram) of the distribution of pass-through coefficients of "salient" relative price increases to core personal consumption expenditures (PCE) inflation for the specified sample period. The weights are equal to sector-specific average PCE shares in each period.

Source: C Borio et al (2021), forthcoming.

Different eyes, different policies

What does our different pair of eyes imply for monetary policy?

I started by stressing that a key challenge ahead for monetary policy is to regain room for policy manoeuvre, ie to rebuild buffers. Economies that operate with small safety margins are exposed and vulnerable. Building buffers will be especially important in the wake of the Covid-19 crisis, which has also dramatically cut fiscal policy headroom. I have dealt with the implications for monetary policy in more depth elsewhere. Here, let me just sketch one key point.

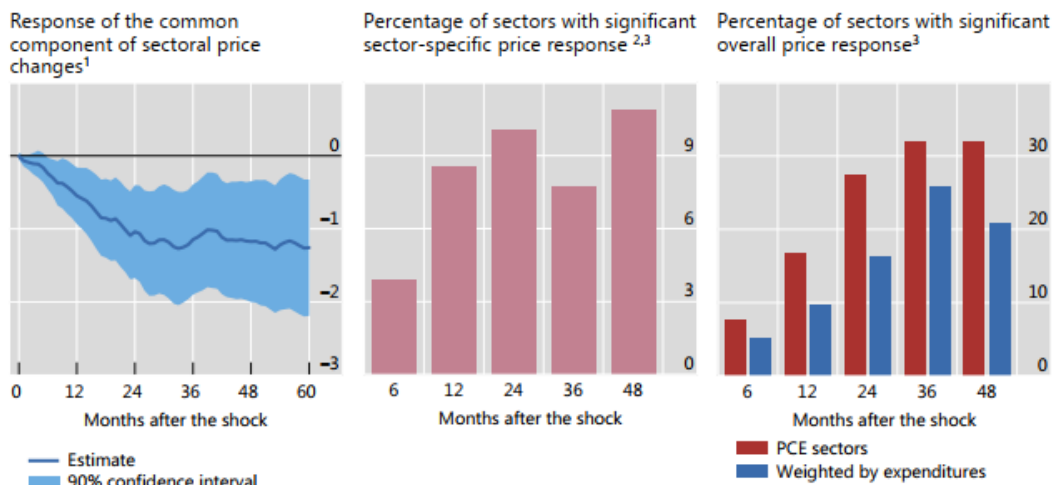
Put simply, if the foregoing analysis is a better approximation to reality than the prevailing ones, there would be room for additional flexibility in gradually building buffers as opportunities arise and as conditions allow. The costs of normalisation would be smaller, because the risk of inflation drifting down and the costs thereof would be lower. Further, the benefits would be greater, as higher interest rates would reduce the, by now familiar, potential side effects of interest rates remaining "low for long" that operate through the financial system (eg higher risk-taking, weaker financial institutions, capital misallocation etc). Extra flexibility means being able to afford somewhat larger and more persistent deviations of inflation from narrowly specified targets than would otherwise be the case. The length of the policy horizon is key here.

More generally, this extra flexibility in the pursuit of inflation objectives could allow for a more systematic integration within monetary policy strategy of longer-term financial and macroeconomic stability considerations – linked, in particular, to the financial cycle and the gradual cumulative increase in indebtedness. This, in turn, could help address the tricky inter-temporal trade-offs involved. Just like the credible and highly respected conductor of a well-rehearsed orchestra can afford to lead with minimal gestures, so a credible central bank can afford to let inflation evolve within a wider range without energetic adjustments to the stance.

Monetary policy loses traction: the US example

In per cent

Graph 4



¹ The common component is constructed as the first principal component of monthly log price change across the 131 sectors. The response corresponds to a 25 basis points monetary policy shock. ² For each sector, its sector-specific log price is calculated by summing up the residuals from regressing monthly log price change of the sector on the common component. ³ Significant at 10% level.

Sources: C Borio et al (2021), forthcoming; Federal Reserve Board; US Bureau of Economic Analysis; author's calculations.

The usefulness of flexibility is underlined by two stylised facts. First, it stands to reason that, as a pervasive or aggregate force, changes in the monetary policy stance should have a stronger impact on the common component than on the item- or sector-specific component. Evidence is indeed consistent with this (Graph 4, compare the left-hand with the centre panel). In addition – at least since inflation has been low and stable – changes in the stance have operated through a remarkably narrow set of prices (right hand panel), mainly in the more cyclically-sensitive services sector. Taken together, these stylised facts indicate that monetary policy would have to try hard to push inflation up to achieve a tightly-defined target, which would magnify the side effects of “low for long”.

At the same time, it is clear that monetary policy cannot effectively address the inter-temporal trade-offs linked to the financial cycle and the trend increase in indebtedness on its own. The support of (micro- and macro-) prudential policy, fiscal policy and even structural policy is critical –as part of what can be termed a holistic “macro-financial stability framework”, eg BIS (2021). This is very much a work in progress.

Conclusion

Let me conclude. Central banks are facing especially testing times. It is precisely in periods like this that probing questions about analytical paradigms need to be asked and convictions re-examined. Central bank reviews of the monetary policy frameworks testify to the importance of this task.

As the physicist Richard Feynman (2005) once said, with reference to “hard” science: “I can live with doubt and uncertainty and not knowing ... We will not become enthusiastic for the fact, the knowledge, the absolute truth of the day, but remain always uncertain ... In order to make

progress, one must leave the door to the unknown ajar.” This task, arduous as it is, applies to all of us, all the more so in economics.

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Climate Crisis

Remarks by IMF Managing Director on Global Policies and Climate Change^{*}

By KRISTALINA GEORGIEVA^{*}

Minister Franco, Governor Visco, Ministers and Governors, Dear Colleagues and Friends,
I would like to thank the Italian G20 Presidency for your leadership in organizing this important event at a critical juncture.

To keep global warming between 1.5 to 2 degrees Celsius, we must cut global emissions by one quarter to one half over the next decade. Based on our historic experience, this may seem an impossible target—but it is one we ought to and can achieve, with public support, technological breakthroughs, and the right policies.

But our miserable performance so far has given ground to an interesting a joke: how can we achieve sustainability and protect our climate? The answer is there are two ways to do that. One is realistic, and the other one is fantastic. The realistic way is that extra terrestrials come from space, take over our affairs and they get it done. The fantastic way is that we people do it ourselves.

So, your job as G20 Presidency is to make the fantastic, realistic. And we are here to help you do so.

Public awareness and support are growing. Recent global polls tell us that majority of people surveyed consider climate change a global emergency, with the level of concern highest in small islands and developing states and high-income countries (at 74 and 72 percent) and well above 50 percent in middle-income and least developed countries (at 62 and 58 percent). Another poll tells us that the pandemic has heightened these concerns: 43 percent of people surveyed were more worried about climate change now than they were before, with only 7 percent saying they are less worried.

The response of science and technology during the pandemic, and success in creating effective vaccines in record time, have also set hopeful examples for the leaps that are needed in innovation, development, and commercialization of low-carbon technologies. In addition, the policy responses of governments to the COVID-19 crisis have demonstrated that many major economies are capable of unprecedented and drastic action when it is called for.

It is in this context that staff from several international organizations (AFD, IEA, IMF, OECD, UNDP, WTO) worked to set out key global policy priorities to cut emissions in line with the Paris Agreement, to be published in a report after the Conference. Applying them at a country level would require specificity of making climate mitigation compatible with continued social development and national preferences toward policy approaches.

^{*}Speech given at International Conference on Climate, Venice, July 11, 2021

^{*}Kristalina Georgieva, IMF Managing Director

The first priority is to make market signals work for the new climate economy, not against it. As politically challenging as this may be, the world needs to rid itself from all forms of fossil fuel subsidies. Defined broadly to include undercharging for supply and environmental and health costs, they are equivalent to more than 5 trillion dollars annually—and we will soon publish an updated research on the exact composition of these subsidies.

Key is putting a robust price on carbon as we discussed at the G20 High-Level Tax Symposium. This will provide a critical signal for redirecting private investment and innovation to clean technologies, and to incentivize energy efficiency. Our research is clear—without it we simply cannot reach the goals of the Paris Agreement.

And this price signal needs to get predictably stronger—by 2030, we need an average global price of \$75 per ton of CO₂, way up from today's \$3 per ton and up from the 23 percent current emissions coverage.

A minimum first step on carbon pricing is a regular stocktaking of measures by the G20 countries to assess progress toward mitigation commitments.

A higher level of ambition is an International Carbon Price Floor agreement among major emitters—staff at the IMF have elaborated in a recent proposal how this could work, and we will continue to expand our policy research in this area.

With a pragmatic design, this type of arrangement would allow different minimum prices based on different development levels and different national policy approaches. And the carbon price floor does not have to be a tax. Some countries may prefer other measures that achieve the same outcome, such as emission trading or combinations of feebates/regulations at the sectoral level.

Crucially, as well as making global mitigation efforts more effective, a price floor would address concerns about competitiveness that already incentivize carbon border adjustments, which are less effective and more divisive.

But carbon pricing alone is not enough. Which brings me to the second policy priority: green investments.

Radically decarbonizing our economies will require a substantial scaling-up of investment over the next two decades. The shift to renewables, new electricity networks, energy efficiency, low carbon mobility—offer a huge investment opportunity.

And it's a huge opportunity for growth and jobs. Research by IMF staff shows how deficit-financed green supply policies could raise global GDP by about 2 percent this decade and create millions of new jobs.

On average, around 30 percent of new investment is expected to come from public sources—which will be vital to mobilize the remaining 70 percent from private sources. That means giving priority to green recovery packages, green budgeting, and green finance.

International public finance can help reduce both costs and perceived risks. Governments can help provide the infrastructure to support the deployment of low-carbon technologies in response to carbon pricing. And financial sector policies—such as green taxonomies and common risks disclosures—can steer private investment toward sustainable projects.

The third global policy priority is a “just transition”—within and across countries, ensuring the shift to a low-carbon economy is fair and benefits all.

Within countries we must recognize that decarbonization would impact vulnerable households, as well as businesses and workers currently deployed in sectors with high emissions. Fair compensation measures will be required. For example, revenues from carbon pricing schemes can fund cash transfers, social safety nets, worker retraining, and relocation schemes. And place-based policies can help develop new low-carbon industries and jobs through green investments.

Across countries, help must be provided to both those faced with the double challenge of increasing energy access while reducing their carbon footprint, and those faced with costs associated with adapting to the impact of climate change coupled with limited fiscal space. They will need support from the international community.

This brings me to the role of the IMF.

At the Fund, we are working closely with partners on this important agenda. With the World Bank, we have formed a High-Level Advisory Group on Sustainable and Inclusive Development that will put forward policy analysis and proposals to address the twin crises of climate and the pandemic.

We are putting climate at the heart of our work—from country, regional, and global economic surveillance to capacity building to helping small island states with fiscal strategies that build resilience.

Most recently, our Board agreed to increase climate coverage in Article IV and Financial Sector Assessment Programs. We will now cover mitigation policies in the 20 largest emitters and other cases, adaptation in countries that are especially vulnerable to climate shocks, and transition in economies heavily dependent on fossil fuel production. Our FSAPs will examine physical risks due to climate change, and transition risks as we move to a low-carbon economy.

And earlier this year, we launched a new Climate Change Indicators Dashboard, in collaboration with partners including the OECD, the World Bank, the UN, and the European Commission.

Beyond surveillance, capacity development, and data, the next step is to consider whether and how IMF financing can help implement policy advice—including climate mitigation, adaptation, and transition policies. In the context of the forthcoming allocation of \$650 billion of Special Drawing Rights, we are exploring the creation of a Resilience and Sustainability Trust.

This Trust would aim to support resilient and sustainable growth in the post-pandemic period, including resilience to climate change. It could lend at cheaper rates and longer maturities to provide fiscal space for countries to undertake green reforms and policies. And it could especially benefit low-income, poorer, and vulnerable middle-income countries. I look forward to discussing this with our membership in the period ahead.

Let me end with the words of Leonardo da Vinci, who worked in Venice as an architect and engineer.

He said: “I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do.”

Climate change is a global challenge that requires urgent global action. We know what must be done. The time is now.

As we look ahead to COP26 we must be ready to move decisively—together—for the sake of our planet, prosperity and for people everywhere.

Disclosures and Data: Building Strong Foundations for Addressing Climate- Related Financial Risks^{*}

By RANDAL QUARLES^{*}

Introduction

As Chair of the Financial Stability Board (FSB), I have the privilege of collaborating with the Italian G20 Presidency, the G20 Finance Ministers and Central Bank Governors, and with the FSB membership on the most pressing issues affecting financial stability. Among those issues, one of increasing focus is understanding and monitoring climate-related financial risks. Given the global nature of climate change, this demands a coordinated international effort.

The FSB published a Climate Roadmap that presents a comprehensive and coordinated plan to address climate-related financial risks. The FSB's roadmap dovetails with the ongoing work of the G20 Sustainable Finance Working Group (SFWG) to develop a broader sustainable finance roadmap. The views expressed in these remarks are those of the speaker in his role as FSB Chair and do not necessarily reflect those of the FSB or its members.

Today, in my role as Chair of the FSB, I would like to focus on the two foundational components of the FSB roadmap: disclosures and data. Globally consistent, comparable, and reliable disclosures, as well as a broader set of high-quality, relevant data, together, can provide the basis to assess climate-related financial risks and the impact on financial stability.

Disclosure

The FSB was an early leader in bringing attention to the importance of reliable, entity-level disclosures to assess and manage climate-related financial risks and opportunities. In 2015, the FSB submitted a proposal to the G20 to create an industry-led disclosure task force on climate-related risks.

The work of this FSB-sponsored Task Force on Climate-related Financial Disclosures, or TCFD, has led to greater recognition of the importance of climate-related financial risk and of comparable and reliable disclosure. The early development of industry-led recommendations and a usable framework by users and producers of this information was critical. The four core elements of the TCFD recommendations have provided a widely accepted framework for disclosures—covering governance, strategy, risk management, and metrics and targets. The task force has continued to provide significant support to those seeking to disclose and has encouraged steadily increasing uptake. These initial steps greatly helped to define appropriate parameters, drive towards consistency, and give the public sector a running start in developing their own approaches.

Now it is time to build on that work. It will be useful to establish a globally consistent baseline standard for climate-related disclosures. Globally consistent and comparable entity-level disclosures by non-financial companies, banks, insurers, and asset managers are increasingly important to market participants and financial authorities as a means of providing information needed to assess and manage risks.

The G20 Presidency, in developing its 2021 work program, asked the FSB to encourage more consistency in disclosure practices. As a start, the FSB surveyed what financial authorities across our membership were doing to promote disclosures. Almost all our members have already set requirements, guidance, or expectations or plan to do so. We found some heterogeneity in the

^{*}Speech given at the Venice International Conference on Climate Change, Venice, Italy, 11 July 2021

^{*}Randal Quarles, Chair, Financial Stability Board and Vice Chair for Supervision, Board of Governors of the Federal Reserve System

approaches they were taking. Some members prefer mandated disclosure while others would make it voluntary. There is also variation in the desired scope of disclosures. However, there is a trend towards an important baseline that focuses on one-way materiality— or the financial risk that climate change could have on a particular entity—based on the TCFD recommendations. The majority of our membership are already using the TCFD recommendations as a baseline for their own requirements or guidance.

The International Financial Reporting Standards Foundation (IFRS), in consultation with other international organizations, will develop a set of standards, starting initially with climate and building upon these TCFD recommendations. As reflected in our December 2020 statement, the FSB supports IFRS’s advancement of an International Sustainability Standards Board to take this work quickly forward. This work holds the promise of providing baseline standards that could inform or be built upon by national authorities as they develop their approaches to climate-related financial disclosure or broader sustainability disclosure.

The initial focus of the IFRS will be on climate standards, while allowing for interoperability with individual jurisdictions’ frameworks, that may go beyond climate-related impacts. Consistency in one-way disclosures would provide a needed avenue for accurate and appropriate risk assessment and comparability to assess investment decisions. Simultaneously, the IFRS standards are intended to provide flexibility for national authorities to build on the baseline. The “interoperability” feature will allow jurisdictions to address broader or jurisdiction-specific concerns in a manner consistent with their legal and regulatory frameworks, and indeed to go further in scope or faster if they wish. Given the importance of this work, we encourage the IFRS to press forward as quickly as possible. In the interim, the FSB continues to encourage jurisdictions that are implementing frameworks to base them on the TCFD recommendations to avoid unnecessary fragmentation.

Data

The need for high quality, reliable data doesn’t stop at firms’ disclosures, however. International initiatives are needed to improve data quality and address data gaps, and ultimately to establish a basis of comprehensive, consistent, and comparable data for global monitoring and assessing climate-related financial risks. We published a separate report on this topic last week.

Our data needs include data on the underlying drivers of physical and transition risk and financial institutions’ exposures. The challenges here are considerable. To understand the financial risks, better information is needed on the underlying physical risks, including the sorts of extreme weather events that pose greatest risks to the balance sheets of households, firms, and financial institutions. Comparable data is also needed on the nature of jurisdictions’ climate-change targets and progress in meeting them. All this information needs to be related to financial risks—including financial institutions’ exposures to non-financial counterparties.

This is not an easy task. The current lack of usable data is a reflection of difficulties in transforming existing information on the drivers of climate risk into reliable metrics that quantify financial risks. The key here is to find metrics that are forward-looking, recognizing that the nature and magnitude of future climate-related risks may differ from those in the past.

Improved financial risk data can also help achieve the financial stability mandates of financial authorities. For example, the FSB is exploring how to assess the degree to which climate-related risks might be transferred or amplified by different financial sectors, including the interdependence of banks and insurance firms. Climate-related risks vary across jurisdictions, and we need to look at how risks might be amplified by feedback loops with the real economy. Such analysis will contribute to a more comprehensive and global understanding of how to assess climate change and potential effects on the financial system, but those efforts are hampered by a variety of data limitations.

The FSB is working with international bodies, such as the IMF and other international groupings, such as the Network for Greening the Financial System (NGFS), to assess climate data gaps and to identify steps to address them, with a special emphasis on ensuring cross-sectoral and international consistency. For example, the FSB plans to coordinate work with the NGFS on the issues surrounding scenario analyses, which some jurisdictions are using or contemplating, and the financial metrics that would be useful for such an analysis, both at the level of the firm and the overall system. Examining scenario analysis presents many challenges: A very long time horizon—which requires dynamic balance-sheet analysis—and the need to capture the interplay between the macro-economy and drivers of climate-related risks are two such challenges that would need to be overcome.

Conclusion

Today, the FSB is well-positioned to lead in the next phases of the work required to assess and address climate-related financial risk. The FSB's mandate, its diverse membership, and its connection to the G20 make it the ideal forum to forge a consensus on the appropriate path forward. The FSB, as laid out in its roadmap, has taken on a critical role in coordinating and carrying forward work that will make the global financial system more resilient to the threats posed by climate change. The roadmap establishes a strategic vision for addressing climate-related financial risks, which sets out how we will coordinate with other standard-setting bodies and international organizations in order to progress towards our goal. Our Climate Roadmap leverages the FSB's strength as a coordinating body, provides some structure to the vast amount of work on climate-related financial risks currently going on internationally, and clarifies interdependencies between work streams and between issues.

The Climate Roadmap sets the course and promotes consistency through, among other things, building consensus around common principles, best practices, and cross-jurisdictional alignment. These include the two broad objectives that I have focused on today—establishing consistent, comparable, and reliable information through a global baseline standard for disclosures and through improving the availability and quality of data. The roadmap also includes work on analytical tools and policy approaches developed for identifying and managing climate-related financial risks. We have a long road ahead of us, but every journey begins with the first steps. The FSB will continue to leverage its strengths to coordinate and contribute to understanding and addressing the challenges to the financial system that arise from these risks.

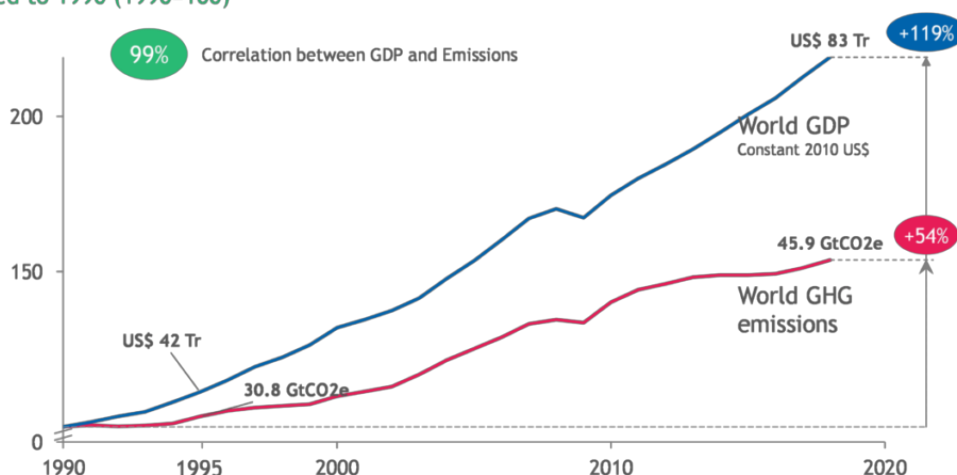
Time for Central Banks to Stop Dithering over Climate*

By URJIT PATEL*

After a drop in 2020 due to Covid-19, global greenhouse gas emissions will grow this year and again in 2022. It gets worse. According to the International Energy Agency, 2023 is projected to be the year with the ‘greatest levels of carbon dioxide output in human history’. The Intergovernmental Panel on Climate Change’s sixth assessment report has spelt out in detail that irreversible changes in climate due to human influence are witnessed across the globe.

Economic activity, of practically any and every kind, is strongly integrated with emissions that contribute to climate change, hence the sizeable drop in carbon emissions last year and strong snapbacks thereafter as output recovers to baseline. Output and GHGs go hand in hand, and will continue to do so.

World GDP World GHG Emissions Indexed to 1990 (1990=100)



Sources: CAIT - all GHG excluding LUCF, World Bank
Index has been compiled by author based on publicly available data on emissions and GDP

Central bank regulations have been incorporating, within the transaction-based frameworks, granulated climate-related risks from the standpoint of financial intermediation and financial stability. At the most basic level these regulations make intermediaries recognise the possibility of climate risk factors that reduce borrowers’ ability to repay and service debt. This includes the likelihood that, in extreme circumstances, the recovery of a loan could be impaired. By and large this recognition translates into apposite (usually higher) pricing of risk for the borrower and setting aside of more bank capital by the intermediary.

What about monetary policy?

Consequences of climate change are now apparent in many parts of the world. The lag between increase in the stock of GHGs and their impact seems to be getting shorter – important thresholds are being crossed. Remarkably, decades after climate change became important in public discourse,

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the build-up of climate change-induced considerations seem to be ignored in monetary policy ‘reaction functions’ of central banks.

The canonical economic relationships that guide changes in central bank policy rates have, for the most part, incorporated utilisation (levels) of production factors and inflation developments with reference to output. The Phillips curve as an empirical observation has evolved into the practical or implementable Taylor Rule (given below). The policy rate is predominantly determined by deviation of actual inflation from the target (the latter is usually 2% to 4% for inflation-targeting central banks) and deviation of actual output from ‘potential’ output, called the output ‘gap’.

$$i = \pi + r^* + 0.5 (\pi - \pi^*) + 0.5 (y - y^*)$$

Where:

i is nominal interest rate

π is rate of inflation

π^* is inflation target

r^* is neutral real rate of interest

y is output

y^* is potential output and

$y - y^*$ is the ubiquitous output gap.

The rule encompasses both inflation control (‘nominal anchor’) and moderation of output fluctuations objectives of monetary policy (with interest rate as the policy instrument). The basic idea is that, all else being equal, inflation tends to rise when output is above potential, and conversely fall when output is below potential. The rule underlines the reasoning for a positive real interest rate when inflation exceeds the target and the need for positive real interest rates to manage inflationary pressures. In a flexible inflation targeting framework, the interest rate rule requires assigning a greater weight to inflation management compared to other objectives.

High inflation is the key symptom of macroeconomic unsustainability. The theoretical and empirical link between conventionally defined output gap and inflation has been so strong historically that hardly anyone doubts this depiction. In recent years, the concept of the finance-neutral output gap for determining the policy rate has gained currency. This was in response to the 2008 financial crisis, when financial risk accretion starting in 2004 was discounted by global central banks as inflation continued to be at (or below) target and monetary policy was kept accommodative (which added to the risk build up) because of negative conventional output gaps.

The finance-neutral output gap evaluates the sustainability of economic growth based on broader financial considerations since inflation below the target that is mandated imparts a false or, at any rate, incomplete sense of macroeconomic sturdiness. It is widely accepted that in some countries the financial crisis and its aftermath contributed to long-term social and political contracts between voters and elected politicians coming under stress, so the costs of disregarding obvious hazards can be large, multi-dimensional and durable.

Given the tight causal relationship between economic activity and emissions, it is perhaps time for central banks to formally and rigorously internalise those aspects of climate change (and variability) that affect the output gap ‘block’ in the suite of models that underlie the reaction function metric. It may not be out of place for central banks to include a report on the subject as part of policy statements.

There are five, albeit not entirely independent, dimensions to take into account:

1. Effect of rising temperature and climate variability on short-term economic activity stemming from, for example, disruptions due to extreme floods.

2. Regulatory restraint: national commitments made in the Paris agreement are akin to additional constraints to maximising economic output compared to the unconstrained baseline. The cross-country variations are significant.*

3. Feedback loop from economic growth to higher GHGs.

4. Implications of rising temperatures, in the absence of adaptation, on long-term economic capacity as emissions boundaries are breached, resulting in lower labour productivity and degradation of capital stock.

5. Expected changes in carbon-related tax and subsidy arrangements.

Similar to overlooking the financial risk build-up in the previous decade, the price will be heavy in terms of social and economic dislocation if conventional output gaps are not redefined as climate-change augmented (neutral) output gaps, or some other definition and associated terminology. If sustainability is a defining characteristic of potential output, then it has to incorporate climate considerations. In other words, high inflation can no longer be the proximate symptom of macroeconomic infirmity if central banks are serious about the subject. Integrated assessment models may have to be explicitly incorporated in central bank work related to monetary policy.

While no single country may have an appreciable bearing on total global emissions, climate change is a damaging, long-term or even permanent shock to potential output. All things considered, output gaps corrected for climate considerations will be smaller (less negative). Not adjusting for this aspect in central bank reaction functions will lead to suboptimal policy choices; this may imply that the current stance of monetary policy is, conceivably, looser than it should be. No one would claim the analogy to be exact, but ignoring climate risks will complicate macroeconomic management, much like overlooking financial risks led to the 2008 financial crisis.

* Estimates from ‘Long-Term Macroeconomic Effects of Climate Change: A Cross-Country Analysis’, IMF working paper, October 2019, are noteworthy. Sticking to the Paris Agreement (mitigation) is envisaged to limit the temperature increase to 0.01°C per annum and is estimated to reduce per capita world real gross domestic product by around 1% by the end of the century. On the other hand, business-as-usual, that is, in the absence of mitigation reduction in world real GDP per capita is estimated to be more than 7% over the same time frame.

Asset Owners Can Be Game Changers in Climate Fight^{*}

By PEDRO GUAZO^{*}

The United Nations Joint Staff Pension Fund (UNJSPF) joined the Net-Zero Asset Owner Alliance in July 2020 when it decided to step up its efforts to fight climate change. The Alliance, founded in 2019, is built on the idea that asset owners can be game changers in the fight against climate change with their portfolio holdings, through structural dialogue, capital allocation strategies and collaboration efforts.

The Alliance's role is crucial: climate change as a systemic risk needs to be addressed by sharing actions and solutions. By joining resources and targets, the Alliance amplifies investors' voices and efforts. With over 40 institutional investors representing over \$6.6tn of assets under management, the Alliance has already demonstrated that major financial actors can align their investments with the 1.5°C target set out by the Paris agreement.

The Alliance's ambition is to make investment portfolios carbon neutral by 2050 and it is committed to setting intermediate targets every five years. Alliance members believe setting targets at regular intervals is the best way to make sure that objectives will be reached on time.

By 2025, Alliance members have pledged to decrease the carbon footprint of their listed equities, corporate bonds and real estate portfolios by 16% to 29% from the December 2019 level of emissions. Targets are also set for high-emitting sectors such as oil and gas, utilities, steel, cement and transport, which include aviation, shipping and heavy and light duty road.

Engagement activities such as direct and collective structural dialogue play a key role in reaching the 2025 targets. The purpose of this dialogue is to support the transition to a low-carbon economy and the adoption of net-zero strategies by all entities in every sector and industry around the world. The Alliance also seeks to create a favourable policy environment by advocating ambitious public policies on climate.

A decarbonisation strategy that is not backed by investments into climate change mitigation and adaptation tools is not sufficient to reach the goals set by the Alliance. Therefore, the Alliance asks asset owners to grow their allocation towards the financing of transition solutions. By increasing the exposure to those investments, institutional investors contribute to the rise of supply-side environmental solutions.

Being a member of the Alliance has given the UNJSPF the tools and targets to integrate climate action at every level of our portfolio management. And after our first year of membership we committed to very ambitious targets. We pledged to reduce the absolute greenhouse gas footprint of our equities and corporate bonds' portfolios by 29% in 2021 against the 2019 level. The Alliance recommended achieving this reduction by 2025 but we will achieve it four years earlier. By 2025, the UNJSPF has set a target to reduce greenhouse gas emissions by 40% compared to the 2019 level.

Being part of the Alliance has enabled us to have a better understanding and more knowledge of the net-zero initiative, adopt higher commitments and start to implement them faster. Any asset owner can do the same with the right processes and frameworks, and this is what the Alliance brings to its members.

The UN Secretary-General has called 2021 'a crucial year for climate change'. We call all asset owners to collaborate with others, whether in the Alliance or in any other sectorial group, to take their fair part in the fight against climate change in line with the Paris agreement and the UN Sustainable Development Goals.

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Digital Economy

CBDC Systems Should Focus on Programmable Payments*

By WOLFRAM SEIDEMANN*

According to the BIS, over 60% of central banks are experimenting with central bank digital currency technology. CBDCs are close to being widely introduced and many complex matters have been discussed in financial circles. These include developing secure infrastructure, questions around governance – such as how to balance anonymity with transparency – and mitigating adverse economic impacts. As public digital currencies rapidly transform from theory to reality, there is one important feature that needs to be examined: programmability.

When talking about programmability, it is crucial to note the distinction between programmable money and programmable payments. The two terms are often used interchangeably, but there is a difference. Programmable money is designed with in-built rules that constrain the user. These rules could mean that money expires after a fixed date or its use is restricted to a certain set of goods. This would affect digital currency acceptance and has obvious legal implications.

Programmable payments, on the other hand, enable automatic transfers to be carried out or blocked when pre-determined conditions are met. These could include daily spending limits or recurring payments, similar to direct debits and standing orders but with added complexity and conditionality. Programmability features could bring numerous benefits, enabling new workflows, processes and digital business models without affecting the properties of the currency itself.

Machine-to-machine payment, for example, is one area that harbours enormous potential. Driverless vehicles could negotiate directly with charging points, pay for the electricity used and drive away without any human intervention. Industrial machines could purchase supplies when stocks are running low, diagnose reliability issues and pay for repairs autonomously. Programmable payments make doing business more efficient and more consistent. When transactions can be automatically settled, huge cost and time savings can be made.

At its most basic, the ability to programme payments boosts convenience and improves efficiency for a wide range of stakeholders. CBDCs must include programmability as a feature – as long as programmable logic is located outside of the asset.

Programmability is achievable without using blockchain technology. G+D's retail CBDC solution, G+D Filia, includes a programmability feature that forms a foundation for innovation. Financial service providers can build on reliable infrastructure provided by central banks. And people can be sure that CBDCs are just a digital form of cash, without any usage restrictions or privacy issues.

People are no longer questioning if CBDCs will be introduced. The focus is on how they are built and what form they will take. A CBDC with programmable features has the potential to revolutionise business, expedite the economy of things and move our world into an ever more digital future. All of this can be achieved in a secure manner and without touching the currency itself, instead layering functionalities on top of digital money. In this way, citizens can continue to trust the value of money, while the features and processes developed through programmable payments foster the growth of the digital economy.

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Sovereign Issuers Explore Digitalisation Options*

By PHILIP MOORE*

When it launched its first digital bond on a public blockchain in April, the European Investment Bank (EIB) provided a glimpse into how primary markets for sovereign and supranational borrowers may function in years to come. Arranged by Goldman Sachs, Santander and Société Générale, the €100m two-year bond was launched in partnership with Banque de France as part of its experiment on the use of central bank digital currencies for settling bonds.

Panellists at a recent OMFIF meeting on sovereign debt agreed that this pilot transaction had been a success. ‘It went very smoothly,’ said Christian Kopf, head of fixed income at Union Investment Group, which participated in the deal. ‘We went through the entire process at Union and settled without any problem. It’s a promising development, although I’m still unsure about how the issue of counterparty risk will be dealt with in the secondary market.’

The Banque de France followed up at the end of June with a simulated sale of a fungible Treasury bond (or Obligations Assimilables du Trésor) on a permissioned blockchain. The experiment was followed by several secondary market operations performed on these bonds. Cash settlements were simulated by a CBDC issued on the blockchain. The experiment required the development and deployment of smart contracts so that the Banque de France could issue and control the circulation of CBDC tokens and ensure that their transfer takes place simultaneously with the delivery of the OATs into the investors’ portfolio.

One of the banks involved in the OAT test was HSBC, alongside BNP Paribas, Credit Agricole and Société Générale. But the experiments are not limited to Europe. At the OMFIF event, HSBC’s co-CEO of Global Banking and Markets Georges Elhedery described how HSBC Singapore had drawn some valuable lessons on digitalisation from its participation alongside the digital issuance platform, Marketnode, on deals such as a \$1bn digital bond for Singtel in April. HSBC acted as joint lead manager and bookrunner on this transaction, the largest on the platform to date, which attracted 123 investors.

‘The best solution for the removal of settlement risk is to use a digital currency, which in our case was an HSBC-issued stablecoin,’ Elhedery explained. ‘This is delivery versus payment because you’re simultaneously exchanging two digital assets on the same platform. One is dollar-backed and the other is a bond-backed token.’

The drawback with this is that if every bank issued its own digital currency, it would create a potentially unmanageable plethora of stablecoins. ‘This is where central bank digital currencies can come into play,’ Elhedery added. ‘A digital asset that is totally acceptable to all parties and not labelled with an individual bank’s name could be used to eliminate settlement risk.’

Sovereign borrowers on a panel held by OMFIF had differing views on digitalisation. Germany has applied a similar methodology to its experimentation in the digital area as it has in green bonds, aiming to maximise efficiencies by combining conventional and innovative features. Christian Wellner, head of strategy at Germany’s Finanzagentur, explained how alongside the Bundesbank and Deutsche Börse, the agency has developed and successfully tested an issue of a 10-year federal bond using distributed ledger technology for settlement with the aid of a trigger solution. This has demonstrated that it is possible to establish a bridge between blockchain technology and traditional payment systems to settle securities without the need to create a CBDC.

The Italian Treasury, meanwhile, has begun to assess the potential of digitalisation in the government bond market, but is undecided on some of the regulatory implications. ‘The speed of

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execution and the transparency it gives the authorities to know about market participants is valuable’, said Maria Cannata, Member of the Council of Experts at the Italian Treasury in Rome. ‘But at the same time it concentrates a lot of responsibility in the hands of the owner of the algorithm.’

Others agreed that while there are a number of uncertainties to be addressed, the long-term potential of digitalisation in sovereign bond issuance is compelling. ‘The legal and regulatory backdrop is one major hurdle’, said Elhedery. ‘Another is the need to reach agreement on standard technology, because the last thing we need is fragmented, non-interoperable systems. But if a standardised system can be rolled out and supported with clear rules and regulations, it will lead to accelerated settlement processes, reduced costs, 24/7 liquidity and simpler asset servicing.’

Cryptoasset Markets Moving too Fast for Clear Regulation and Valuation*

By KATIE-ANN WILSON*

At a recent panel discussion, Dan Berkovitz, commissioner at the Commodities and Futures Trading Commission, raised the challenges surrounding the need for imminent regulatory clarity on cryptoassets, while also recognising their lack of underlying value. Berkovitz was speaking at an event jointly hosted by the OMFIF Digital Monetary Institute and Kroll (formerly Duff & Phelps) on the risks, opportunities and valuation of cryptoassets, alongside experts from Barclays and Kroll.

Berkovitz acknowledged the highly fragmented US regulatory landscape in relation to cryptoassets, which includes crypto currencies like bitcoin and stablecoins such as Tether and Diem. He highlighted the difficulties in providing certainty from a regulatory perspective: 'By the time we have formulated a proposal for public comment... all these markets could be different.'

Panellists compared the explosion of cryptoassets to the dot-com bubble in the late 1990s, which saw excessive speculation around internet-related companies. Berkovitz said, 'If we had tried to regulate the dot-com before it was mature, we may have stifled unintentionally much of that innovation... We don't know where this is going to go, we want to promote innovation and give it the freedom to grow and at the same time maintain the guardrails.'

Ken Joseph, managing director of financial services compliance and regulation at Kroll, also highlighted that although the situation is similar to the dot-com bubble, where many companies failed and gave way to big tech, valid use cases will come out of the 4,000 different cryptoassets on the market today. Joseph noted, 'It's not the role of governments to place bets on who's going to succeed and who's going to fail, it's about making sure there is clarity in the rule making and letting the markets decide.'

The panel also addressed concerns of retail investor participation amid high volatility and speculation around cryptocurrencies. Berkovitz observed that, 'Retail participation and retail speculation in commodity markets is not new.' In traditional commodity markets, the speculation is based on the future worth of assets, given the economic value of gold and oil for example. However, in crypto, 'We are not there yet, there's no underlying fundamental value at this point,' Berkovitz said. 'We are dealing with speculation on whether it will have value in the future.' He also cautioned the retail investor that 'it may not be appropriate for everybody.'

The CFTC regulates futures exchanges, and once an asset such as a bitcoin futures contract is on the futures market, everybody can trade in it. This is unlike the relatively young swap market, also under the CFTC's jurisdiction, where statutory requirements ensure retail investors are usually ineligible to swap.

David Larsen, managing director in the alternative asset advisory practice at Kroll, stressed the difficult questions raised by cryptocurrencies for investment entities having to report their valuation to investors. Larsen said, 'In the crypto space one of the biggest questions is: is there anything behind it? Is there anything there but that limited supply, which drives demand?' The value in this space becomes 'what the next person will pay for it.'

Regulators are then left with a swag of challenges, including how do you verify that this really exists and how do you verify that you own it? Panellists agreed the regulatory approach will

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remain ‘reactionary rather than proactive’ with Nicole Sandler, head of digital policy at Barclays, arguing that regulatory uncertainty will continue to hinder cryptoasset application.

When asked about what this approach means for the European Union’s new Markets in Crypto-Assets Regulation, Sandler said, ‘MiCA is a work in progress. When it eventually lands and is implemented, I hope it is done in a way that does factor in future cases.’

Meanwhile, the US Securities and Exchange Commission has released its 2021 regulatory agenda and has left bitcoin and cryptocurrency out altogether.

Sustainable Development

The Circular Economy Grows Up*

By ANDREW SHENG AND XIAO GENG*

If we do not abandon the prevailing “take-make-waste” pattern of global production and consumption soon, we will need the equivalent of almost three Earths to provide enough natural resources to sustain current lifestyles, and annual waste generation will increase by 70%. But there is a better way.

Every year, 400 million tons of heavy metal, toxic sludge, and industrial waste are dumped into our waterways. At least eight million tons of plastic end up in our oceans. Some 1.3 billion tons of food – about one-third of all that is produced – is lost or wasted, while hundreds of millions of people go hungry. Our oceans are being overfished, our lands degraded, and biodiversity rapidly eroded. Meanwhile, devastating natural disasters – flash floods in Europe and China, forest fires in the United States, and locust infestations in Africa and the Middle East – are becoming more frequent.

The unsustainability of our linear “take-make-waste” pattern of global production and consumption has never been more obvious. In fact, if we do not abandon it by 2050, we will need the equivalent of almost three Earths to provide enough natural resources to sustain current lifestyles, and annual waste generation will increase by 70%. But there is a better way: we can embrace the circular economy.

The circular economy would decouple growth from the consumption of finite resources, keep products and materials in use, and regenerate natural systems. The European Union is already embracing this approach. Its Circular Economy Action Plan – a pillar of the European Green Deal – introduces legislative and non-legislative measures that would affect the entire life cycle of products, with a view not only to saving on materials, but also to creating jobs, improving human well-being, and protecting nature.

The manufacturing sector is a case in point. As the plan notes, up to 80% of a product’s environmental impact is determined at the design phase, yet manufacturers do not have sufficient incentives to design sustainable (or circular) products. The EU plans to strengthen these incentives through legislation.

Ultimately, this will help manufacturers. Given that raw materials currently account for about 40% of manufacturers’ costs, on average, closed-loop models can significantly increase their profitability and protect them from resource-price fluctuations. This latter point highlights the circular economy’s geopolitical dimension: As the Dutch plan for developing a circular economy by 2050 notes, “of the 54 materials that are critical for Europe, 90% must be imported, primarily from China.”

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The EU estimates that applying circular-economy principles comprehensively could increase its total GDP by an additional 0.5% by 2030, and create around 700,000 new jobs. Crucially, measures aimed at implementing the circular economy in the EU would be introduced in a broad-based manner, including initiatives by communities and local and regional governments.

Given that the EU is a manufacturing powerhouse, it can help to set global standards for product sustainability and influence product design and value-chain management worldwide. But Europe is also taking a more direct approach to driving forward global progress toward a circular economy. This past February, it launched the Global Alliance on Circular Economy and Resource Efficiency. It is also pushing circular-economy principles through global trade negotiations and in its partnerships with African countries.

But, if this effort is to succeed, we must first understand why it has taken so long for the circular-economy concept to take root. Part of the answer lies in how mainstream economic ideology regards nature.

As John Ramsay McCulloch put it in his introduction to the 1828 edition of Adam Smith's *The Wealth of Nations*, "water, leaves, skin, and other spontaneous productions of nature, have no value, except what they owe to the labor they required for their appropriations." More broadly, the prevailing economic models since Smith have been linear and mechanical – an approach that is out of step with cyclical natural systems.

In a recent report, Partha Dasgupta was diplomatic in excusing mainstream economics for ignoring nature (defined interchangeably as natural capital, the natural environment, the biosphere, and the natural world). In the immediate post-World War II period, he noted, absolute poverty was endemic in much of Africa, Asia, and Latin America, and much of Europe lay in ruins. It was therefore "natural" to focus on the accumulation of physical capital (infrastructure and goods) and human capital (health and education). "To introduce Nature, or natural capital, into economic models would have been to add unnecessary luggage to the exercise."

The unwillingness to carry the "luggage" of nature has meant that economic accounting has focused almost exclusively on GDP growth – the more, the better – for over 70 years, without any regard for the impact of economic activity on the natural environment. No surprise, then, that the situation has gotten so desperate.

But there are promising developments. In March, the United Nations Statistical Commission adopted the System of Environmental-Economic Accounting Ecosystem Accounting, a framework for organizing data about habitats and landscapes, measuring ecosystem services, tracking changes in ecosystem assets, and linking this information to economic and other human activity. And both, the Japanese G20 Presidency in 2019 and the current Italian Presidency have pushed for global action on the circular economy.

China has also taken important steps in this direction. In August 2008, it became one of the first countries to pass a law aimed at promoting the circular economy. As Dasgupta noted in his report, China also enshrined the concept of an "ecological civilization" in its constitution in 2018. And China's dual-circulation strategy – a feature of its 14th Five-Year Plan (covering the 2021-25 period) aimed at cushioning the blow from economic decoupling – evolved from the circular economy model.

While the EU and China might disagree about the circular economy's technical, economic, and political uses, their shared commitment to moving toward such a system is good news. More economies should follow suit, with targeted multilateral aid and technical assistance provided to emerging economies.

The circular economy is our only hope of achieving the 17 UN Sustainable Development Goals and ensuring humanity's long-term survival. If great powers must compete, it is here that they should be doing it.

Research Report

RMB Internationalization Report 2021 Press Release*

By INTERNATIONAL MONETARY INSTITUTE

Part I Preface

The outbreak of COVID-19 in 2020 brought the severest global public health crisis that the human race has ever encountered since the end of the World War II. Not only has the novel coronavirus posed a threat to people's health and life, but it has dealt a heavy blow to the world economy, international trade and the global financial market. The pandemic has proved so destructive that it has even dwarfed the global economic crisis of 2008. Governments of various countries juggle policy goals as they strive to keep a balance between pandemic control and economic resumption. With the pandemic spiraling out of control and the economy slipping into recession, the US Treasury was pressed into bringing forward several relief programs, while the Federal Reserve effected emergency rate cuts to unleash liquidity to an infinite extent. For all these efforts, the US continues to face a broken society, antagonism between political parties and chaos during election and the transfer of power. Even so, the US government's pressure on China has shown no signs of easing with ever growing initiatives aimed at containing China's rise on all fronts. In the face of the sudden onset of the virus and an increasingly deteriorating external environment, China's social governance has exhibited great resilience in various aspects: not only has China made major strategic achievements in pandemic control, but it has gained remarkable results in coordinating and promoting economic and social development with regular pandemic prevention measures in place. China has become the only major economy in the world that sustains positive GDP growth.

By the end of 2020, the RMB internationalization index (RII) reached 5.02, a sharp increase of 54.20% year-on-year. RII was compiled by the International Monetary Institute (IMI) of Renmin University of China and was officially disclosed in the first Renminbi Internationalization Report in 2012. It is an objective description of the actual use of RMB in international economic activities. Through this comprehensive and quantitative indicator, it helps us understand the development of the RMB as an international currency in terms of trade valuation and settlement, financial transactions and official reserves and enables comparison of RMB with other major international currencies, thus laying the technical foundation for analyzing RMB internationalization both in China and abroad.

The sharp increase in RII is attributable to the following factors. First, RMB as a means of denomination and settlement in international trade was augmented: in 2020 RMB settlement in cross-border trade under current account reached RMB 6.77 trillion, up by 12.09% year-on-year and accounting for 18.44% of China's total export-import volume of commodities and services; globally, RMB accounted for 2.91% of all international trade settlements, up by 18.40% compared to the previous year. Second, there was a remarkable step-up in the performance of RMB in terms of financial transactions: as the world direct investment kept at an ebb, the RMB direct investment

*IMI Research Report No. 2101 [EN]. This is an excerpt from the RMB Internationalization Report 2021 published in July 2021 by China Renmin University Press.

volume reached RMB 3.81 trillion, up by 37.05% year-on-year and marking the highest growth rate of the past five years; by the end of 2020, RMB accounted for 9.89% of international financial denomination and settlement. The figure, collectively determined by direct investment, international credit loans and international bonds and notes, represented a year-on-year increase of 84.23%, constituting a major impetus for the rise in RII. Third, RMB's role as an international reserve currency was further advanced: so far more than 70 foreign central banks or similar institutions have entered the China Interbank Bond Market, with the monetary authorities of over 75 countries and regions having RMB included in their foreign reserves; in the fourth quarter of 2020, RMB accounted for 2.25% of global official foreign reserves, up by 14.80% year-on-year; the share of RMB in Special Drawing Rights (SDR) was 10.83%, a modest pickup compared to the previous year and more or less an equal to its initial weight.

It is commonly acknowledged that RMB settlement in cross-border trade, which began in pilot zones in 2009 and was later implemented throughout the country in 2011, marks the official commencement of RMB internationalization. At that time, RMB was literally absent from the international market. Just ten years later, RII climbed from 0.02 to 5.02 after undergoing a bumpy process where it surged, plummeted and then picked up to hit a record high—the RMB internationalization has completed the metamorphosis of “from zero to one”. Currently, RMB has gained a secure footing as a major international currency. During the same period of time, the changes in the internationalization indices of major currencies are as follows: the USD from 49.52 to 51.27, the EUR from 29.84 to 26.17, the JPY from 3.34 to 4.91 and the GBP from 4.00 to 4.15. Notably, RMB internationalization surpassed that of the JPY and the GBP in the first half of 2020 and ranked the third among major international currencies for three consecutive quarters.

Interestingly, before the RMB became a major international currency, although the currency internationalization indices had been constantly changing, the four major currencies had maintained a two-group structure with a significant gap in international use in between. In other words, the USD and the EUR had been far more widely used internationally than the JPY and the GBP. It had been like this ever since the birth of the EUR and there had been no indication for change. Therefore, the general concern across the market after the inclusion of the RMB into the international currency club was: Is the outperformance of the RMB over the JPY and the GBP going to be nothing but a flash in the pan? Is the RMB going to be long stranded in the second group together with the JPY and the GBP? Is there any chance for the RMB to break into the first group? If the ultimate objective of RMB internationalization is a currency status that matches China's economy and trade, how should we design and push forward goals of RMB internationalization for the next 10 and 20 years now that the first ten-year objective has been achieved?

RMB Internationalization Report 2021 is the tenth annual report issued by the research team of the Renmin University of China. It aims to present a faithful account of the progression of RMB internationalization with in-depth analysis on major theoretical issues and policy hotspots. Under the theme of “The New Development Pattern of Dual Circulation and Currency Internationalization”, this year's report provides a systematic exposition on the theoretic logics and historical logics between the dual circulation, high-quality development and RMB internationalization before going on to discuss the major areas of work entailed in creating the new development pattern of dual circulation. We are of the opinion that the accelerated formation of the new development pattern in which “the domestic economic cycle plays a leading role while the international economic cycle remains its extension and supplement” is a crucial strategic plan which allows China to embrace new phases of development, implement new development concepts and realize high-quality development. Undoubtedly, it will help build up the hard power and soft power of RMB in an all-round way and create a historic opportunity for RMB internationalization to step up a gear.

The nature of the internationalization of a sovereign currency is the extension of the functions of that currency across the world, which entails large-scale cross-border movement of commodities, services, capital, etc. in and out of the country in question. High levels of dual circulation is conducive to augmenting the above-mentioned movement. High levels of the domestic cycle provide a robust basis for the real economy and the financial market, a stable and secure environment for development and strong competitiveness in technology. All this forms the foundation for the internationalization of currencies. High levels of the international cycle constitute the means to realize the internationalization of currencies, including foreign trade, cross-border investment, international financial transactions, international financial services, international coordination of economic policies, among others.

Historically, the GBP was once among the first group of international currencies. With the collapse of the colonial system, Great Britain's domestic cycle shrank with the slide in its technological and economic capacities and was no longer able to sustain trade expansion and the presence of the GBP in transactions. Being an international financial center, London strove to uphold the GBP as a means of financial transaction, but the general performance of the GBP as an internationalized currency dropped to the second group and it was there to remain. Japan's domestic cycle is also limited as the country cannot position itself either as the world's export hub or as a big import market, which has restricted the share of the JPY in international trade. Moreover, as the Tokyo does not compare with New York or London as an international financial center, the JPY has long existed in the international market as a haven currency and the JPY finds itself stuck in the second group. Similarly, the German Mark has never been able to break away from the second group either. However, the creation of the Eurozone has led directly to a big market and high levels of domestic cycle within the zone and has naturally taken over all the external cycles of its member states. The result is that the Euro swiftly positioned itself among the first group of international currencies right after its birth.

Obviously, the construction of a new development pattern of dual circulation can provide the conditions to promote RMB into the first group of international currencies. The domestic cycle as the mainstay determines the shape and size of domestic consumer market and investment market. A smooth international cycle guarantees the profitability and security of RMB assets, keeps up the appeal of RMB and generates vigorous demands for RMB by residents and non-residents in a fundamental way. The international cycle is the platform where China practices multilateralism and international cooperation. It is conducive to mutual interest, multiple wins and inclusive development among different countries and will help to stabilize the international industrial chain and supply chain. It will effectively reduce economic and financial risks for China and promote efficiency and robustness during the development process. A smooth international cycle keeps RMB in sufficient supply and promotes the availability and convenience of RMB assets. Building an economic development layout where domestic and international cycles reinforce each other can increase the international scenarios and presence of RMB and make a habit of using and holding the RMB for the majority of residents and non-residents.

Building a new development pattern of dual circulation is a strategic layout that has a bearing on the whole landscape of China's modernization. The aim is to boost high-quality economic development during and even long after the 14th Five-Year Plan as we continue deepening reform and seeking high-level opening-up. High-quality development of the contemporary China entails efficiency, robustness and inclusiveness. To be more specific, high-quality development should be efficient; high-quality development should be robust and orderly with a particular highlight on the bottomline of avoiding systemic financial crises and realizing sustainable and healthy development; high-quality development should be inclusive and shared by all. The model of development should be open and balanced and the fruit of development should manifest itself in the sense of achievement and happiness of society as a whole and the entire human race.

High-quality development determines the future of RMB internationalization. On the one hand, high-quality development strengthens the overall economic power of the country and serves as the solid basis and perpetual momentum for RMB internationalization. It constitutes the hard power that ensures long-term success of RMB internationalization. On the other hand, RMB internationalization propelled by high-quality development will naturally export efficiency, robustness, inclusiveness, among other elements, to the world. The international cycle led by China does not adopt the domineering colonial or hegemonic model where capital is let loose as a means to pillage and profit. Instead, it invites the whole world to share in the giant market and valuable opportunities of development in its domestic cycle in pursuit of all-round cooperation based on consultation, contribution, shared benefits and governance. In the process of globalization China has exhibited the broadness and profundity of its culture and maintained the path of multilateralism and peaceful development, as well as the values and concepts of mutual respect, harmony and a community with a shared future for mankind. This, together with the appeal and charisma of the RMB, constitutes an essential soft competitive power. This open attitude with which we welcome the whole world to hitch a lift with China as its economy rapidly develops serves as the strongest endorsement for RMB internationalization. With a sense of mission and a posture of equality befitting a major economy, China is bound to earn wide recognition and support from the international community, which in turn will determine in a fundamental manner the success or failure of the ultimate goal of RMB internationalization.

Building a new development pattern of dual circulation requires a fine focus on the problems, key issues and major breakthroughs.

The key to a smooth domestic cycle is two-fold. First is accelerating productivity. Through enhanced technological innovation and reduced costs of labor, we will boost the ability of supply to create demand. Through deepening reform of the financial market system, keeping up high-level financial opening-up and guiding proper flow of financial resources, we will strengthen the capacity of finance to serve real economy. Second is empowering the market. Through unclogging market flow we will increase the capacity of market integration and unleash the potentials of the real economy. We will push forward the modernization of the state governance system and governance capacities through improving business environment, enhanced policy coordination and better safeguarding property rights, among others, so as to meet the requirements of high-quality development.

The key to a smooth international cycle is a focus on high-level opening-up based on China's realities, reshaping the international economic cooperation and competitiveness through various forms of trade innovation so as to seize the initiative and amplify our voice on the international stage. First, we should continue our efforts in presenting a successful China International Import Expo. On the outside, we will channel quality products and services to the Chinese market from across the world by expanding the scale and improve the quality of trade; on the inside, we will meet the demand of upgraded consumption as well as promoting trade cooperation and stimulating direct investment by capitalizing on the catfish effect on the supply side; continued efforts should be made in amplifying the spillover effect of the Expo on the construction of the Shanghai Central Area and the development of the Yangtze River Delta city group to promote the regional integration of the Yangtze River Economic Belt. Secondly, services trading should improve in both scale and quality. Demonstration zones for services trading should be expanded and differential platforms for the innovation and development of services trading should be established. Efforts should be devoted to improving digitalization of key areas and mending supervision loopholes. Thirdly, we must give full play to the demonstrative role of the free trade areas as we push forward high-quality opening-up and institutional innovation. In order to enhance foreign investment and augmenting regional linkages, free trade areas should take on more initiative in reform and

opening-up to accumulate experiences that can be applied elsewhere so that places other than the free trade areas can benefit from the dividends of reform.

The key to accelerating mutual promotion between the domestic and international cycles lies in the Belt and Road Initiative and the construction of the offshore market. The construction of the BRI should lead Chinese enterprises and capital to go global and expand cooperation in trade and investment so as to improve the competitiveness and international market status of Chinese enterprises; in this way the international cycle will promote the domestic one as it stimulates the transformation of domestic industries and contributes to the integration of the domestic market. A smooth domestic cycle will add momentum to the increase in export and foreign investment. Chinese enterprises and capital should be encouraged to take part in boosting the economy and improving the lives of the people of the BRI countries so that these countries can have their share of the benefits of development that comes with a smooth international cycle. The emergence of the offshore RMB market is a conscious choice as the external cycle of the Chinese economy has entered a certain phase. The mutual promotion of the two cycles requires a fully developed and well-balanced offshore market. The offshore market should guide international market resources towards stronger ties with China as well as expanding the coverage and influence of the international cycle; it should also assist Chinese enterprises in making full use of the domestic and international markets and their respective resources and assist Chinese financial institutions in establishing unique advantages of international operation in order to boost the domestic cycle. The offshore market helps residents and non-residents allocate and manage their assets, strengthen the roles of RMB as a means of financial transaction and store of value. It helps realize the mutual promotion of the domestic and international cycles and accelerate the network effect of RMB international use.

Since 2021, with the continued variation of the virus the pandemic is still here and the prospects for global economic recovery are bleak. Armed regional conflicts happen all the time. The world is turbulent with intensified game among great powers. Against the backdrop of such turmoil and chaos, China has entered the opening year of the 14th Five-Year Plan, namely the first year of fighting towards the second centennial goal. Building the new development pattern and promote high-quality development is both a political vision and a plan of action. The purpose is to build China into a great modern socialist country in all aspects and realize national rejuvenation. As long as China manages its own affairs well and keep our strategic focuses, we will definitely realize the ultimate goal of RMB internationalization!

There is still a long way to go for RMB internationalization. We have both time and morality on our side.

Part II RMB Internationalization Index

2.1 The Current Situation of the RMB Internationalization Index

2.1.1 RMB Internationalization Made Progress Despite Obstacles and RII Showed Rapid Climb

The year 2020 is destined to be unusual, with COVID-19 raging through the world, the world economy plunging into deep recession and the international financial market experiencing terrible jolts. As the pandemic interweaves with the profound changes unseen in a century, all countries in the world are faced with unprecedented challenges. Under the attack of the pandemic, China's economic and financial system showed resilience and RMB internationalization made progress despite hindrance. In 2020, the RMB as a means of denomination and settlement in international trade became increasingly consolidated. The RMB international financial denomination and settlement continued to deepen. The RMB as an international reserve currency remained steady with moderate progress. The RII was 5.02, up by a considerable 54.20% year-on-year (see figure 1) and marking a record high. The RMB overtook the JPY and the GBP to become the third largest

international currency. The RII for the four quarters of 2020 were 4.10, 5.19, 5.14 and 5.02 respectively, representing a steep climb with fluctuations at higher levels.

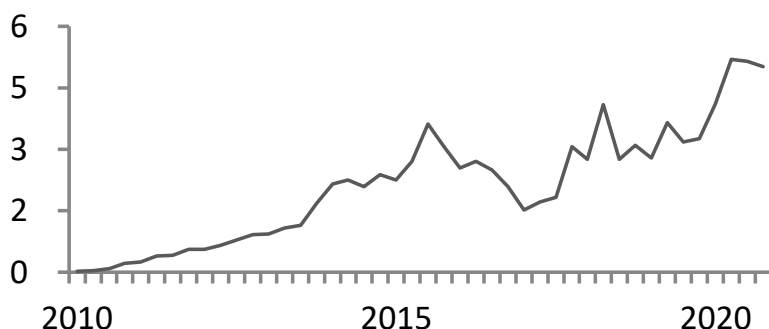


Figure 1 RMB Internationalization Index

2.1.2 The RMB International Financial Denomination and Settlement was Strengthened

The opening-up of China’s capital account made remarkable progress and the use of the RMB became freer. International financial denomination and settlement replaced trade settlement as the biggest engine for RII growth. Characterized by accelerated growth with radical fluctuations, the 2020 RMB international financial denomination and settlement accounted for 9.89%¹, up by 84.23% year-on-year and becoming a major driving factor for the rise in RII (see figure 2).

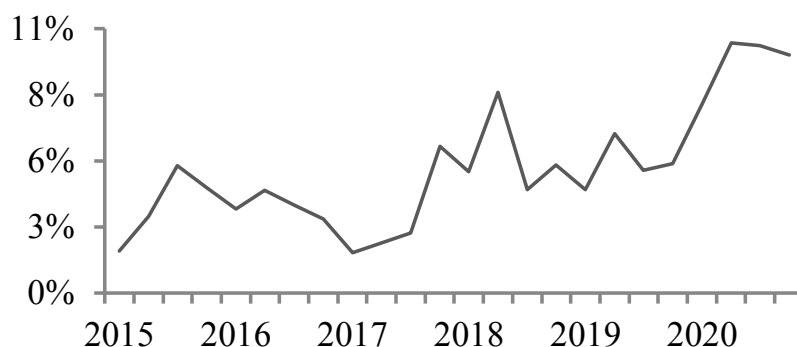
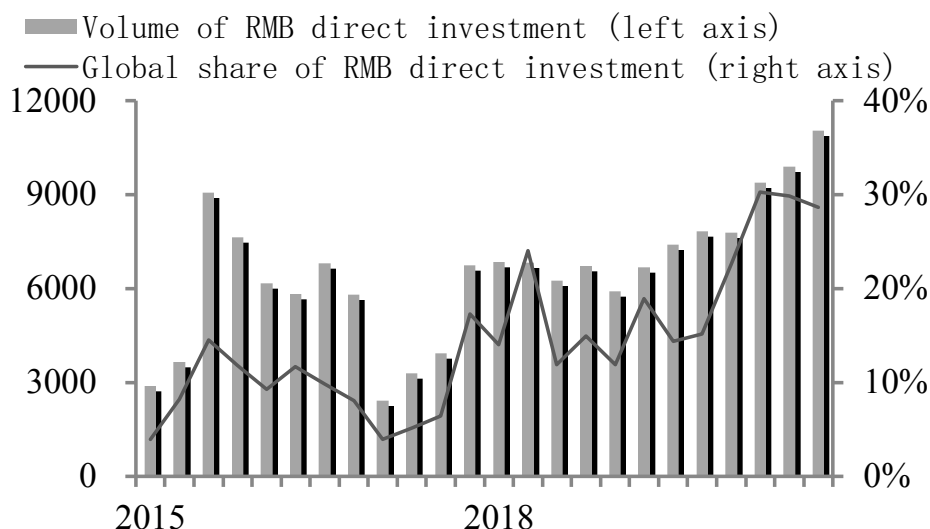


Figure 2 Comprehensive Indicator of RMB Use in International Financial Denomination and Settlement

In 2020, the scale of RMB international deposits and loans firmed up. RMB international credit loans accounted for 0.62% of the world’s total, up by 9.14% year-on-year. RMB offshore loans made by financial institutions rose by 13.56% year-on-year. Under the impact of COVID-19, issue of RMB international bonds shrank. The balance of international bonds and notes was USD111.287 billion, accounting for 0.41% of the world’s total and down by 0.18 percentage points compared to the peak of 0.59% recorded at the end of the fourth quarter of 2015. Despite the disturbance as a result of COVID-19, RMB direct investment during the second half of 2020

¹ As we calculated this figure we noted that according to OECD global outflow of foreign direct investment for the fourth quarter of 2020 was negative, which was at odds with our data. According to the definitions, global inflow and outflow of direct investment should be equal, while there exists a difference in the statistics in practice. We multiply the global inflow of direct investment by 2 to work out a rough estimate of the figure for global direct investment for this quarter.

surged. The total amount of the whole year reached RMB 3.81billion, up by 37.05% year-on-year and marking a new record high.



(billions of yuan)

Figure 3 Global Share of RMB Direct Investment

2.2 Comparison of Internationalization Indices of Major Currencies

This report uses the same method for compiling RII to work out the internationalization indices of the USD, the EUR and the JPY (see figure 4). In 2020, the internationalization index of the USD was 51.27, down by 0.09 compared to the end of the previous year. With a weak performance in pandemic control, the US experienced radical economic shocks and its annual GDP was down by 3.5%, a record low since 1946. The USD index and the global demand for USD underwent a “first up, then down” process. The share of USD in global reserves was down by over 1.71 percentage points. However, the USD’s status as the largest international currency remains basically stable. The EUR had an internationalization index of 26.17, up by 0.17 year-on-year with its international footing slightly improved. The share of the Eurozone in investment and financial market went up and the EUR’s status was consolidated, although its share in trade and direct investment flagged as the Eurozone became deeply bogged down in repeated surges of the pandemic, economic recession and internal division. The GBP had an internationalization index of 4.15, registering a historic low. Hit by both the pandemic and Brexit, the UK economy was bogged down in recession. Its GDP was in negative growth; its export-import was shrinking; the UK was quickly losing its appeal to foreign capital. The internationalization index of the JPY is 4.91, up by 0.13 compared to the end of the previous year with a mild pickup in international ranking. Japan faced a serious downturn in consumption and investment, while its foreign trade and manufacturing industry were at a low ebb. For the second half of 2020, external demand improved and demand for the JPY increased as a consequence of an elevated risk-averting sentiment, which resulted in a rise of 0.14 percentage points in the JPY’s share in international reserves.

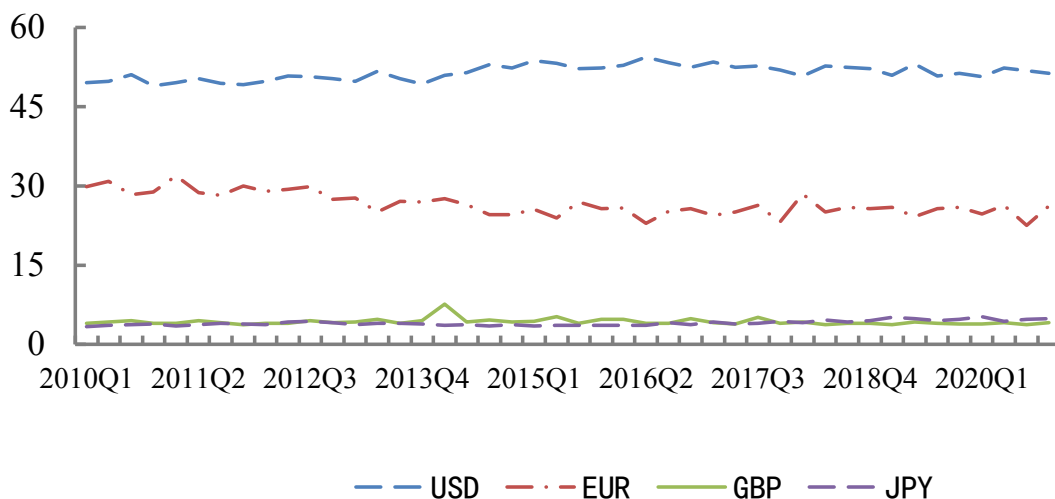


Figure 4 Changes in Internationalization Indices of Major World Currencies

2.3 Main Impetuses for RMB Internationalization

RMB internationalization attained remarkable process after 11 years of continued efforts and withstood major tests posed by the 2020 pandemic. Being the only one with positive economic growth among the G20 countries, China exhibited a resilient economic and financial system, unwavering stance in reform and opening-up as its international cooperation deepened and advanced. The foundation for RMB internationalization further consolidated and RMB market recognition notably improved.

2.3.1 China's Economy Proved Resilient and the Foundation for RMB Internationalization Further Consolidated

Digital technologies promote state governance, stable operation and high-quality development of real economy, serving as crucial pillar to RMB internationalization. In 2020, under the strong leadership of the Central Committee of the Communist Party of China, China coordinated pandemic control and economic and social development and was the first to shake off the crisis. Its GDP passed the RMB 100 trillion mark and had a growth rate of 2.3%, far ahead of other major powers. Against the backdrop of a world economy in deep recession and rising protectionism everywhere, China adopted multiple measures to enhance trade and investment, achieving a positive growth of 1.9% in foreign trade; the amount of foreign capital actually used was near RMB 1 trillion, up by 6.2% against unfavorable conditions and marking a record high. This is a manifestation of robustness and resilience. Facing the long-running impact of COVID-19, China upheld new development concepts, stepped up building the new development pattern of dual circulation, enriched and expanded RMB use scenarios and added new momentum to RMB internationalization. With the implementation of the RMB priority policy and the simplification of cross-border RMB use procedures, the inclination and ability of market entities to use RMB were further augmented.

2.3.2 China Accelerated Financial Opening-up and Channels for RMB Internationalization Continued to Expand

China upholds the basic state policy of reform and opening-up, focuses on promoting high levels of financial opening-up and offers an institutional and business environment that is fair, transparent and predictable. In March 2020, the CPC Central Committee and State Council issued

Opinions on Constructing a More Complete Market-Oriented Allocation System For Factors, in an attempt to expand the opening-up of the financial sector in an orderly manner. The measures include simplifying capital regulatory requirements for foreign institutional investors in inward securities and futures investments, perfecting the rules for information disclosure and issue of panda bonds, canceling restrictions such as QFII and RQFII, and expanding and streamlining the channels for cross-border RMB use. The Chinese government bonds were included in JP Morgan Emerging Markets Bond Index and the World Government Bond Index, leading to an increase in RMB financial asset holdings by international capital. By the end of 2020, the amount of domestic RMB financial asset holdings by foreign institutions and individuals was close to RMB 9 trillion, up by 40% year-on-year. In addition, financial institutions innovated “Cross-Border Wealth Management Connect” and the “RMB International Investment and Loan Fund”, among other services and platforms, which further fostered the competitiveness of RMB assets.

2.3.3 China Maintained a Normal Monetary Policy, Which Highlights the Stability of the RMB Value

Under the blow of the pandemic, the international financial market experienced colossal turmoil and sank into a liquidity crisis. All of a sudden the market panicked. Major central banks initiated a wave of ultra-loose monetary policies, with interest rates of various countries dropping to zero and even below. In stark contrast, China maintained a normal monetary policy and a positive interest rate, with a focus on supporting micro-, small- and medium-sized enterprises; China implemented proactive fiscal policies and discreet macro-level policies that allow orderly cross-border flow of capital and a two-way fluctuation of the RMB exchange rate. In 2020, the RMB-to-USD exchange rate fluctuated in a range of 4.2%, far lower than the 15% for the USD index and more stable than other major currencies and currencies of newly emerging markets. Owing to the stability of the RMB value and the relative competitiveness of RMB asset returns, the RMB is on its way to becoming the new international haven currency. Net inbound capital through Northbound Stock Connect totaled RMB 1.2 trillion and foreign holdings of Bond Connect was RMB 3.3 trillion, a year-on-year increase of 21.0% and 48.8% respectively.

2.3.4 International Monetary Cooperation Continued to Deepen with Broader Platforms for RMB Use

In the process of building the Belt and Road with high quality, China actively promoted international monetary cooperation and bilateral settlement of RMB. In January 2020, the People’s Bank of China entered into a cooperation agreement on bilateral local currencies with the central bank of Laos, which allows the two countries to use their local currencies in international transactions; in September, the People’s Bank of China signed the MoU for the Establishment of a Framework for Cooperation to Promote the Settlement of Current Account Transactions and Direct Investment in Local Currencies with Bank Indonesia, which marks an important milestone of financial cooperation between the two countries. By the end of 2020, there existed 30 valid agreements on RMB currency exchange, involving a total of RMB 3.6 trillion. The functions of the bilateral local currency exchange system have become diversified, which is conducive to streamlining trade and investment as well as securing RMB liquidity.

2.4 Main Barriers to RMB Internationalization

2.4.1 Fierce Competition from the USD and the EUR

RMB internationalization was faced with a graver external environment and fiercer international monetary competition. In 2020 the US upgraded its suppression on China with relentless propaganda that “China is the birthplace of the virus” and that “China should be responsible for the pandemic”. This is fundamentally detrimental to China’s international image and the global recognition of the RMB. The US interferes with China on such issues as Hong Kong and Xinjiang

as well as imposing heavy financial sanctions. Its intention to launch a financial contest with and seek disconnection from China is beginning to manifest itself. Moreover, the more the pandemic disrupted the supply chain and weighed down economy, the more the international financial market panicked and the stronger the USD became as a major haven currency. The USD index returned to 103 after a lapse of four years, which inhibited the use of RMB to a certain extent. The EUR also seized the opportunity to shore up its own monetary status. The EU withdrew from the digital chain and sped up building the digital EUR with a view to improving EUR internationalization in the following five years.

2.4.2 Accelerating Capital Account Convertibility and Holding the Bottomline of Risk

International currencies need to satisfy the requirement of free exchange. At the early phase of RMB internationalization, there was more focus on settlement in cross-border trade than on capital account convertibility. Although the internationalization of a currency does not necessarily entail complete convertibility of capital account as a prerequisite, as financial transactions have turned out to be the main driving force of RMB internationalization, there is a need to sort out the advantages and disadvantages, achieve project suitability and policy coordination, as well as accelerating the opening-up of the financial market and cutting down restriction on capital account. Centering on the goals of China's new development pattern and national economic and financial security during the 14th Five-Year Plan, there is an urgent need to discuss the objectives, sequences, risks and routes of capital account that align with our goals, reassess the financial management framework and establish a regular management system and emergency response mechanism for cross-border capital movement.

2.4.3 Imbalance in RMB Inflow and Outflow and in RMB Investment and Financing

With the pandemic raging across other countries and the "flooding" of world currencies in 2020, huge amounts of foreign capital were directed to China and holdings of RMB assets rocketed. While a large-scale inflow of foreign capital within a short period is good for stabilizing foreign investment, exchange rate and market confidence, capital inflows like this tend to be short-lived and prone to fluctuation. If the external environment deteriorates or if international political and economic gaming reaches a certain special point, a large-scale capital flight will undoubtedly deal a blow to the RMB exchange rate, undermine economic and financial stability and crush the confidence in RMB internationalization. In stark contrast to RMB assets which enjoyed much favor with international investors and the surge of global RMB debts, the RMB encountered impediments in the field of international financing. According to BIS statistics, the balance of international bonds priced in RMB in 2020 shrank by roughly 30% compared to the peak of 2015. The imbalance in the inflow and outflow of RMB capital and its functions is not conducive to the medium- and long-term development of RMB internationalization.

2.5 Suggestion on Expanding Cross-border RMB Use Scenarios

China needs to think ahead and form a correct understanding of the gravity of the situation. It must reconsider the significance of RMB internationalization as it aims to ensure economic and financial security. Efforts should be made to give full play to the advantages of China's market and institutional system to find a balance between short-term and long-term profits as we accelerate RMB internationalization during the 14th Five-Year Plan.

Attention should be directed to the retailing and individual payment of cross-border RMB transactions, improving capital movement, making use of digital technologies and digital currencies to utilise technological prowess and promoting cross-border use of RMB in the field of services trading. We should use trade routes as the major strategic choice to expand RMB credit

loans and encourage enterprises and financial institutions to better embrace the Belt and Road countries.

Efforts should be made in exploring the feasibility of RMB as a means of international financial transaction, continuing to optimize and improve the opening-up mechanism of bond markets, simplify the market-entry procedures for foreign institutions and integrate market-entry channels, in order to provide a more friendly and convenient investment environment for international investors and expand the scale of panda bonds. As the RMB value remains stable and progresses uphill in a steady manner, we should seize the opportunity to carry on the reform of the formation mechanism of RMB exchange rate, establish the concept that a stable, predictable exchange rate mechanism outweighs the stability of the exchange rate itself, and improve the appeal of RMB assets to international investors. Through big data technologies, we should build up cross-border RMB movement surveillance and warning capacities, improve the macro-level framework for discreet management and the discreet macro-level policies in order to hold fast to the bottomline and avoid systemic risks.

The pursuit of departmental interests must be stopped and state-owned enterprises should be encouraged to take the lead in using RMB in international trade, investment and financing so as to erase the institutional and policy impediments to RMB use for enterprises. RMB investment, financing and asset management should be treated as priorities in expanding RMB international use during the 14th Five-Year Plan so as to satisfy the needs of international investors.

Part III The Current Situation of RMB Internationalization

3.1 Cross-border Trade RMB Settlement

3.1.1 Scale and Ratio of RMB Settlement Attained Moderate Progress

In 2020, RMB became the choice of more and more multi-national corporations. Current account cross-border trade RMB settlement² totaled RMB 6.77 trillion, up by RMB 730 billion compared to 2019 and registering a year-on-year increase of 13%, surpassing the growth rate of exports and imports; cross-border trade RMB settlement accounted for 19.55% of the aggregate trade volume of Chinese commodities and services, up by 2.14 percentage points compared to the end of 2019.

² This includes cross-border Commodities trading, services trading and other current account items.

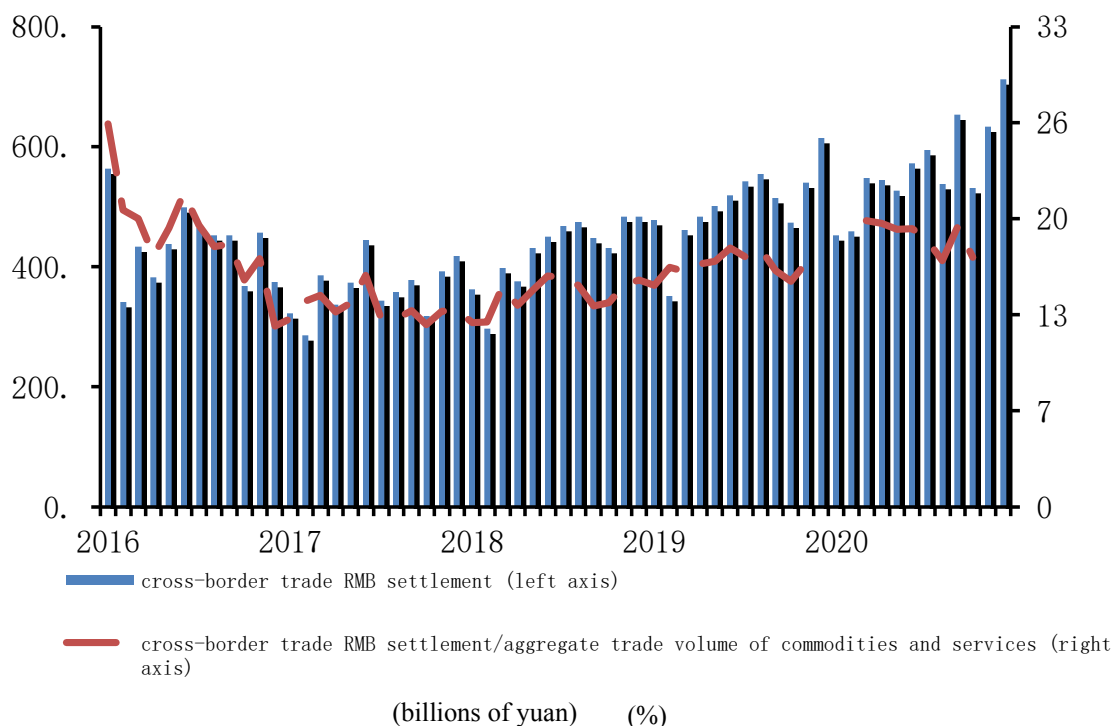


Figure 5 Scale of Cross-border Trade RMB Settlement
Source of data: The People’s Bank of China, The Ministry of Commerce, State Administration of Foreign Exchange

3.1.2 Settlement Centered on Commodities Trading While Services Trading Achieved Steady Growth

Commodities trading RMB settlement in 2020 totaled RMB 4.79 trillion, up by 12.7% compared to 2019 and accounting for 70.8% of the aggregate cross-border RMB settlement of the year; services trading RMB settlement totaled RMB 1.98 trillion, a year-on-year increase of 10.6% and accounting for 29.3% of the aggregate cross-border RMB settlement for the year. Since 2017 the annual growth rate of cross-border services trading RMB settlement has averaged 15.6%, 8.9 percentage points higher than the average annual growth rate of cross-border trade RMB settlement.

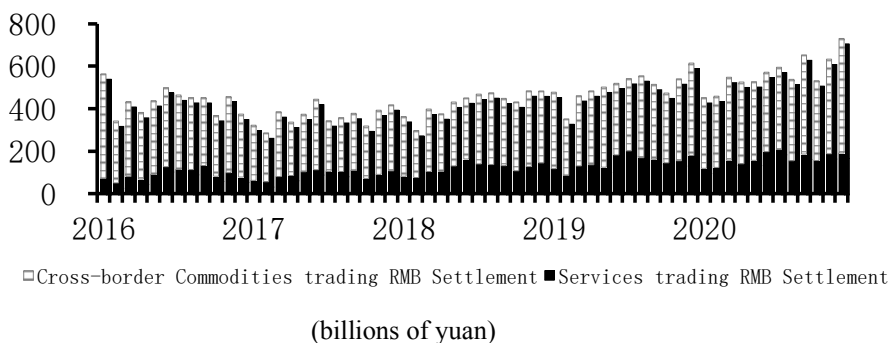


Figure 6 Scale of Commodities trading and Services trading RMB Settlement
Source of data: The People’s Bank of China

3.1.3 Capital Account Experienced a Higher Growth Rate While Payments and Receipts Remained Basically Balanced

In 2020, China’s cross-border RMB payments and receipts totaled RMB 28.4 trillion, up by 44% year-on-year. Both RMB outflow and inflow outperformed those of 2019. After RMB trade settlement expanded to include receipts and payments of RMB settlement for capital financial transactions in 2014, surpluses and deficits tended to alternate in cross-border RMB receipts and payments due to the great volatility of financial transactions. After the receipts-to-payments deficit in 2016 and 2017 followed by a slight receipts-to-payments surplus in 2019 and 2020, it was a small deficit again in 2020, with cross-border RMB receipts-to-payments ratio of 1.01. Actual receipts totaled RMB 14.1 trillion while actual payments totaled RMB 14.3 trillion. Since 2017, the receipts-to-payment ratio has remained balanced and steady.

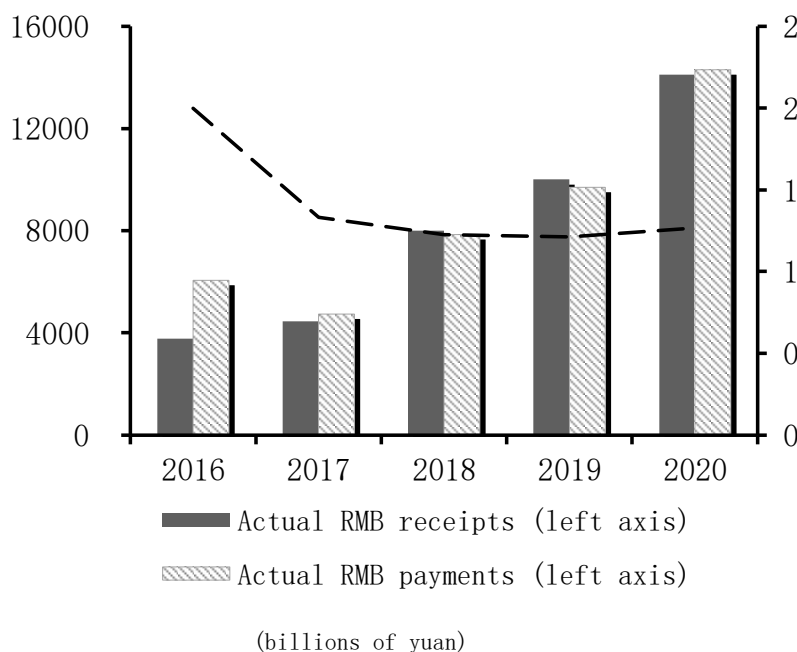


Figure 7 Cross-border Trade RMB Receipts-to-payments Ratio
Source of data: The People’s Bank of China

3.1.4 Third-party Payment Platforms Played a Crucial Part in Expanding RMB Settlement Channels

While the global spread of coronavirus dealt a heavy blow to international trade, it gave a boost to China’s cross-border e-commerce transactions. According to the statistics from the Customs, the export and import lists inspected and approved via the Customs cross-border e-commerce management platform numbered 2.45 billion, up by 63.3% year-on-year. Cross-border e-commerce import and export volume for the whole year reached RMB 1.69 trillion, up by 31.1%. Tens of thousands of traditional foreign trade enterprises joined the network for improved quality

and efficiency. Cross-border e-commerce has become the new engine for the advance of China’s foreign trade.

3.2 RMB-denominated Financial Transactions

3.2.1 RMB-settled ODI

3.2.1.1 ODI and RMB-settled ODI Both Rose Significantly

In 2020, China’s ODI reached RMB 916.97 billion (USD 132.94 billion), up by 3.3% compared to 2019. RMB-settled ODI reached RMB 1.05 trillion, up by 38.2% year-on-year and reversing the negative growth shown in 2019 .

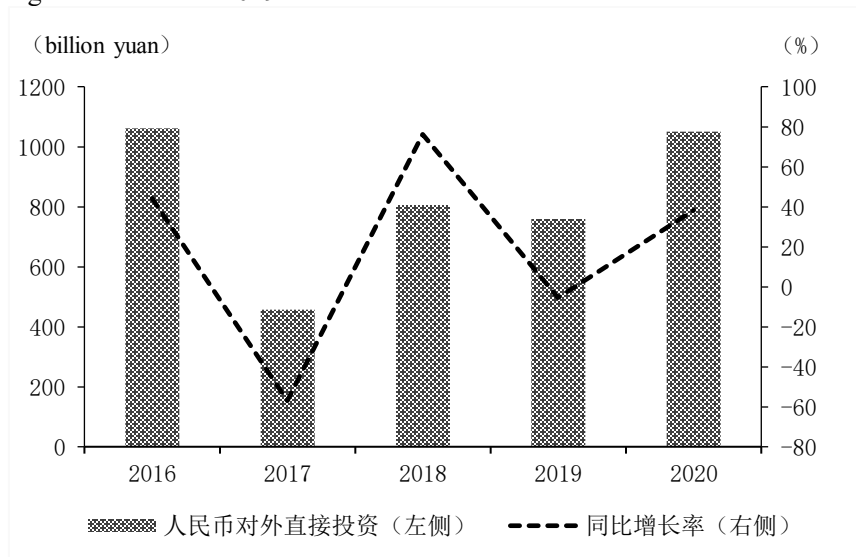


Figure 8 Outbound Direct Investment (ODI) in RMB

ODI in RMB (left axis) Year-on-year growth rate (right axis)

Source: People’s Bank of China

3.2.1.2 Foreign Capital Actually Used Rose Despite of the Global Situation While RMB-settled FDI Increased Steadily

In 2020, Foreign Capital Actually Used in China was RMB 999.98 billion, increased by 6.2% from 2019 and reaching a historical high. RMB-settled FDI reached RMB 2.76 trillion, up by 36.6% from 2019.

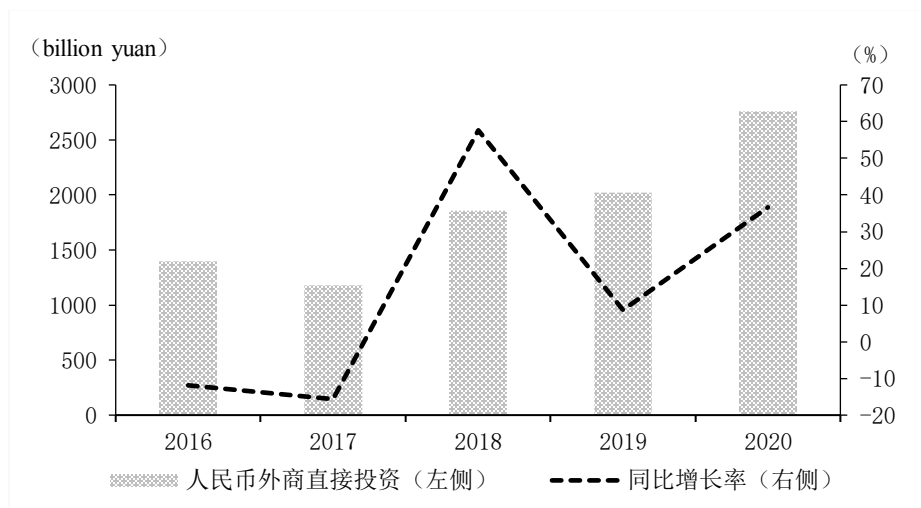


Figure 9 Foreign Direct Investment (FDI) in RMB

FDI in RMB (left axis) Year-on-year growth rate (right axis)

Source: People’s Bank of China

3.2.2 Investment in RMB-denominated Securities

3.2.2.1 The Offshore RMB-denominated Bond Market Continued to Develop While the Panda Bond Issuance Decreased Slightly

In 2020, 374 RMB-denominated bonds have been issued in the offshore market, up by 89 compared to 2019; the amount issued totaled RMB 206.52 billion, increased by 15% from 2019. A total of 24 entities in the Chinese bond market issued 43 rounds of panda bonds, totaling RMB 58.650 billion and representing a slight decrease of 1.99% compared to 2019.

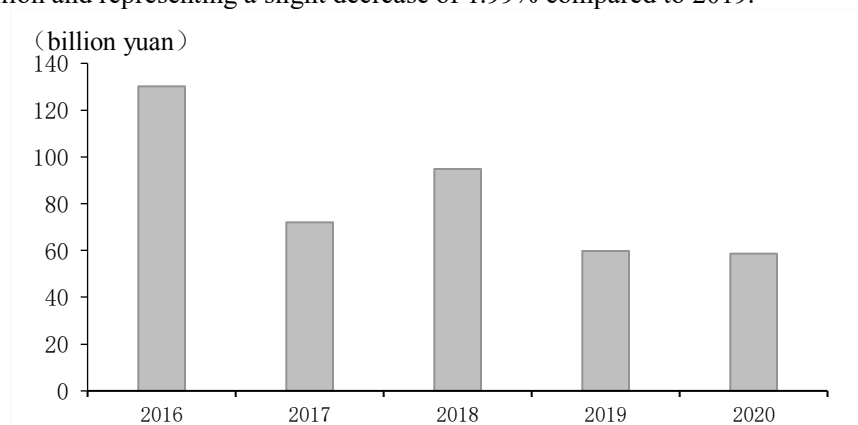


Figure 10 Issuance Details of Panda Bond

3.2.2.2 The Stock Market’s Financing Function Was Enhanced, and the Capital Market Continued to Accelerate its Opening-up

In 2020, the stock market structure was further improved, with its financing function being enhanced. The Shanghai Composite Index, Shenzhen Component Index, and the Growth Enterprise Market Index rose by 13.9%, 38.7% and 65.0% year-on-year respectively. From the beginning to the end of the year 2020, the average price-to-earnings ratio rose from 14.42 to 16.76 in Shanghai Stock Exchange and from 26.73 to 34.51 in Shenzhen Stock Exchange.

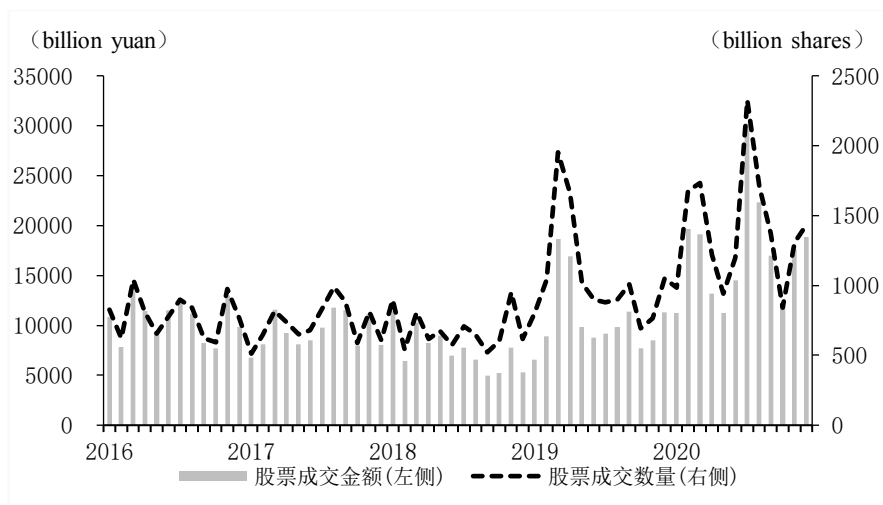


Figure 11 Chinese Stock Market Turnover

Chinese stock market turnover (left axis) Number of stock transactions (right axis)

Source: Shanghai Stock Exchange³, Shenzhen Stock Exchange⁴

The capital market continued to accelerate its opening-up to the outside world. On September 10, 2020, the CSRC, the PBoC and the SAFE jointly published the new QFII/RQFII regulations to announce to lift the restrictions on investment quotas for QFII and RQFII, and continue to lower the market access threshold, expand the scope of investment and strengthen consistent regulation. By the end of 2020, a total of 45 overseas institutions have passed the reviewed conducted by the CSRC, up by 39 compared to 2019, increasing the total number of qualified foreign institutional investors to 558.

3.2.2.3 The Development of the Derivatives Market Made New Breakthroughs

Under the impact of the COVID-19 Pandemic, enterprises' haven demand was on the rise. In 2020, both the total trading volume and the total deals registered a historical high. The cumulative trading volume of the national futures market reached 6.152 billion lots, a year-on-year increase of 55.29%, and the total deals reached RMB 437.53 trillion, a year-on-year increase of 50.56%. In 2020, the futures market launched 12 new futures types such as LPG futures, low-sulphur fuel oil futures, short fiber futures and international copper futures, and first created the futures types "launched through cloud" to aid enterprises to deal with price fluctuation risks and optimize the trade pricing mechanism. China's futures market was opening up through more diversified channels, with more and more types opened up. By the end of 2020, the total number of futures types opened up to the world reached 7, including crude oil futures, iron ore futures, PTA futures, TSR 20 futures, low-sulphur fuel oil futures, international copper futures and palm oil futures. The futures exchanges follow the general plan featuring "international platform, clean price, bonded delivery and RMB denomination" to introduce overseas traders, and this practice can serve the Belt and Road Initiative and steadily push forward RMB internationalization.

³<http://www.sse.com.cn/market/stockdata/overview/monthly/>

⁴ <http://www.szse.cn/market/stock/situation/monthly/index.html>

**Table 1 Turnover in the Inter-Bank RMB Interest Rate Derivatives Market
(Unit: 100 million RMB)**

Year	Number of transactions	notional principal (Unit: 100 million RMB)
2016	87018	98587
2017	137974	143462
2018	184560	210863
2019	237744	181529
2020	274029	195565

Source:China Foreign Exchange Trade System

In 2020, the total deals in the inter-bank RMB interest rate derivatives market reached RMB 19.9 trillion, a year-on-year increase of 6.8%. The interest rate derivatives market has shown richer derivative types, broader transaction entities and more active trade. Among exchanges that run RMB interest rate derivatives, HKEx has completed 1.768 million USD/CNH futures contracts, down by 8.8% from 2019, and had 28,000 open positions, up by 21.7% from 2019. CME has witnessed steadily growth in USD/CNH futures contract trade volume; it has completed 0.278 million USD/CNH futures contracts, down by 15.6% year-on-year, and had 4,713 open positions, up by 205.2% year-on-year. From January to November of 2020, SGX has completed 9.168 million USD/CNH futures contracts, up by 15.6% year-on-year, and had 92,000 open positions, up by 59.5% year-on-year.

3.2.2.4 RMB-denominated Financial Assets are Favored by International Investors

At the end of 2020, the balance of domestic RMB-denominated financial assets held by overseas institutions and individuals increased to RMB 8.98 trillion, representing a rapid year-on-year increase of 40.11% and continuing its growth momentum since 2016. Among the RMB-denominated assets held by non-residents, stocks account for the biggest share, followed by securities, deposits and loans. Since the beginning of 2020, there is an apparent trend among overseas investors to increase their holdings of Chinese securities and stocks.

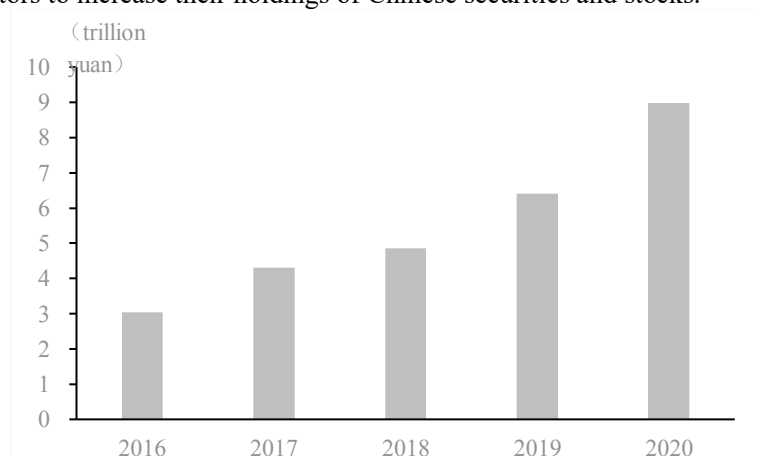


Figure 12 RMB-denominated Financial Assets Held by Overseas Institutions and Individuals

Source: People's Bank of China⁵

⁵ <http://www.pbc.gov.cn/diaochatongjisi/resource/cms/2020/11/2020110417475871026.pdf>

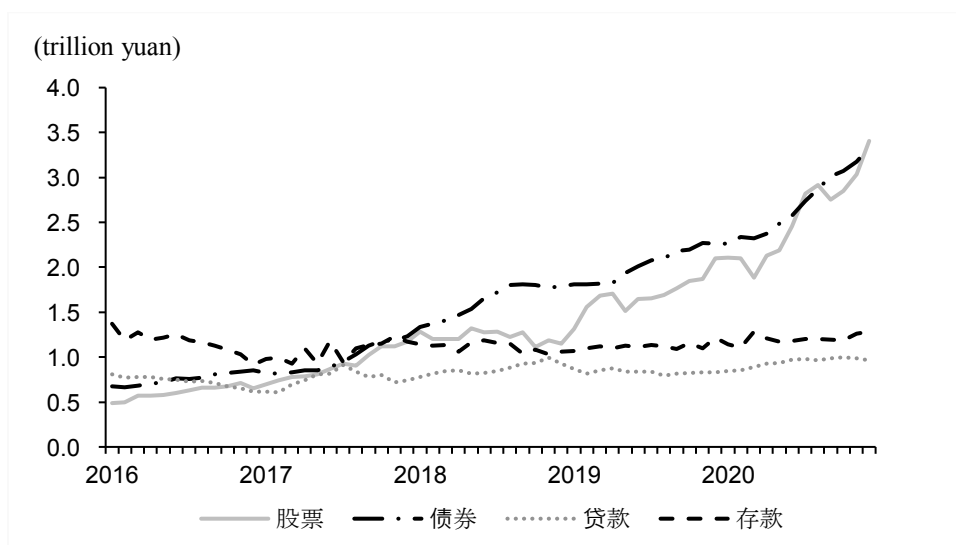


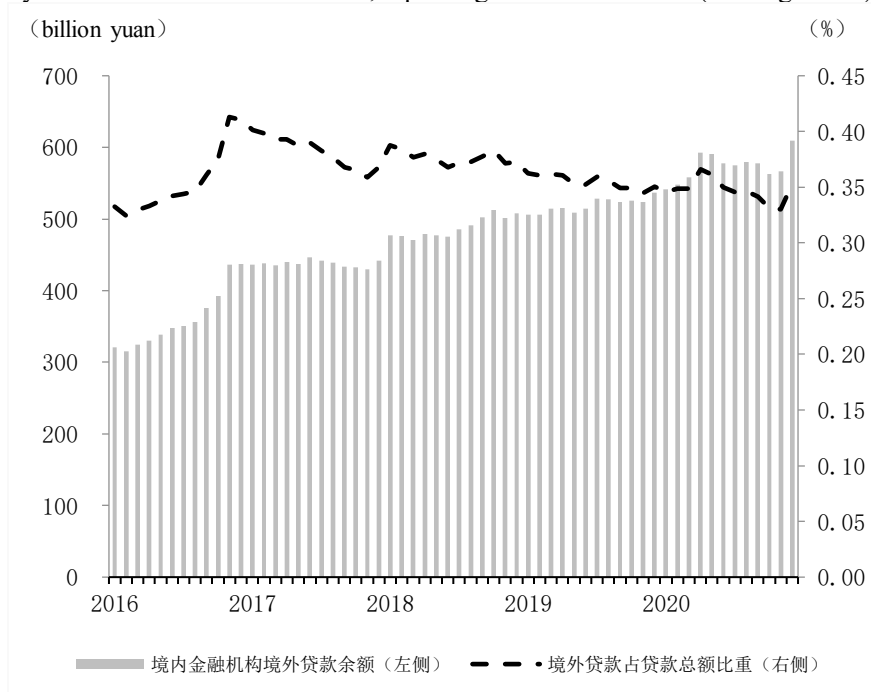
Figure 13 RMB-denominated Financial Assets Held by Overseas Institutions and Individuals

Stocks, Securities, Loans, Deposits

Source: People’s Bank of China⁶

3.2.3 RMB-denominated Outward Loans

In 2019, RMB-denominated overseas loans of domestic financial institutions reached RMB 609.59 billion, up by 13.56%. RMB-denominated overseas loans accounted for 0.35% of total loans by Chinese financial institutions, equalling the level of 2019. (See Figure 14)



⁶http://www.nafmii.org.cn/xhdt/202101/t20210114_84090.html

Figure 14 RMB-denominated Outward Loan Balance and its Share of Chinese Financial Institutions

RMB-denominated outbound loan balance of Chinese financial institutions
Share of RMB-denominated outbound loan balance of Chinese financial institutions
 Source: People’s Bank of China⁷

3.2.4 RMB Foreign Exchange Trade

According to statistics from the State Administration of Foreign Exchange (SAFE)⁸, the foreign exchange market turnover totaled RMB 206.38 trillion in 2019, an increase of 2.73% year-on-year. Foreign exchange spot transactions totaled RMB 82.06 trillion, a year-on-year increase of 4.78%; foreign exchange derivatives transactions reached RMB 123.98 trillion, a year-on-year increase of 1.42%, and its proportion in the foreign exchange market slightly fell to 60.17%. The bank-to-customer market transactions reached RMB 31.24 trillion, a year-on-year increase of 10.08%; the inter-bank forex market transactions reached RMB 174.79 trillion, a year-on-year increase of 1.52%.

In the past five years, the foreign exchange derivatives market grew rapidly from 2016 to 2018, followed by a period of steady growth, with its volume basically unchanged. In 2020, the foreign exchange derivatives transactions participated by overseas institutions totaled RMB 5.050 trillion, a year-on-year increase of 101.8%.



Figure 15: RMB Forex Market Transactions

Foreign exchange spot transactions (black bar)

Foreign exchange derivatives transactions (grey bar)

Source: China Foreign Exchange Trade System (CFETS)**Error! Bookmark not defined.**

3.3 RMB in Global Foreign Exchange Reserves

The scale of RMB global foreign exchange reserves increased from USD 90.29 billion in 2016 to USD 267.52 billion in 2020, growing for ten seasons consecutively. So far, 75 countries and regions have included RMB into their foreign exchange reserves. The increasing proportion of RMB in global foreign reserves fully represents the appeal of RMB-denominated assets in terms of safety, openness and convenience.

⁷ <http://www.pbc.gov.cn/diaochatongjisi/116219/116319/3959050/3959053/index.html>

⁸ The statistics of the foreign exchange market are only limited to transactions between RMB and foreign exchanges, and transactions among foreign exchanges are not included.

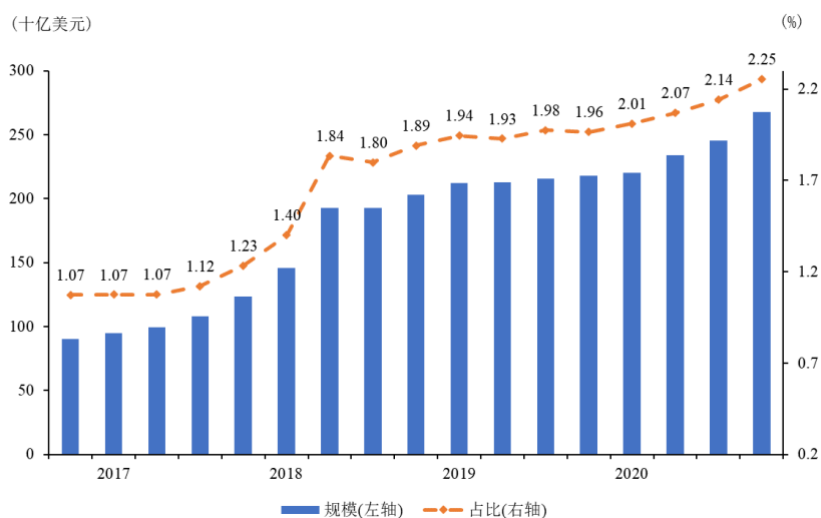


Figure 16 RMB's Size and Share in Official Foreign Exchange Reserves
Billion USD Volume (left axis) Share (right axis)

Since 2008, the People's Bank of China has signed bilateral currency swap agreements with the central banks or monetary authorities of 39 countries and regions, covering all main developed economies, emerging economies and locations of main offshore RMB markets. By the end of 2020, there were 30 effective RMB-related currency swap agreements, with a total volume of RMB 3.6 trillion.

3.4 RMB Exchange Rate

3.4.1 RMB Exchange Rate

In 2020, we continued to promote the exchange rate forming mechanism reform, enhance the elasticity of RMB exchange rate, and allow the exchange rate to play the role of adjustment of the macroeconomic and the automatic stabilizer of international balance of payments. We paid attention to the guidance of expectations to create conditions for orderly foreign exchange market operation and basic stability of the RMB exchange rate at a reasonable and balanced level.

3.4.1.1 The Currency Exchange Rates Against Major Countries are Either Appreciating or Depreciating

In 2020, the exchange rates of the RMB against major international currencies are either appreciating or depreciating, floating in both ways. The central parity rate of the RMB against the USD appreciated after depreciation, and stayed at 6.5249 at the end of the year, up by 6.92%; that against the EUR fluctuated stronger in both ways, ending up at 8.0250 with a year-on-year depreciation of 2.61%; that against the JPY was stable, reaching 6.3236 with a year-on-year appreciation of 1.34%; that against the GBP was volatile, ending up at 8.8903 with a year-on-year appreciation of 2.92%.

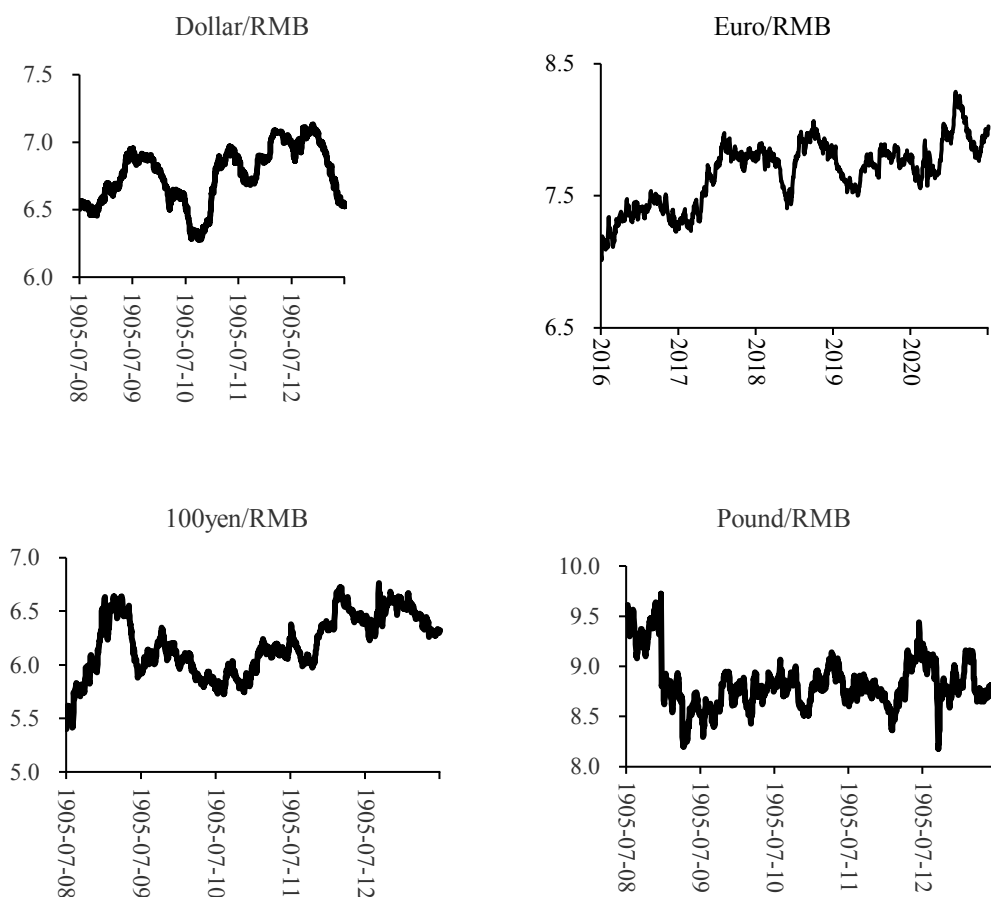


Figure 17 The Central Parity Rate of RMB against Major International Currencies (from 2009 to 2019)

Source: Wind

3.4.1.2 The Real Effective RMB Exchange Rate Fell After Rise

The real effective RMB exchange rate in 2020 fell after rise, and it showed a trend of rebound in the latter half of the year. At the end of 2020, the nominal real effective exchange rate index of RMB was reported at 119.04, an appreciation of 4.05% year-on-year. The real effective exchange rate index (with inflation factors deducted) was 126.31, up by 3.33% and reaching a new high in ten months. (See Figure 18)

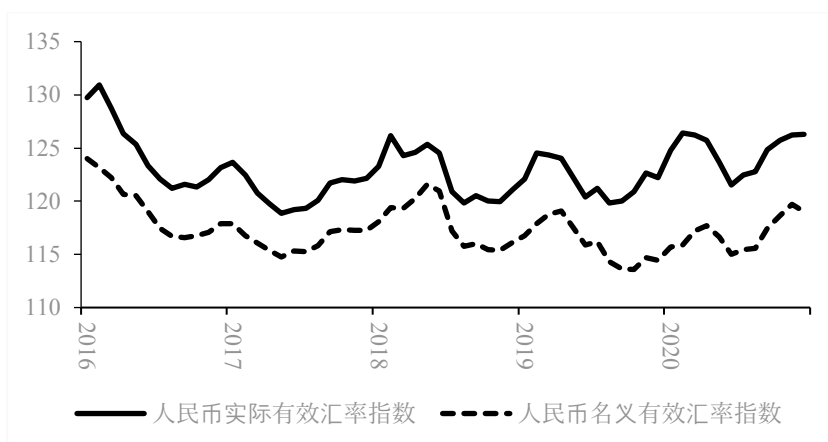


Figure 18 The Trend of the Effective Exchange Rate of RMB
The Index of nominal effective exchange rate of RMB (dotted line)
The Index of real effective exchange rate of RMB (full line)

Source: Bank for International Settlements

3.4.1.3 The RMB Exchange Rate Index Rose

At the end of 2020, the CFETS MB exchange rate index was reported at 94.84, up by 3.78% year-on-year; the RMB exchange rate indices of the BIS currency basket and the SDR currency basket were 98.68 and 94.23 respectively, up by 3.78% and 2.64% for the whole year.



Figure 19 RMB Exchange Rate Indices
CFETS RMB exchange rate index (blue line)
RMB exchange rate index of the BIS currency basket (red line)
RMB exchange rate index of the SDR currency basket (green line)

Source: China Foreign Exchange Trading Center

3.4.1.4 The Two-way Fluctuation of Offshore RMB

In 2020, the trends of CNY and CNH remained basically the same, showing two-way fluctuations. CNY and CNH reached the peak of the year on May 28th and May 27th, at 7.1600

and 7.1766, and closed at 6.5398 and 6.5030 on December 31st. The average annual spread between CNY and CNH in 2020 is 118.82 basis points, close to that in 2019.

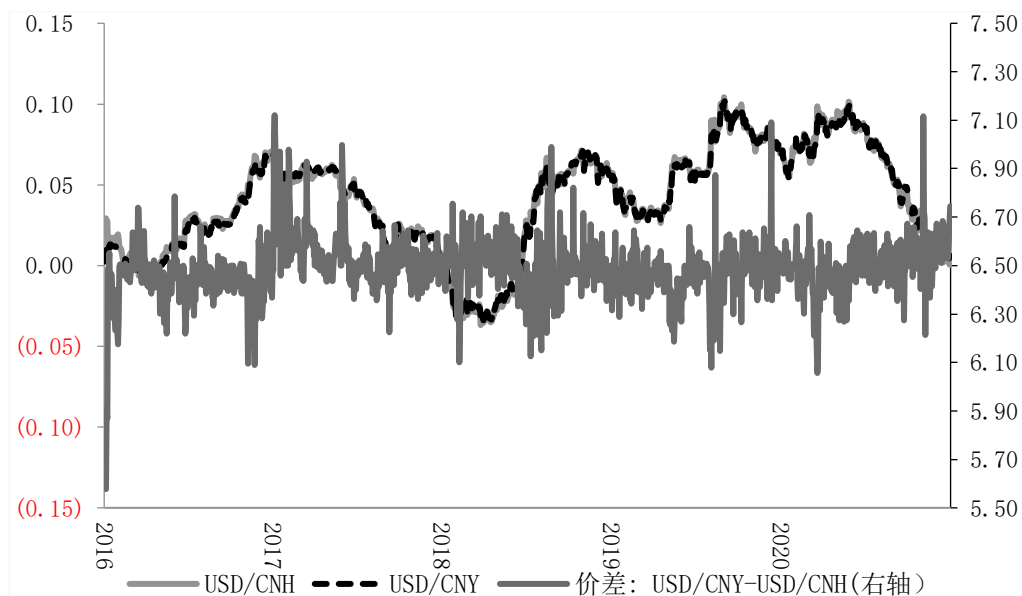


Figure 20 The Exchange Rates of CNY and CNH and Their Spread, 2013-2020

Source: Wind

3.4.1.5 RMB NDF Depreciation Widened

As of the end of December 2020, the 1-month, 3-month, 6-month and 1-year RMB NDF closing prices were 6.5365, 6.5685, 6.6065 and 6.6785 respectively. Compared with the same period in 2019, the exchange rate of RMB against the USD appreciated by 6.56%, 6.21%, 6.06% and 5.43% respectively in the four above-mentioned NDF transactions, showing a widening trend. (See Figure 21)

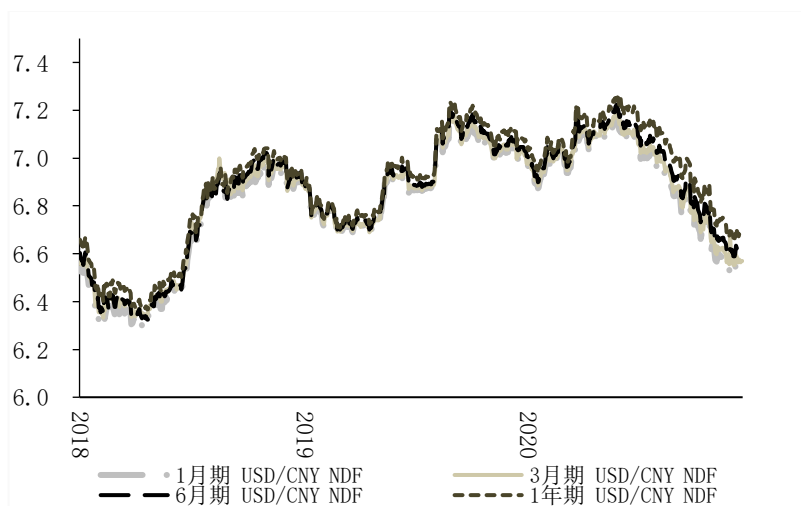


Figure 21 RMB NDF Daily Comprehensive Closing Price, 2018-2019

Source: Wind

Part IV Promoting Dual Circulations to Push Forward RMB Internationalization

4.1 Promoting Domestic and International Circulations to Provide Strong Support for Currency Internationalization

International experience shows that the domestic circulation is the precondition for currency internationalization, while the external circulation is a means of currency internationalization. The “Domestic Circulation” determines the scale and structure of the domestic consumption market and investment market, so as to fundamentally create RMB demand; the “International Circulation” realizes inclusive development and risk sharing in the international arena, and adds to the scenarios and adhesiveness of the international use of RMB. China needs to make major breakthroughs in promoting both the domestic and international circulations.

The focus of promoting domestic circulation is to unleash the potential for consumption growth and develop an outsize domestic market. First, we will strengthen income distribution adjustment and expand the middle-income group; second, fiscal expenditure will be more inclined to people’s livelihood and the public sector, be inclusive, meet essential needs, and ensure basic living standards for people in difficulty, so as to create favorable conditions for the development of the tertiary industry and consumption growth; third, we will implement prudent monetary policies to keep liquidity at a reasonable and abundant level, keep the domestic price level basically stable and boost consumers’ confidence. Fourth, we will actively develop a quality-oriented, integrity-based, uniform and open domestic market with orderly competition to stimulate external demand with internal demand.

We will promote international circulation and enhance the function of the RMB as an international currency through multiple channels and platforms. We will give play to our leading advantages in areas of digital currency, mobile payment and AI to develop all kinds of match-making and trading platforms and enhance the payment function of RMB. We will take ASEAN, Central Asia, Middle East and Africa as key areas for promoting international circulation and improving the level of RMB use. We will utilize ODI to drive trade financing and the export of equipment, labor and technology, and develop a docking mechanism between outward investment and domestic circulation through import. We will adopt market-based means such as stabilizing market shares, streamlining payment process and avoiding exchange rate risks to encourage enterprises to use RMB for pricing and settlement and build the double closed-loop of RMB capital flow and trade flow.

4.2 Improving Technological Innovation and Unblocking the Dual Circulation to Improve National Governance

We will catch the tide of the fourth industrial revolution and stick to the new-type industrialization path with Chinese characteristics to improve the ability of creating demand with supply. We will build the organic bond between technology, capital, market and policy, and give play to both the government and the market to successfully transform a large batch of traditional manufacturing enterprises, integrate smart manufacturing into production, develop new production models, and focus on fostering leaders of the new industrial revolution like Huawei and ZTE, so as to improve the innovation ability of the manufacturing industry.

We will optimize the technological innovation system, improve the research funding evaluation system, better preferential tax and subsidy policy rules related to technological innovation and create an orderly environment for fair play. We will focus on the expansion of domestic demand and the domestic circulation and develop a batch of national-level labs in relevant sectors to enhance basic research and shore up the weak links in the manufacturing industry. At the same time, we will stick closely to the dual circulation, pay attention to international cooperation on industrial chains, reinforce each other and strengthen the technical support for effective supply. We will use the commodity market, the labor market and the capital market as important channels

to unchoke the domestic circulation and accelerate market integration. First, we will speed up the development of a safe and efficient logistics network to make logistics smarter and more modern, and improve the depth of traffic accessibility. We will reduce the trade barriers caused by local protectionism, share market supervision information, optimize inter-regional market access, strengthen the cooperation and exchanges of products, production factors and production technologies among regions and promote fair play among different market players. Second, we will speed up the urbanization of migrant farmers, improve the labor information sharing service platform and create cross-region jobs for laborers. We will strive to cut labor cost in multiple dimensions and push ahead with the sorted housing supply system, which provides commercial residential housing for the high-income group, affordable housing with proper social security subsidy for the middle and low-income group and low-rent housing with large social security subsidy for the group with the lowest income, so as to lower housing prices in a reasonable manner. Third, we will continue to deepen supply-side financial reform, develop inclusive finance and promote digital transformation of financial institutions to create important impetus and catalyst for the creation of supply. We will develop a multi-layer capital market, increase the proportion of direct financing, built a reasonable transition mechanism between different layers of the capital market, and ensure effective interaction between different layers of the capital market in areas with scarce financial resources, so as to realize balanced and coordinated regional economic development and build a “financial ecosystem” in which market main players and financial institutions can yield mutual benefit and win-win results.

We will improve national governance to promote sound and stable development of domestic circulation and lay a solid political foundation for RMB internationalization. First, we will focus on improving the tax structure and cutting tax and fees. We will cancel some tax categories with small contributions, increase the contribution from income tax and property tax and channel the policy dividend to market players. Second, we will continue to cut the negative list to open up more sectors of the economy in a more thorough fashion. We will actively participate in the governance of global and regional international organizations, push forward the formation of economic governance mechanisms, rules and standards in emerging sectors such as digital economy and green development, so as to build a fair and reasonable global governance system. Third, we will identify the market boundary, further delegate power and provide institutional guarantee for the market to play the main role in resource allocation. We will keep our policies continuous, stable and sustainable to stabilize market expectations to enable the market mechanism to serve as the adjustment. Fourth, we will build an intellectual property publicity system which is jointly organized and attended by the government, industry associations, enterprises and schools to let the idea of IPR protection take root among people. We will actively revise the implementation rules of the Patent Law, accelerate the revision of the Provisions of the Product Protection of Geographical Indications and improve the legislation of IPR protection. We will enhance coordination and cooperation among departments to deepen whole-link IPR protection.

4.3 Leading High-level Opening Up Through Trade Innovation to Lay the Foundation for RMB Internationalization

We will take trade in services as key to trade innovation, expand the pilot zones of trade in service and build differentiated innovative development platforms of trade in services. We will adopt digital technologies to improve the digital delivery capacity in key areas such as IT, financial insurance, intellectual property, management consultation, and medical education.

We will host a successful CIIE, and improve its domestic spillover effect to meet residents’ needs for consumption upgrade. At the same time, we will enable the CIIE to exert the catfish effect at the supply side to improve resource allocation efficiency. The CIIE will guide the development of the Yangtze River Delta city cluster, and facilitate regional integration of the

Yangtze River Economic Belt. We will give play to the CIIE's demonstration effect in the world, drive foreign investment through trade, attract more foreign enterprises to enter the Chinese market and accelerate the development of a new pattern featuring positive interplay between domestic circulation and international circulation.

We will both intensify investment abroad and strengthen inter-regional linkage at home to deepen reform and opening up of free trade zones. We will provide good institutional guarantee in areas of enterprise service, IPR protection and business dispute settlement, remove unnecessary investment barriers, create duplicable and sharable experience and give play to the free trade zones' demonstrative effect. We will create the channels to transfer the dividend of reform from coastal areas to inland areas and from free trade zones to non-free trade zone areas, so as to exert the radiation effect of innovation outcomes and promote coordinated and rapid regional economic development.

The RCEP has provided institutional guarantee for the region to expand trade and reduce trade cost. We suggest that China develop more RMB-denominated futures products, provide more convenient trading mechanisms, reduce trade cost, utilize our comparative advantages against European and US exchanges, and encourage Chinese transnational corporations and state-owned enterprises to more actively participate in the commodity futures market. We should relax the restrictions on real-demand-based trade, and allow enterprises to use the commodity futures market as an integrated risk management tool. Besides, we should learn from the practice of the commodity futures markets in Europe and the US, properly expand the participation of financial institutions, private equity and hedge funds in the futures market, make the market more international and add to the trade vitality and the impact on pricing.

4.4 High-quality “Belt and Road” Development and RMB Internationalization Promote Each Other

We should clear the path for the implementation of Belt and Road Initiative, and propel the mutual promotion and supplement of high-quality Belt and Road development, the new pattern of dual circulation and RMB internationalization. We should pursue connectivity among high-quality policies, rules and standards to lay the foundation for RMB internationalization; we should use high-quality infrastructure connectivity to drive cross-border RMB infrastructure investment and financing and take the integration of investment, financing, construction and operation of overseas infrastructure programs; we should pave the way for RMB settlement through high-quality trade connectivity; we should create a carrier and platform for RMB's international use through high-quality finance connectivity; we should improve China's leading role in the Belt and Road international circulation through high-quality international industrial cooperation and lay the foundation for RMB asset pricing; we should create a solid public opinion basis for RMB's international use through high-quality people-to-people connectivity.

We should seek breakthroughs and make efforts beforehand in the following dimensions: (1) we should develop Belt and Road commodity trade platforms, accelerate the integration of commodity trade rules and terms, intensify the innovation of the service system and the supervision system, improve financial services and develop competitive commodity pricing centers to promote commodity trade and RMB pricing. (2) We should develop a multi-layer and fairly comprehensive infrastructure investment and financing system, give play to AIIB, NDB, sub-regional banks and sovereign national development financial institutions, use the “joint loan” model to leverage international capital and deepen the co-development of a “bank union” framework with banks from Belt and Road countries. We should encourage the use of RMB in infrastructure program financing. (3) We should develop Belt and Road digital trade, explore ways to develop systems on e-commercial full-range statistics, taxation and trade facilitation and consumer protection, so as to win the right of speech in the global digital trade rule-making. (4)

We should enhance bilateral and multilateral financial and monetary cooperation, establish normalized coordinating agencies for multilateral cooperation on infrastructure development financing and formulate uniform investment rules. We should sign regional financial and monetary cooperation agreements with countries and regions along the Belt and Road to encourage relevant countries to expand the scale of RMB reserves.

4.5 Developing an Efficient Interaction Mechanism Between Offshore and Onshore Markets to Strengthen RMB's Financial Transaction Function

Realizing effective interaction, coordinated development and continuous integration between the offshore market and the onshore market is key to the RMB internationalization process. We should aim to accelerate the development of the new development model of dual circulation and cover all key countries and regions with offshore RMB centers to enable foreign enterprises, individuals, institutions and governments to use RMB. We should develop a price linkage system between offshore markets and onshore markets and a firewall system, and establish an exclusive account system for offshore markets to prevent rapid external risk contagion and provide a buffer zone for domestic financial safety. We should expand the connection between offshore markets and onshore markets, build interest rate corridors in offshore markets and establish a risk hedging mechanism and a liquidity safeguard mechanism for RMB financial market transactions. First, we should take foreign exchange transactions as the main channel for foreign exchange rate interaction, push forward cross-border capital settlement through foreign exchange transactions and change the supply and demand statuses of RMB capital, so as to impact the offshore RMB exchange rate. Second, we should take inter-bank lending as the main channel for interest rate interaction. We should use intra-bank, inter-bank and bank-enterprise financing activities to enable offshore and onshore RMB capital to impact each other and produce an interest rate interaction effect. Third, we should take the currency swap conducted by central banks as the main channel for market liquidity management. We should encourage overseas central banks to set up RMB liquidity arrangements, increase market liquidity supply and guarantee systems and give play to liquidity adjustment. Fourth, we should take bond issuance as the main channel for interaction between offshore and onshore markets. We should take reference from the rules of international bond markets in New York, London and Eurozone to settle the taxation problems about cross-border securities transactions and sharpen the international competitiveness of RMB-denominated bonds. Fifth, we should take the stock connect and bond connect as important channels for cross-border RMB flow under the capital account and use the above-mentioned institutional channels to impact the interest rate and foreign exchange rate differences between offshore and onshore RMB markets.

In order to facilitate RMB internationalization in the dual circulation pattern, we should also take the following measures. The first is to strengthen onshore financial market development, deepen market-based foreign exchange rate and interest rate reform and optimize the operation mechanism of the financial market. The second is to push forward opening up of the financial market, take control of the opening-up pace of the capital account, improve relevant supporting systems and use fintech measures to prevent and resolve potential risks in the new pattern. The third is to develop a policy-driven and market-guided RMB internationalization model and add digital nature to RMB internationalization. We should form overseas RMB foreign exchange markets of different size through direct investment and assistance and create necessary conditions for more enterprises and individuals to accept RMB. We should use the CIIE and FTZs to provide powerful e-commercial and digital trade platforms, and use third-party platforms to explore the application of digital currency in cross-border trade. We should push forward RMB pricing and settlement, add digital nature to RMB to use its use scenarios and enable RMB to become a local monetary anchor. The fourth is to handle the logical relationship between market-based RMB

foreign exchange rate, flexibility and stability. We should draw lessons from past experience and not rigidly cling to the psychological foreign exchange rate threshold.

RMB Internationalization Milestones (2020)

Date	Event
January 6, 2020	The PBoC signed a bilateral domestic currency cooperation agreement with the Bank of the Lao P.D.R. to allow the direct use of domestic currencies in the settlement of transactions under all the open currency and capital accounts in both countries.
February 10, 2020	The PBoC and the Central Bank of Egypt renewed the bilateral currency swap agreement with a volume of 18 billion yuan/41 billion Egyptian pound.
February 11, 2020	The PBoC examined and approved the application of Mastercard NUCC to begin formal preparations to set up a domestic bankcard clearing institution in China.
February 13, 2020	The PBoC issued 20 billion yuan worth of three-month central bank bills and 10 billion yuan worth of one-year central bank bills in HKSAR.
February 14, 2020	The Opinions on Further Accelerating the Development of Shanghai as an International Financial Center and Providing Financial Support for the Integrated Development of the Yangtze River Delta Region (Yinfa [2020] No.46)
February 14, 2020	The CSRC, the Ministry of Finance, the PBoC and the CBIRC jointly issued The Announcement on the Participation of Commercial Banks and Insurance Institutions in Treasury Bond Futures Transactions in China Financial Futures Exchange (CSRC Announcement [2020] No.12)
February 28, 2020	The Chinese treasury bond was officially included into J.P. Morgan's Government Bond Index-Emerging Markets.
March 5, 2020	Six departments including the PBoC and the NDRC jointly issued the Work Plan for Overall Supervision of Financial Infrastructure.
March 26, 2020	The PBoC issued 10 billion yuan worth of six-month central bank bills in HKSAR.
March 31, 2020	The State Council officially approved the Measures on Supporting the Opening Up and Development of the Whole Oil and Gas Industrial Chain in China (Zhejiang) Pilot Free Trade Zone.
April 16, 2020	The digital RMB was first used in Xiancheng District of Suzhou, and then received closed beta testing in Zhenshen, Xiongan, Chengdu and the future Winter Olympic Games scenarios.
April 16, 2020	The Agricultural Bank of China launched the Plan on Further Promoting RMB Internationalization.
May 7, 2020	The PBoC and the SAFE jointly issued the Regulations on Funds of Securities and Futures Investment by Foreign Institutional Investors
May 11, 2020	China Baowu Group, the largest steel group in China, announced the completion of the first RMB cross-border settlement through blockchain technology with Rio Tinto Group, with a total volume of over 100 million yuan.
May 14, 2020	Fitch Ratings was allowed to enter the Chinese credit rating market.
May 14, 2020	The PBoC issued 20 billion yuan worth of three-month central bank bills and 10 billion yuan worth of one-year central bank bills in HKSAR.
May 20, 2020	The PBoC and the Central Bank of Lao P.D.R. signed the bilateral currency swap agreement with a volume of 6 billion yuan/7.6 trillion Lao kips.
May 27, 2020	The Bond Business Guidance for Foreign Government Institutions and International Development Institutions was released.
June 13, 2020	The PBoC and the CBIRC approved the application of American Express to commence operations as a bank card clearing organization.
June 18, 2020	Turkey first used the RMB funds under the bilateral currency swap agreement renewed by the Central Bank of Turkey and the PBoC in 2019.
June 23, 2020	The PBoC issued 10 billion yuan worth of six-month central bank bills in HKSAR.

June 29, 2020	The PBoC, the Hong Kong Monetary Authority and the Macau Monetary Authority released an announcement to carry out pilot programs of “cross-border wealth management scheme” in the Guangdong-Hong Kong-Macau Greater Bay Area.
July 19, 2020	The PBoC and the CSRC jointly issued the Announcement of PBoC and CSRC ([2020] No.7).
July 31, 2020	The PBoC and the Central Bank of Pakistan signed the revised bilateral currency swap agreement to expand the volume to 30 billion yuan/720 billion Pakistan rupees.
July 31, 2020	The PBoC and the Central Bank of Chile signed the revised bilateral currency swap agreement to expand the volume to 50 billion yuan/5.6 trillion Chilean pesos.
July 31, 2020	The PBoC and the Central Bank of Mongolia renewed the bilateral currency swap agreement with a volume of 15 billion yuan/6 trillion Mongolian tugrik.
August 13, 2020	The PBoC issued 20 billion yuan worth of three-month central bank bills and 10 billion yuan worth of one-year central bank bills in HKSAR.
August 22, 2020	The PBoC and the Central Bank of New Zealand renewed the bilateral currency swap agreement with a volume of 25 billion yuan.
August 31, 2020	The PBoC published The Participation in International Benchmark Interest Rate Reforms and Improving China’s Benchmark Interest Rate System white paper.
September 8, 2020	The work plan on deepening the development of a new round of comprehensive pilot programs for further opening up of service industry in Beijing and developing the integrated demonstration zone for further opening up of the service industry in China was formulated.
September 17, 2020	The PBoC and the Central Bank of Hungary signed the bilateral currency swap supplemental agreement with a volume of 40 billion yuan.
September 18, 2020	The Opinions Concerning Standardization of the Development of Supply Chain Financing and Supporting Stable Circulation and Optimization and Upgrade of Supply Chain and Industry Chains (Yinfa [2020] No.226) was issued.
September 21, 2020	The first Chinese bond ETF in Singapore, managed by asset management company CSOP was put in transaction.
September 23, 2020	The total volume of QDII investment reached 107.343 billion US dollars.
September 24, 2020	The PBoC issued 10 billion yuan worth of six-month central bank bills in HKSAR.
September 25, 2020	FTSE Russell announced that the Chinese treasury bond would be included into its World Government Bond Index (WGBI).
September 30, 2020	RMB realized the highest quarterly appreciation rate of 3.71% since 2008.
September 30, 2020	Yi Gang, Governor of PBoC and Perry Warjiyo, Governor of Bank Indonesia signed the MoU for the Establishment of a Framework for Cooperation to Promote the Settlement of Current Account Transactions and Direct Investment in Local Currencies.
October 11, 2020	The General Office of the CPC Central Committee and the General Office of the State Council issued the Implementation Plan for the Pilot Comprehensive Reform of Building a Pilot Demonstration Zone of Socialism with Chinese Characteristics in Shenzhen (2020-2025).
October 12, 2020	The PBoC decided to lower the reserve requirement ratio for financial institutions when conducting some foreign exchange forwards trading from 20% to 0.

October 22, 2020	The PBoC and the Bank of Korea renewed the bilateral currency swap agreement to increase the volume from 360 billion yuan/64 trillion won to 400 billion yuan/70 trillion won, with a duration of five years.
November 12, 2020	The PBoC issued 10 billion yuan worth of three-month central bank bills and 15 billion yuan worth of one-year central bank bills in HKSAR.
November 15, 2020	Trade Ministers from ASEAN, China, Japan, Korea, Australia and New Zealand jointly signed the Regional Comprehensive Economic Partnership (RCEP)
November 25, 2020	The PBoC and the Hong Kong Monetary Authority renewed the currency swap agreement to increase the volume from 400 billion yuan/470 billion Hong Kong dollars to 500 billion yuan/590 billion Hong Kong dollars, with a duration of five years.
December 4, 2020	The SAFE approved to increase the quota under the QDIE pilot scheme in Shenzhen from 5 billion US dollars to 10 billion US dollars.
December 4, 2020	The SAFE approved to increase the quota under the QDLP pilot program in Shanghai by 5 billion US dollars, making to total volume 10 billion US dollars.
December 8, 2020	Shanghai Clearing House and Euroclear Bank jointly launched the Yulan Bond.
December 11, 2020	The PBoC and the SAFE lowered the macro-prudential adjustment parameter for cross-border financing of financial institutions from 1.25 to 1.
December 11, 2020	The PBoC, the CBIRC, the CSRC and the SAFE jointly issued the Roadmap for the Implementation of LEIs in China (Yinfa [2020] No.283)
December 15, 2020	The first WFOE PFM fund product subscribed by qualified foreign institutional investors through QFII/RQFII was launched in Shanghai.
December 18, 2020	The 5 th Meeting of the China-Vietnam Financial and Monetary Cooperation Work Group was held virtually.
December 21, 2020	The PBoC approved to establish an RMB international investment and loan fund in Beijing.
December 23, 2020	The PBoC issued 10 billion yuan worth of six-month central bank bills in HKSAR.
December 25, 2020	The Bond Business Guidance for Foreign Government Institutions and International Development Institutions (Trial) was formulated, and the Debt Financing Instrument Business Guidance for Foreign Non-financial Enterprises (2020 version) was revised.
December 28, 2020	Business related to the QFII registration and settlement system reform in Shanghai Stock Market and Shenzhen Stock Market was officially launched, and QFIIs were allowed to participate in securities margin trading from December 29.
December 29, 2020	Guotai Junan Securities assisted large foreign institutional investors to complete the first QFII securities margin trading deal in the A-share market.
December 30, 2020	China and EU leaders jointly announced that the negotiation on the China-EU Comprehensive Investment Agreement was completed on time.

Working Paper

Index Volatility and the Put-call Ratios: A Tale of Three Markets*

By GANG JIANHUA, HUANG NAN, SONG KE AND ZHANG RUYI*

Abstract: *This paper investigates the role of the put-call-ratio (PCR) implied by the SSE50-ETF option towards the price discovery process of the SSE50 index both on the spot market and the futures market. By using an asymmetric VARX-MGARCH model, the short-term relationship between the PCRs and SSE50 index (futures) are tested. Empirical results indicate an asymmetric V-shaped relationship between the PCR series and the conditional volatility of the stock index as well as its futures. Specifically, the volatility increases when the PCRs go wild from its mean. This study also shows evidence that the PCRs as adopted in many trading practices may be misused because no significant correlation is found between the PCRs and index returns. However, our study implies a potential way of using it: to trade on the volatility.*

Keywords: SSE50-ETF, futures, option, PCR, MGARCH

1 Introduction

Past literature has documented that the option market can reveal trading behaviors of the informed investors through their derivatives position (Ge, Lin, Pearson, 2016). Therefore, to extract information from the option market is important and this is consistent with a recent booming of studies focusing on relevant topics. Researchers are keen to create various measurements such as price-based implied volatility (Xing, Zhang, and Zhao, 2010; Cremers and Weinbaum, 2010) or corporate events (Jin, Livnat, and Zhang, 2012; Lin and Lu, 2015; Chan, Ge, and Lin, 2015; Hayunga and Lung, 2014) in order to predict future stock market.

In this paper, we focus on the daily put-call ratio (PCR) to describe the option market. The PCR is a ratio from the option market which is constructed by the number of open interests of the put-option against that of the call-option in a given time period. Compared with other indicators, the PCR is perhaps the most intuitive and straightforward one. Furthermore, it is forward-looking, easy to understand, and widely believed to be informative.

A pioneer study by Easley, et al. (1998) indicates that the option volume by itself can be informative for stock price movements and also shows the option trading is information-based in nature. The follow-on research suggests that a trading volume-based PCR is a good forward-looking indicator. Blau, et al. (2014) compares the two commonly used ratios on forecasting stock returns: PCR and OSR (Option-to-Stock Volume Ratio), and shows that the PCR contains more information at a daily level while OSR performs well only at weekly or monthly level. Similarly, Bandopadhyaya and Jones (2011) and Weir (2015) find better explanatory power in the PCR than

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VIX. Moreover, a study by Billingsley and Chance (2009) examines the predictive power of the PCRs in both the CBOE and the OEX, and argues the PCRs can be used to predict the direction of the market. More recent works tend to support this argument, for example, Connors and Alvarez (2012), Houlihan and Creamer (2014), Mehta and Patel (2014), Blau and Brough (2015) and Wu, et al. (2016). However, mixed evidence is also documented by Pan and Poteshman (2006), which investigates the information content of the PCRs for option contracts that are traded out-of-the-money, and Chang, et al. (2009) also uses this model to examine the TAIEX option market. Results strongly indicate that the PCR constructed from the trading volume carries no valid information on spot index return.

However, in contrast to the large amount of documented results in developed markets, research on the Chinese index/ETF option market is both inadequate and inconclusive. There are mainly trading-oriented institutional reports on the PCR in a descriptive form. This paper is keen to fill this gap and thereby exhibits a wider view on the Chinese financial derivatives markets.

The SSE50-ETF option contract which tracks the SSE50 index was introduced and listed in the Shanghai Stock Exchange in early 2015. Until recently, the SSE50-ETF option market has attracted enormous attention due to its fast expansion and the SSE50-ETF option ranked the fifth most-traded ETF option worldwide⁹. Hence, it requires close examination regarding how to extract and interpret information from this market. To this matter, various PCR measurements are constructed and tested in trading practices. Founder Securities Research (2015) looks into the China SSE50-ETF market using a simple autoregressive model and finds that the residuals of the model can be attributed to non-economic factors such as sentiment, of which the PCR (of the SSE50-ETF option) is among the most suitable ones. In particular, large falls of PCRs tend to signal market bottom. But most of these are descriptive without solid robustness proof. The China SSE50-ETF Investment Guidelines (2004)¹⁰ summarize the role of the PCR as providing investors with a way to reduce market risk in a bearish condition. This paper is therefore motivated to fill this gap and study the potential effect of the PCR towards index return and volatility.

Apart from a direct relationship between the PCR and spot index (cash market) as examined by previous studies, this price discovery mechanism is also likely to connect to the index futures market. Literature suggests that the futures market generally leads the cash market and serves as a primary market of the price discovery. For example, a series of pioneer studies such as Kawaller, Koch, and Koch (1987), Cheung and Ng (1990), and Chan, et al. (1991) all present evidence suggesting that the S&P 500 futures leads the underlying cash index. Furthermore, follow-on research on this topic shows that this effect is both significant and conditional. For example, Chatrath, et al. (2002) shows clear evidence that this information advantage is only valid when the market is booming. There are also studies investigating the relationship between stock volatility and the basis (Chen, et al., 1995, Chatrath, et al., 2002, Kogan, et al., 2009 and Yang et al., 2012), and results show this correlation is negative, time-varying and conditional. In addition, research focusing on the Chinese market is emerging in recent years after the China Financial Futures Exchange (CFFEX) starts trading index futures with underlying indices of CSI300 in 2010, CSI500 and SSE50 in 2015¹¹. A study by Yang, et al. (2012) finds that the cash market plays a more dominant role in the price discovery process, and hence indicates the index futures market is still underdeveloped in China.

However, there is little evidence combining the cash market, index futures market, and the PCR series from the option market so as to investigate the price discovery or volatility dynamics across all three markets. This study contributes to the existing literature by incorporating the PCR into the whole price discovery process, and evaluating the predictive power. It is after all possible that this relationship exhibits some complexity when the underlying product (Chinese A-share stock

⁹Statistics are shown in Table 1.

¹⁰Huaxia Fund Management Co., Ltd., which is the only manager of the SSE50-ETF, is obligated to compile and update these guidelines.

¹¹Tickers for CSI 300, CSI 500, and SSE50 index futures are IF, IC, and IH, respectively.

market) is highly volatile. Therefore, we are also motivated to test higher moments influence and justify the robustness. Furthermore, the identification of the index option behavior in special periods such as the market crash shows some insights for policy makers and market participants. Specifically, this study tests both realized and conditional volatility.

To sum up, the contribution of this paper is threefold: First, we show there is no evidence that the PCR can predict any direction of the SSE50 index. This is different from international experience. This may be attributed to the fact that the index futures are always used for risk hedging but not the options, and that the delta-hedging behaviors by the option sellers would blur the relationship in practice. Therefore, our empirical results indicate a potential misuse of the PCR as a predictor in trading practice. Second, a significant asymmetric V-shaped relationship between the PCR and conditional variance is found and this is valid both for stock index and its futures. Specifically, conditional variance increases either PCR goes up or down from its long-term mean. Third, this study is the very first study to examine the relationship between the PCR and the SSE50 index (and its futures) both in conditional mean but also in conditional variance. Our research indicates the possible misuse of the popular PCR-related strategies and a potential correct way of using it - to trade on volatility.

The rest of the paper is structured as follows: Section 2 describes the methodology; Section 3 outlines the dataset and variables; Section 4 presents empirical results; Section 5 concludes.

Table 1 Trading Volumes of Top5 ETF Index Options

Rank	ETF Index Option	Jan-Dec 2016	Jan-Dec 2015	%Change
1	SPDR S&P 500 ETF Options	671,661,453	655,942,274	2.40%
2	iShares Russell 2000 ETF Options	140,662,647	138,135,687	1.80%
3	Powershares QQQ ETF Options	111,873,109	120,174,871	-6.90%
4	iShares MSCI Emerging Markets ETF Options	87,941,483	78,473,551	12.10%
5	SSE50-ETF Option, Shanghai Stock Exchange	79,069,347	23,269,976	239.79%

Notes: Data of SSE50 options is from WIND database, other data is from FIA 2016 Volume Survey.

2 Methodology

2.1 Linear model

Our study follows Pan and Poteshman (2006) to construct a simple linear model as our benchmark to link the PCR and future stock index returns:

$$R_{t+\tau} = \alpha + \beta \text{PCR}_t + \gamma X_t + \varepsilon_{t+\tau}, \quad \tau = 1, 2, \dots, T \quad (1)$$

where $R_{t+\tau}$ denotes the daily logarithmic return of the SSE50 index on day $(t+\tau)$; X_t denotes the control variables; PCR_t denotes the put-call ratio implied by the outstanding SSE50-ETF options on day t . The null hypothesis is that the stock market and options market are in separate equilibrium and that the information variable (PCR) has no predictive power at all, that is to say, for all $\tau=1, 2, \dots, T$, $\beta=0$.

Apart from the stock index return, we also evaluate the predictive power of the PCR on stock index volatility (realized volatility):

$$\text{Vol}_{t+1,t+\tau} = \alpha + \beta \text{PCR}_t + \gamma X_t + \varepsilon_{t+\tau}, \quad \tau = 1, 2, \dots, T$$

where $\text{Vol}_{t+1,t+\tau}$ denotes the standard deviation of logarithmic return of the SSE50 index between date $t+1$ and $t+\tau$.

2.2 The asymmetric VARX-MGARCH Model

In order to investigate the influence of the basis (Yang et al., 2012) and PCR in the conditional mean and volatility in both cash (spot index) and index futures markets, we revise the model introduced by Yang et al. (2012) and construct the following asymmetric VARX-MGARCH model with diagonal-BEKK specification in the conditional variance function. Our conditional mean function is:

$$\Delta X_t = \mu + \Gamma \Delta X_{t-1} + \gamma \max(E_{t-1}, 0) + \eta \min(E_{t-1}, 0) + \delta \max(\text{PCR}_{t-1} - \mu_{\text{PCR}}, 0) + \theta \min(\text{PCR}_{t-1} - \mu_{\text{PCR}}, 0) + \varepsilon_t \quad (2)$$

where $X_t = (X_{1t}, X_{2t})'$; ΔX_{1t} and ΔX_{2t} represent the underlying SSE50 index (log) return and the IH futures (log) return, respectively; $\gamma, \eta, \delta,$ and θ are coefficients capturing the asymmetric effects of the basis and PCR, respectively.

A multivariate GARCH (MGARCH) model is used for the conditional variance (Baba et al.1991), Engle and Kroner, 1995). However, the number of parameters to estimate in the MGARCH is typically large and rises exponentially with the number of variables. In fact, there are $k(k + 1)/2$ parameters of variance and covariance for k returns. Besides, the positive-definite constraints need to be satisfied as the covariance matrices are positive definite.

To solve these problems, many parametric formulations are introduced for the structure of the conditional variance-covariance matrices. Baba et al. (1991) introduced the BEKK model that has been widely used. The conditional variance-covariance matrix of the full (unrestricted) BEKK model is:

$$H_t = C'C + A'\varepsilon_{t-1}\varepsilon'_{t-1}A + B'H_{t-1}B \quad (3)$$

In Equation (3), $C, A,$ and B are k by k matrices, in which C is upper-triangular. An advantage of the BEKK model is that H_t is positive definite if the diagonal elements of C is positive. But the model contains too many parameters that do not represent directly the impact of ε_{t-1} or H_{t-1} on the elements of H_t . In other words, it is hard to interpret the parameters of a BEKK model. Literature also documents evidence that many parameter estimates of the BEKK model are statistically insignificant, implying the model is over-parameterized (Tsay, R. S. 2006). In fact, a further simplified version of BEKK model in which A and B are diagonal is more frequently used in practice. The diagonal-BEKK model can be estimated without difficulty and ensure positive definiteness (Silvennoinen, and Teräsvirta, 2009).

Therefore, an augmented diagonal-BEKK model is then adopted where both matrices A and B are diagonal. By doing so, the number of parameters can be significantly reduced while maintaining the advantage of positive-definite in the conditional variance-covariance matrix

To further test any potential influence by the PCR to the variance, we then extend the conditional variance model to allow the PCR effect. The model can be written as follows:

$$H_t = C'C + A'\varepsilon_{t-1}\varepsilon'_{t-1}A + B'H_{t-1}B + F\Sigma_{\text{basis},t-1}F' + G\Sigma_{\text{PCR},t-1}G' \quad (4)$$

where,

$$\Sigma_{\text{basis},t-1} = \begin{bmatrix} \max(E_{t-1}, 0) & 0 \\ 0 & -\min(E_{t-1}, 0) \end{bmatrix}$$

$$\Sigma_{\text{PCR},t-1} = \begin{bmatrix} \max(\text{PCR}_{t-1} - \mu_{\text{PCR}}, 0) & 0 \\ 0 & -\min(\text{PCR}_{t-1} - \mu_{\text{PCR}}, 0) \end{bmatrix}$$

The specification as represented in Equation (4) can reveal potential nonlinearities caused by the basis and PCR. Specifically, the sign/significance of the elements in the coefficient matrices F and G would suggest any possible asymmetric effect caused by the basis and PCR, respectively.

To sum up, our full model is built up by Equation (5) and (6) as follows:

$$\Delta X_t = \mu + \Gamma \Delta X_{t-1} + \gamma \max(E_{t-1}, 0) + \delta \min(E_{t-1}, 0) + \eta \max(\text{PCR}_{t-1} - \mu_{\text{PCR}}, 0) + \theta \min(\text{PCR}_{t-1} - \mu_{\text{PCR}}, 0) + \varepsilon_t \quad (5)$$

where,

$$\mu = \begin{pmatrix} \mu_1 \\ \mu_2 \end{pmatrix}, \Gamma_i = \begin{pmatrix} \Gamma_{11} & \Gamma_{12} \\ \Gamma_{21} & \Gamma_{22} \end{pmatrix}, \gamma = \begin{pmatrix} \gamma_1 \\ \gamma_2 \end{pmatrix}, \delta = \begin{pmatrix} \delta_1 \\ \delta_2 \end{pmatrix}, \eta = \begin{pmatrix} \eta_1 \\ \eta_2 \end{pmatrix}, \theta = \begin{pmatrix} \theta_1 \\ \theta_2 \end{pmatrix}, \varepsilon_t = \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}$$

and,

$$\varepsilon_t | \Omega_{t-1} \sim D(0, H_t) \quad (6)$$

$$H_t = C'C + A'\varepsilon_{t-1}\varepsilon'_{t-1}A + B'H_{t-1}B + F\Sigma_{\text{basis}, t-1}F' + G\Sigma_{\text{PCR}, t-1}G'$$

where,

$$C = \begin{pmatrix} c_{11} & c_{12} \\ 0 & c_{22} \end{pmatrix}, A = \begin{pmatrix} a_{11} & 0 \\ 0 & a_{22} \end{pmatrix}, B = \begin{pmatrix} b_{11} & 0 \\ 0 & b_{22} \end{pmatrix}, F = \begin{pmatrix} f_{11} & f_{12} \\ f_{21} & f_{22} \end{pmatrix}, G = \begin{pmatrix} g_{11} & g_{12} \\ g_{21} & g_{22} \end{pmatrix}$$

The above diagonal-BEKK model is estimated by the full-information maximum likelihood method. Since the conditional variance is specified as a diagonal-BEKK form, so there is no straight forward parameter that can be interpreted as the volatility co-movements between the two markets. Therefore, we compute the time-varying cross market conditional correlation:

$CC_t = \frac{h_{12t}}{(h_{11t}h_{22t})^{1/2}}$ to measure the volatility linkage across the two markets, where h_{11t} and h_{22t} are

conditional variance of spot market and futures market, and h_{12t} is conditional covariance of the two.

3 Dataset and variables

The full data panel of the SSE50 index, SSE50 index futures (IH50), and the SSE50-ETF option contracts is drawn from the Wind database¹². Our data set consists of daily trading information of all SSE50ETF option contracts, including types of option (call/put), option characteristics(strike price and time to maturity), prices, trading volumes, and open interests. The time period is from 16th April 2015¹³ to 28th September 2018 and covers 890 trading days and 1,488 option contracts in total. In order to construct a continuous nearby futures price series, we follow Yang et al. (2012) to use the prices of the nearby futures contract until the contract reaches the first day of the delivery month. Then, prices for the next nearby contract are used. The nearby futures contract is used because it is almost surely the most active and liquid contract given a certain time point (trading day). Thereby, a return series is built by taking the first difference of the logarithms of the futures prices. The time series of the basis in this study is calculated as the difference between the logarithmic stock index and its logarithmic futures price.

In this research, a measurement of the 20-trading-day realized volatility is used to proxy the implied volatility, because the iVIX which was the Chinese counterpart of the CBOE VIX and was officially released by China Securities Index Co., Ltd is suspended in early 2018. The patterns of both time series are shown in Figure 1. Figure 1 shows a similarity between the iVIX and the realized volatility that we use. It is clear that the implied volatility of the SSE50-ETF option has a pattern of faster-hiking and slower-cooling than the realized volatility, which suggests greater difficulties to build-up short positions using the SSE50-ETF options. Figure 1 also shows a period of volatility moderation across 2016 and 2017, which is accompanied by a bullish stock market. In practice, put options are often shorted during a bullish market and this is consistent with high PCRs during that time (as shown by Figure 2). Therefore, the PCR on each day reflects views towards future stock market.

¹² The Wind financial database (<http://www.wind.com.cn/>) is the largest vendor of professional financial data and information on Chinese stocks, bonds, funds, futures, RMB rates, and the macro economy.

¹³ The start date is the day on which the SSE50-ETF option is officially introduced to the market.

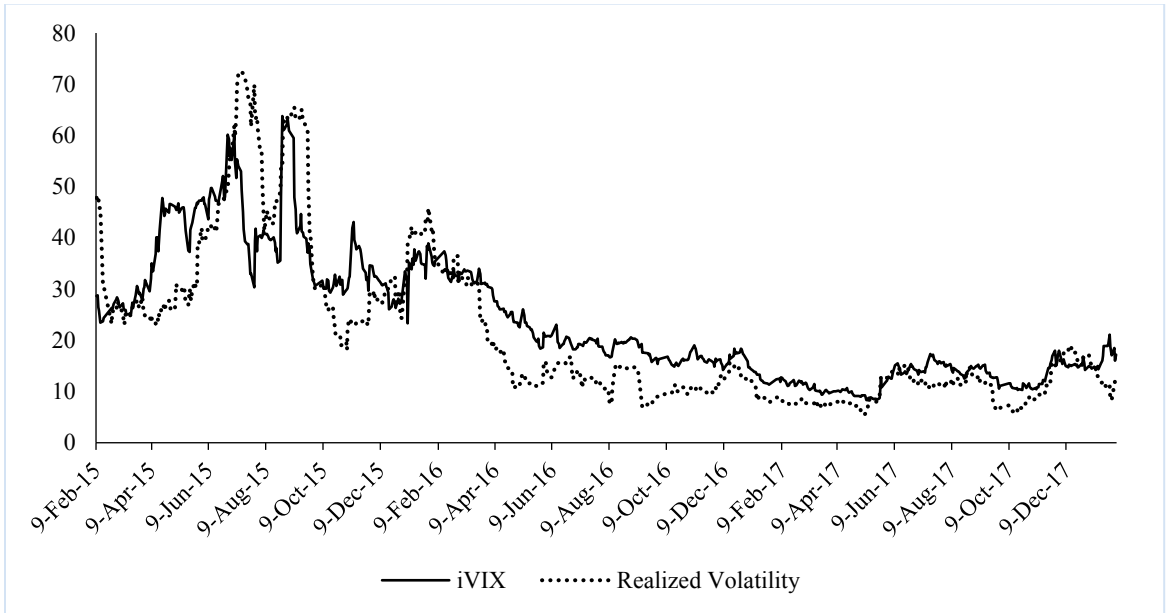


Figure 1: iVIX and Realized Volatility

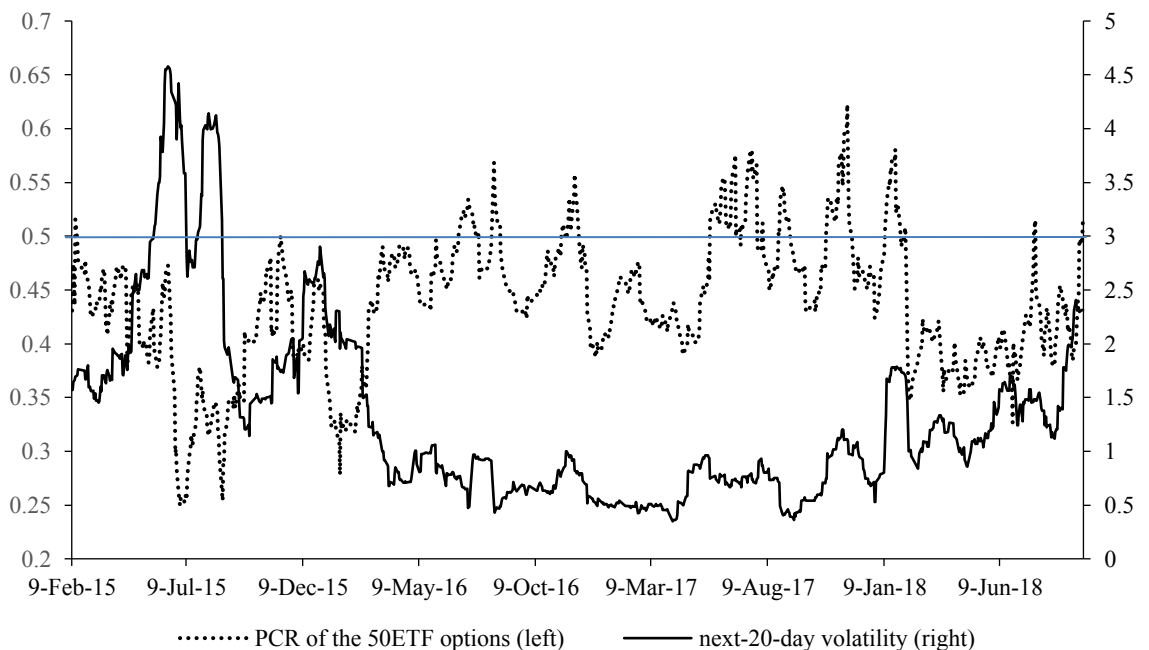


Figure 2: PCR of SSE50-ETF options and realized volatility of SSE50 Index

In this study, among several approaches to calculate the PCR, we implement the open interest approach by Fodor, et al. (2011) as follows:

$$PCR_t = \frac{P_t}{P_t + C_t}$$

where P_t and C_t are the numbers of the open interests of put and call options at time t , respectively. The above calculation ensures all PCR values to be positive and less than one. As argued by Fodor, et al. (2011), this approach is less volatile than the volume approach but very informative, and is less affected by very short, intraday speculations.

All variables in this research are listed in Table 2. Descriptive statistics of key variables are listed in Table 3.

Table 2 Symbol and Explanations of Variables

Variables	Symbol	Explanations
Put-call Ratio	PCR	Open interests of put options divided by open interests of call options
Control variables	X_t	Variables that may contain explanatory power on dependent variables other than independent variables
Return	$R_{t+\tau}$	Return of SSE50 on the $t+\tau$ trading day
Volatility	$Vol_{t+1,t+\tau}$	Standard deviation of SSE50 index return between $t+1$ and $t+\tau$ day which is a proxy for index volatility
Control 1	Dummy \times near maturity PCR	Interaction term between a dummy variable and the near-mature PCR: dummy variable=1 when there are options mature on next trading day near-mature PCR=PCR calculated by options maturing on next trading day
Control 2	Volume	Daily closing SSE50 index trading volume
Control 3	$R_{-5,-1}$	Past five-day SSE50 index cumulative return

Notes: Other mentioned but not adopted variables are given explanations in the context.

Table 3 Descriptive Statistics

	Mean	Standard Deviation	Lowest	Highest
Cash return	-0.02	1.58	-9.85	7.55
Futures return	-0.03	1.78	-10.37	10.60
Basis	-0.74	1.29	-15.13	3.11
PCR	0.44	0.07	0.25	0.63

Notes: Basic descriptive statistics of independent and dependent variables are listed.

Table 3 suggests that the number of the call-option open interests is more than that of the put option in general (by noticing the mean of the PCR is below 0.5 and the lowest PCR has a larger deviation from this mean than the highest does), and this is consistent with existing studies on developing countries (Chan, Chang and Lung, 2009)¹⁴. This finding is also reinforced by Figure 2 by seeing that most of the values of the PCR (left vertical axis) are below 0.5. Figure 2 also exhibits some negative correlation between the SSE50 index return realized volatility and the PCR and this relationship is likely to be time-varying.

4 Empirical Results

4.1 PCR Predictability on the SSE50 Index Return

We follow the approach used by Pan and Poteshman (2006) to regress the next-day return of the SSE50 index on a constant and the daily PCR (shown by Model (1)), and, in the meantime, control for the “moneyness” (in/out of the money or at the money) of the options. Results are shown in Table 4, in which the leverages of the options are of decreasing order from top to bottom (from extremely

¹⁴This is, however, different from the evidence from developed markets (Bollen and Whaley, 2004).

out of the money to extremely in the money). In Table 4, coefficients of the PCR, regardless of the moneyness, are all statistically insignificant based on heteroscedasticity and autocorrelation consistent (HAC) t-tests by Newey and West (1987). Together with very low R²s in all the regressions and heteroscedasticity (White tests) in residuals, Table 4 implies the model used by Panand Poteshman (2006) does not work in China, and that the PCR does not provide any information to forecast the next-day returns. These results, however, are consistent with the findings in TAIEX options by Chang et al. (2009).¹⁵

Table 4: Predictability of PCR on SSE50 Index Return with Varying Moneyness

(Sub-) Samples	Constant	PCR	D-W test	White test	R ²
Full-Sample	-0.0053(-0.95)	0.0120(1.02)	1.92	89.5***	0.0024
Above 10% OTM	-0.0017 (-1.21)	0.0025 (1.56)	1.91*	39.0***	0.0036
3-10% OTM	-0.0024 (-1.36)	0.0049 (1.63)	1.91*	23.3***	0.0027
Near-the-money	-0.0061 (-1.43)	0.0146 (1.44)	1.93	0.04	0.0037
3-10% ITM	0.0005 (0.46)	-0.0013 (-0.46)	1.90*	10.8***	0.0003
Above 10% ITM	0.0006 (0.85)	-0.0020 (-1.03)	1.90*	20.94***	0.0019

Notes: This table reports results of regressing the next-day SSE50 index daily return on both the whole-sample of current-day PCR and the five categories of the current-day PCR. Five categories are divided according to the option moneyness. OTM denotes out-of-the-money options, and ITM denotes in-the-money options. Near-the-money refers to the call and put options having a strike to price ratio between 0.97 and 1.03. T-statistics reported in parentheses are computed from Newey-West standard errors as there are severely heteroscedasticity problems. One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level.

4.2 Univariate Models of the Realized Volatility

In general, because the option market is the only place to trade volatility, so it is reasonable that the PCR may contains information about the stock market volatility. Past literature also indicates the PCR to be a reflection of market sentiment pertaining to market volatility (Dennis and Mayhew, 2002; Simon and Wiggins, 2001). Therefore, it is possible that the “sentiment” would not directly affect the index return, but its volatility instead. This section extends our investigation to examine the predictability of the PCR on the realized volatility of the SSE50 index returns. Regressions as Model (1) are repeated but with a different dependent variable (realized volatility). Three different rolling windows, 5 days, 20 days, and 60 days, are implemented to compute the realized volatility. In addition, we separate the PCR into PCR_{upper} and PCR_{lower} relative to the long-term mean of the PCR (denoted by μ_{PCR}): $PCR_{upper} = \max(PCR - \mu_{PCR}, 0)$; $PCR_{lower} = \min(PCR - \mu_{PCR}, 0)$. By doing so, we can reveal asymmetric effects of the PCR on future volatility. Results are reported in Table 5.

Table 5: Results of Regressions of SSE50 Index Volatility on SSE50-ETF Options PCR

Regression	Constant	PCR _{lower}	PCR _{upper}	R ²
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¹⁵In addition, the prediction power has also been tested for longer horizons up to 20 days ($\tau=1,2,\dots,20$), the PCR is insignificant for any τ . Results can be obtained by request.

5-day volatility	0.88 (5.26) ***	-14.58(-3.86) ***	-0.22 (-0.11)	0.338
20-day volatility	1.08 (2.19) **	-11.49 (-3.35) ***	-1.41 (-0.37)	0.294
60-day volatility	1.28 (1.78) *	-6.96 (-1.67) *	-3.94 (-0.58)	0.194

Notes: This table reports the results of regressions of SSE50 index volatility on SSE50-ETF option PCRs. 5-day volatility is computed by the standard deviation of SSE50 index returns from day t+1 to day t+5. 20-day volatility is computed by the standard deviation of SSE50 index returns from day t+1 to day t+20. 60-day volatility is computed by the standard deviation of SSE50 index returns from day t+1 to day t+60. $PCR_{upper} = \max(PCR - \mu_{PCR}, 0)$ and $PCR_{lower} = \min(PCR - \mu_{PCR}, 0)$, where μ_{PCR} is the sample mean of PCR. t-statistics reported in parentheses are computed by Newey-West methods corrected for autocorrelation and heteroscedasticity. One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level.

Table 5 shows that only the lower PCRs explain the future realized volatility and they perform better in shorter time horizons (5-day and 20-day windows). All coefficients corresponding to the upper PCRs are not significant. These results indicate that the PCR has a significant negative and asymmetric effect on the future realized volatility of SSE50 index returns. When the PCR is below its long-term average, the smaller the PCR is, the larger the stock (index) volatility will be. But this pattern does not hold when the PCR is above the average. In other words, more open interests of the call options relative to the put options signal higher volatility in the stock market but the open interests of the put options do not seem to play a role on any direction. In addition, after controlling for the moneyness and time to expiration as shown by Table 6, the PCRs from the at-the-money options seem to be very informative (Panel A). This is consistent with the fact that the at-the-money options are the most actively traded so they contain more information than the others. And this very argument is the foundation of the VIX index as introduced by Whaley (1993), which is based only on (eight) at-the-money index calls and puts. But there are mixed results regarding to time to expiration as suggested by Panel B of Table 6.

Table 6 Results of Regressions of SSE50 Index Volatility on SSE50-ETF Options PCR by Different Option Types

Contract type	5-day volatility		20-day volatility	
	PCR _{lower}	PCR _{upper}	PCR _{lower}	PCR _{upper}
Panel A: Moneyness				
Above 10% OTM	-1.12(-1.15)	-0.97 (-2.80) ***	-0.71(-0.80)	-1.06(-2.93)
3-10% OTM	-3.81(-2.05) **	-0.65 (-1.42)	-2.83(-1.48)	-0.62(-0.87)
Near-the-money	-5.14(-3.56) ***	5.68 (3.77) ***	-6.13(-3.33) ***	5.61(4.15) ***
3-10% ITM	-0.01(-0.03)	1.58 (2.41) **	-0.20(-0.26)	1.17(2.06) **
Above 10% ITM	1.50(2.51) **	0.11 (0.20)	1.35(2.21) **	0.09(0.18)
Panel B: Time to expiration				
Under 40 days	-10.39 (-2.89) ***	0.57 (1.60)	-8.25(-2.91) ***	0.90(0.48)

40-99 days	-4.87(-1.67) *	-3.49 (-2.08) **	-5.95(-1.41)	-2.92(-0.93)
Above 100 days	-14.30(-3.90) ***	1.91 (0.47)-14.18(-3.16) ***		1.06(0.17)

Notes: This table reports the results of regressions of SSE50 index volatility on SSE50-ETF option PCRs among varying moneyness and time to expiration. 5-day volatility is computed by the standard deviation of SSE50 index returns from day t+1 to day t+5. 20-day volatility is computed by the standard deviation of SSE50 index returns from day t+1 to day t+20. OTM denotes out-of-the-money options, and ITM denotes in-the-money options. Near-the-money refers to the call and put options having a strike to price ratio between 0.97 and 1.03. $PCR_{upper} = \max(PCR - \mu_{PCR}, 0)$ and $PCR_{lower} = \min(PCR - \mu_{PCR}, 0)$, where μ_{PCR} is the sample mean of PCR. T-statistics as reported in parentheses are computed by Newey-West methods corrected for autocorrelation and heteroscedasticity. One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level.

Table 7 Predictability from Extremely low PCR in 5-day Rolling Window Regressions with Control Variables

	5-day volatility		20-day volatility	
	Coefficient	t-value	Coefficient	t-value
PCR_{lower}	-9.61***	-3.51	-6.59*	-1.84
PCR_{upper}	-0.92	-0.63	-2.42	-1.43
Dummy \times near maturity PCR	0.15	0.62	-0.11	-0.57
Volume	0.009***	4.89	0.010***	3.57
$R_{-5,-1}$	-0.030	-1.26	-0.015	-0.73

Notes: This table reports results of regressing next-5-day volatility of SSE50 index returns on SSE50-ETF option with three control variables: expiration dummy interacting with PCR, the daily closing trading volume of SSE50 index, and the five-day accumulated SSE50 index returns. Trading volume of SSE50 index is in billions. The t-statistics reported in parentheses are computed by Newey-West methods corrected for autocorrelation and heteroscedasticity. One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level.

To further address the potential mis specification problem and control other effects in this univariate regression, we follow Chang et al. (2009) and introduce an interaction term between a dummy variable and the near-maturity PCR as the maturity control. The dummy variable takes the value 1 if there are one or more options about to expire on the next trading day. Otherwise it takes the value 0. The near-maturity PCR is then calculated by options that will expire in the next trading day. For liquidity control, we add in the daily SSE50 index trading volume. For reversal control, we add in the past five-day SSE50 index cumulative return $R_{-5,-1}$. Table 7 shows the regressions of the 5-day and 20-day SSE50 return volatilities on the PCR and other control variables. It suggests similar results to Table 5 that only the PCR_{lower} matters and the relationship is negative. Hence, Table 7 suggests robustness of this relationship that the time series of daily PCRs can signal the future realized volatility of the SSE50 index returns (negative and asymmetric). But such a trading implication towards the stock market using the PCR could also interact with other derivatives markets especially those with identical underlying assets, and this motivates us to investigate more across different markets that may be related to the PCR.

4.3 Asymmetric VARX-MGARCH model

Results as shown above have revealed the significance and direction of the PCR to forecast the future realized volatility of the stock market. However, except for the stock market and option market, there is an index futures market with the same underlying asset (IH futures) in China. Comparing with the SSE50-ETF options, the index futures have a much longer history in China and therefore are more commonly used to hedge stock market risk. Therefore, to further examine the information in the PCR and the co-movements across different markets with the same underlying asset, we construct an asymmetric bivariate VARX-MGARCH model. And again, the PCR is separated into upper and lower parts to address possible asymmetric effect. The basis is also separated into positive and negative parts to take account of the asymmetric effects of lagged basis due to the short sale constraint of stocks in China as documented by Yang et al. (2012). Both of the basis and PCR are treated as independent variables and included in the conditional mean and variance functions. An optimal bivariate VARX(1)¹⁶ with the time series of daily returns of the index futures and spot index as the dependent vector, and with other variables as independent variables is constructed as the conditional mean function. And an multivariate GARCH(1, 1) model is constructed as the conditional variance function. Estimates are summarized in Table 8. Table 8 confirms the existence of the GARCH effects in both time series (daily returns of the stock index and index futures) and illustrates all four coefficients (g_{11} , g_{12} , g_{21} , g_{22}) related to the PCR asymmetry to be highly significant in the conditional variance function. These results prove the PCR to be highly significant in forecasting the conditional variances of both markets and in an asymmetric way. Specifically, coefficient estimates in Table 8 suggest an asymmetric V-shaped curve of relationship between the PCR and the conditional variances: the conditional variances of both markets (the stock and futures markets) increase as either the PCR goes up or goes down from its mean.

Table 8 Asymmetric VARX-MGARCH Model Estimation Results

	Coefficient	t-value
Mean Equation		
Γ_{11}	-0.188**	-2.201
Γ_{12}	0.210***	2.650
γ_1	0.356*	1.953
δ_1	-0.022	-0.461
η_1	0.422	0.497
θ_1	0.788	0.469
Γ_{21}	0.045	0.463
Γ_{22}	-0.057	-0.637
γ_2	0.250	1.199
δ_2	-0.084	-1.584
η_2	0.631	0.662
θ_2	1.085	0.610

¹⁶The lag order of VAR is determined based on the BIC.

Variance Equation		
a_{11}	0.297***	8.334
a_{22}	0.278***	9.002
b_{11}	0.943***	77.560
b_{22}	0.948***	98.300
f_{11}	-0.120	-0.965
f_{12}	-0.072	-1.203
g_{11}	0.790***	5.635
g_{12}	1.274***	4.774
f_{21}	-0.026	-0.196
f_{22}	-0.011	-0.177
g_{21}	0.891***	5.939
g_{22}	1.345***	4.825

Notes: This table reports results of Asymmetric VARX-MGARCH Model. t-statistics are computed based on robust standard errors (sandwich formula). One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level. To conserve the space, some less relevant parameter estimates (e.g. the constant) are omitted.

Table 9 Robustness Check

	First		Second	
	Coefficient	t-value	Coefficient	t-value
Mean Equation				
Γ_{11}	-0.287***	-3.260	-0.246***	-2.998
Γ_{12}	0.304***	3.520	0.264***	3.320
γ_1	0.351	1.348	0.359	1.433
δ_1	0.000	0.003	-0.001	-0.011
η_1	0.303	0.341	0.273	0.295
θ_1	0.870	0.498	1.024	0.598
Γ_{21}	-0.068	-0.708	-0.010	-0.108
Γ_{22}	0.056	0.586	-0.003	-0.029
γ_2	0.158	0.522	0.189	0.635
δ_2	-0.130*	-1.715	-0.101	-1.484
η_2	0.575	0.576	0.621	0.602
θ_2	1.056	0.571	1.186	0.648
Variance Equation				
a_{11}	0.289***	7.242	0.294***	7.031
a_{22}	0.283***	8.538	0.280***	7.991
b_{11}	0.948***	70.220	0.943***	65.510
b_{22}	0.948***	81.050	0.949***	81.700
f_{11}	0.174	1.319	0.219	1.302

f_{12}	0.140*	1.742	0.148*	1.955
g_{11}	0.722***	5.621	0.817***	5.306
g_{12}	1.064***	3.446	1.264***	4.606
f_{21}	0.090	0.626	0.122	0.661
f_{22}	0.091	1.083	0.088	1.148
g_{21}	0.856***	5.310	0.894***	5.193
g_{22}	1.240***	3.579	1.270***	3.853

Notes: This table reports results of robustness check. t-statistics are computed based on robust standard errors (sandwich formula). One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level. To conserve the space, some less relevant parameter estimates (e.g. the constant) are omitted.

Table 10 Results of Robustness Check with control variables

	Coefficient	t-value
Mean Equation		
Γ_{11}	-0.124	-1.370
Γ_{12}	0.179**	2.275
γ_1	-0.136	-0.538
δ_1	0.080	1.336
η_1	0.093	0.095
θ_1	2.984*	1.722
Dummy \times near maturity PCR -1	-0.470**	-1.994
$R_{-5,-1}^{-1}$	-0.057***	-3.283
Volume -1	0.007***	2.600
Γ_{21}	0.112	1.086
Γ_{22}	-0.092	-1.012
γ_2	-0.263	-0.916
δ_2	-0.026	-0.387
η_2	0.273	0.244
θ_2	3.325*	1.760
Dummy \times near maturity PCR -2	-0.478*	-1.907
$R_{-5,-1}^{-2}$	-0.052***	-2.782
Volume -2	0.007**	2.193
Variance Equation		
a_{11}	0.306***	8.157
a_{22}	0.283***	8.591
b_{11}	0.931***	54.850
b_{22}	0.938***	68.460
f_{11}	0.085	0.579
f_{12}	-0.069	-1.077
g_{11}	-0.343	-0.893
g_{12}	1.003**	2.249
Dummy \times near maturity PCR-1	0.181	0.762
$R_{-5,-1}^{-1}$	0.049	0.254
Volume -1	-0.036***	-2.852
f_{21}	-0.042	-0.271
f_{22}	0.014	0.202
g_{21}	-0.398	-0.905
g_{22}	1.074**	2.207

Dummy×near maturity PCR-2	0.093	0.512
R _{-5,-1-2}	0.051	0.253
Volume -2	-0.039***	-2.940

Notes: This table reports results of robustness check. t-statistics are computed based on robust standard errors (sandwich formula). One, two and three asterisks (*) respectively indicate the t-values are significant at the 0.1, 0.05 and 0.01 level. To conserve the space, some less relevant parameter estimates (e.g. the constant) are omitted.

In particular, because the values of g_{12} and g_{22} are larger than those of g_{11} and g_{21} (this is also robust and reinforced as suggested by Table 9 and 10), so the conditional variances are more sensitive to lower PCRs than otherwise (Figure 3 and 4). This further implies that smaller values of the PCR are forward-looking and they predict future wild swings in both the stock market and index futures market. This is consistent with the fact that the bearish condition in the Chinese stock market is much longer than otherwise (also documented by Yu, et al., 2017). In contrast to the US stock market as shown by the dotted line in Figure 5 where the bullish pattern dominates, the Chinese stock market has much longer (and more frequent) bearish periods than the bullish ones¹⁷. Because the momentum effect is much stronger during a bullish stock market while reversal dominates the bearish, so the call options are very much needed to cover (or speculate) the upside whilst investors tend to resort to index futures to hedge the downside. Therefore, put options are less often used¹⁸. And this is also reinforced by Figure 2, which suggests the PCR stays below 0.5 most of the time. In addition, Table 8 suggests the basis plays no role either in the conditional mean or variance based on daily frequency (by seeing coefficients of η , θ , and f are all insignificant in Table 8). And this is consistent with the studies by Kawaller, et al. (1987) and Yang, et al. (2012), which argue that the basis is important for the futures price to adjust toward a long-term equilibrium on intraday.

¹⁷ Nyberg (2013) shows that the average period of bull market is 37.17 months and the average period of bear market is 14.08 months in the US, while the corresponding counterparts in China are 15.25 months and 14.14 months, respectively.

¹⁸ There is another reason for the index option to be even less used to hedge the downside risk: the index futures market in China has a much longer trading history (since April 2010), therefore it has a much larger trading volume (62.7 billion yuan of all index futures and 1.02 million yuan of index options as of the date on September 28th, 2018), more tradable underlying indices (including SSE50), and is more widely participated. Hence, the index futures contracts are much often used for hedging than index options.

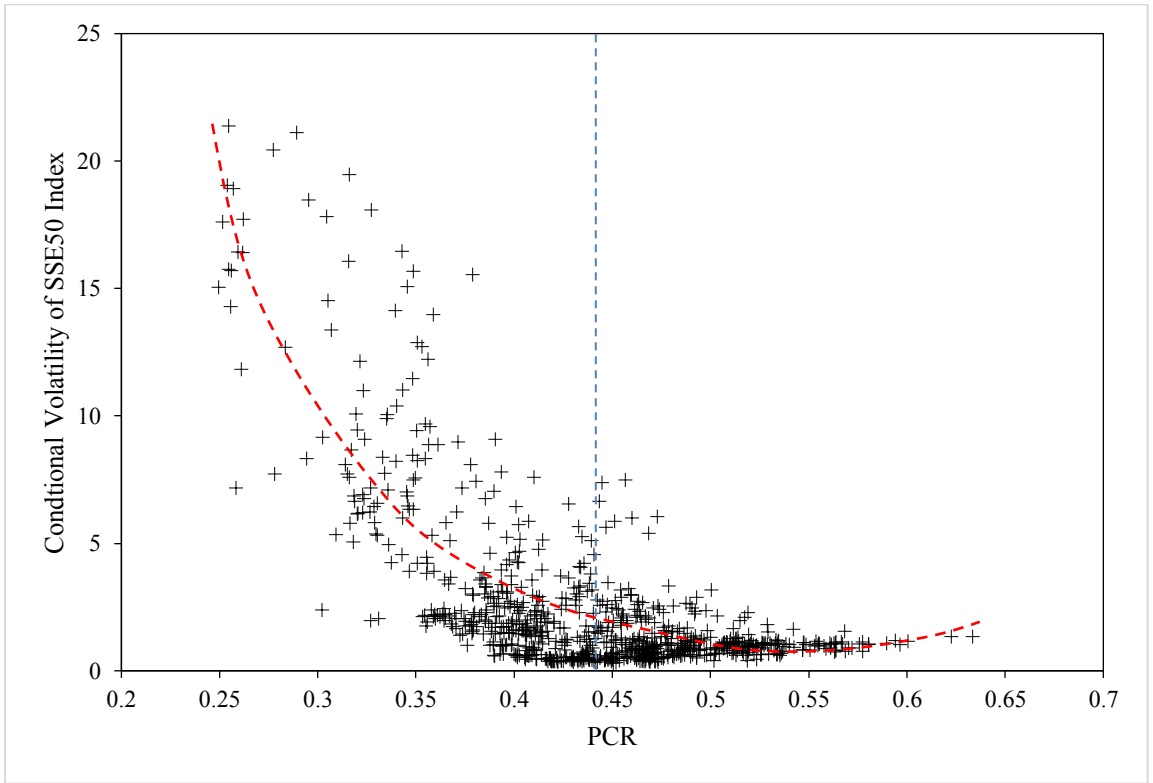


Figure 3: Relationship between PCRs and the SSE50 Index Conditional Volatility

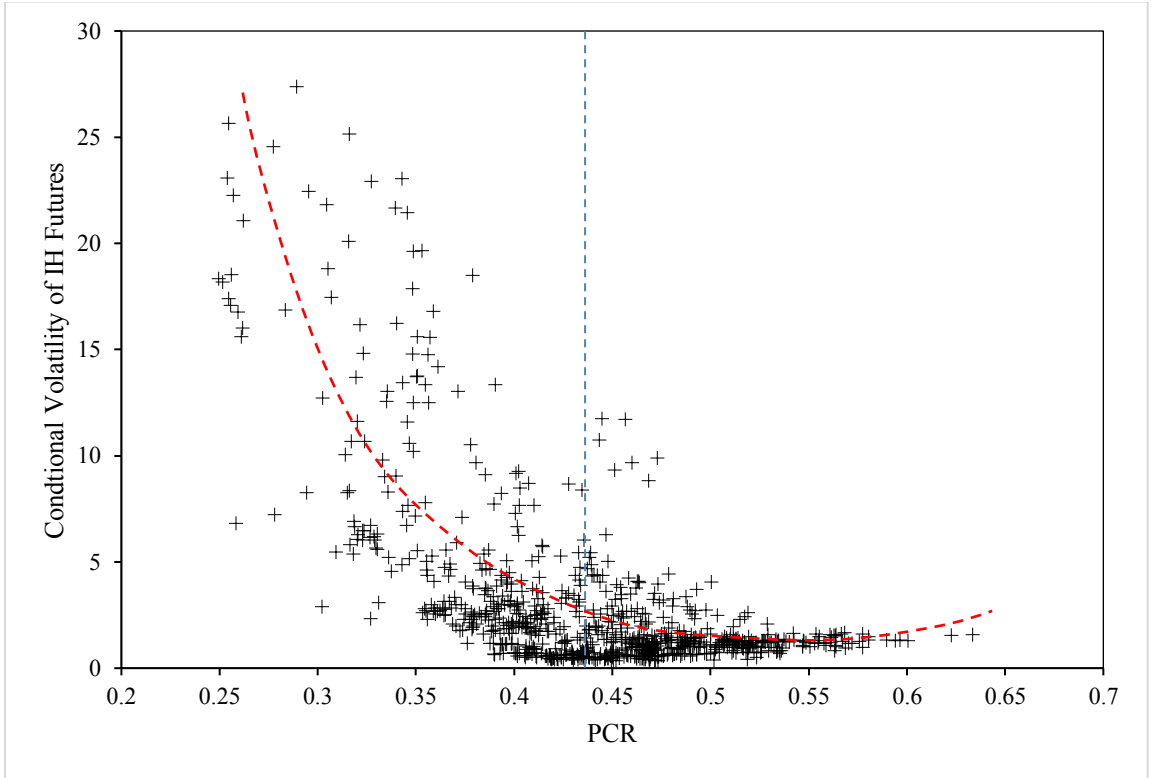


Figure 4: Relationship between PCRs and the IH Futures Conditional Volatility

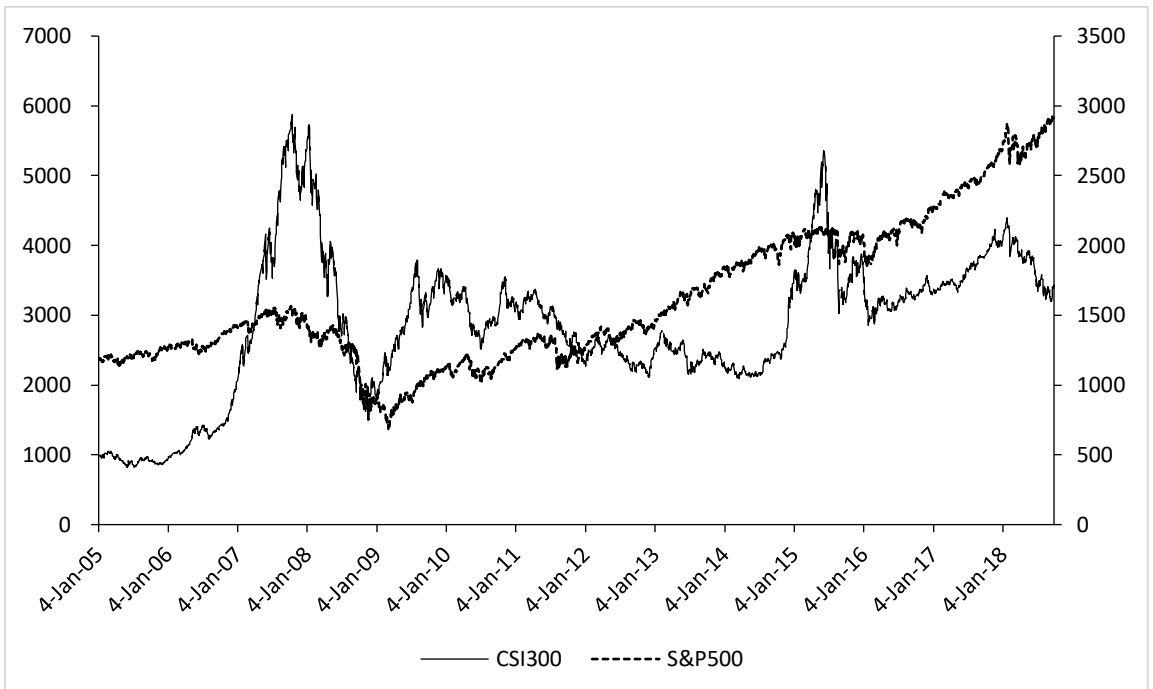
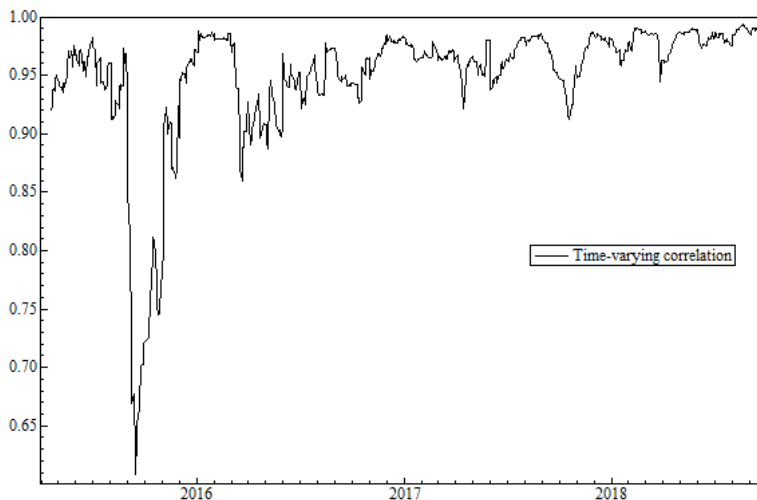


Figure 5: CSI300 and S&P500 index prices

Furthermore, to show the volatility linkage between the two markets, a time-varying conditional correlation is calculated and plotted in Figure 6. The high correlation across the two markets indicates an intensive co-movement. These findings are consistent with earlier studies (e.g. Chan et al., 1991, Yang et al., 2012). Figure 6 also suggests a large drop starting around mid-2015, which is consistent with a dramatic stock market correction, and especially with lots of strict restrictions on the index futures market¹⁹ during that time.



Note: The time-varying conditional correlation is computed as to gauge the volatility linkage across the spot and futures markets, where h_{11t} and h_{22t} are conditional variance of spot market and futures market, and h_{12t} is conditional covariance of the two.

Figure 6: Time-varying correlations across markets

Table 8, 9, and 10 all confirm η and θ , which stand for possible asymmetric effects of the PCR on the conditional mean, to be statistically insignificant. This supports our initial results that the PCR can hardly predict the direction of the stock index on daily basis and is then consistent with the results in Table 4.

4.4 Robustness Check of the VARX-MGARCH

To check the robustness of our model, we firstly re-construct other forms of continuous futures price series and re-estimate the VARX-MGARCH model. Specifically, we adopt two different methods: (1) The method of McMillan and Speight (2006): The nearest-to-maturity contract is always used, and switching to the next nearby contract when the trading volume in the second nearest contract exceeds that in the nearest-to-maturity contract; (2) The method of Chen and Gau (2009, 2010): the most actively traded nearest-to-maturity contract is used, and switching to the next nearby contract five days before the expiration date. Table 9 summarizes the estimates of the VARX-MGARCH models based on the newly constructed price series. Besides, two new plots of the dynamic conditional correlations are shown by Figure 7. All these robustness checks are

¹⁹During the market crash, there are many critics of the role of index futures arguing that the index futures market serves as a venue of speculative trading and exacerbates the spot market volatility. Therefore, the China Financial Futures Exchange (CFFEX) announced on August 25 that starting August 26, three measures would be adopted to curb speculative trading in the index futures market. First, the initial margin for non-hedging trades would be raised from 10% to 12%, 15%, and finally 40% over the following two weeks. Second, any single day non-hedging trading of over 10 contracts would be considered abnormal trade and be subject to scrutiny. Third, the clearing fees for intraday trades would be adjusted upward to 1.15 (soon adjusted to 23) basis points. With these drastic measures, the index futures trading in China nearly came to a complete stop. (Han and Liang, 2017)

consistent with our results as in Table 8.

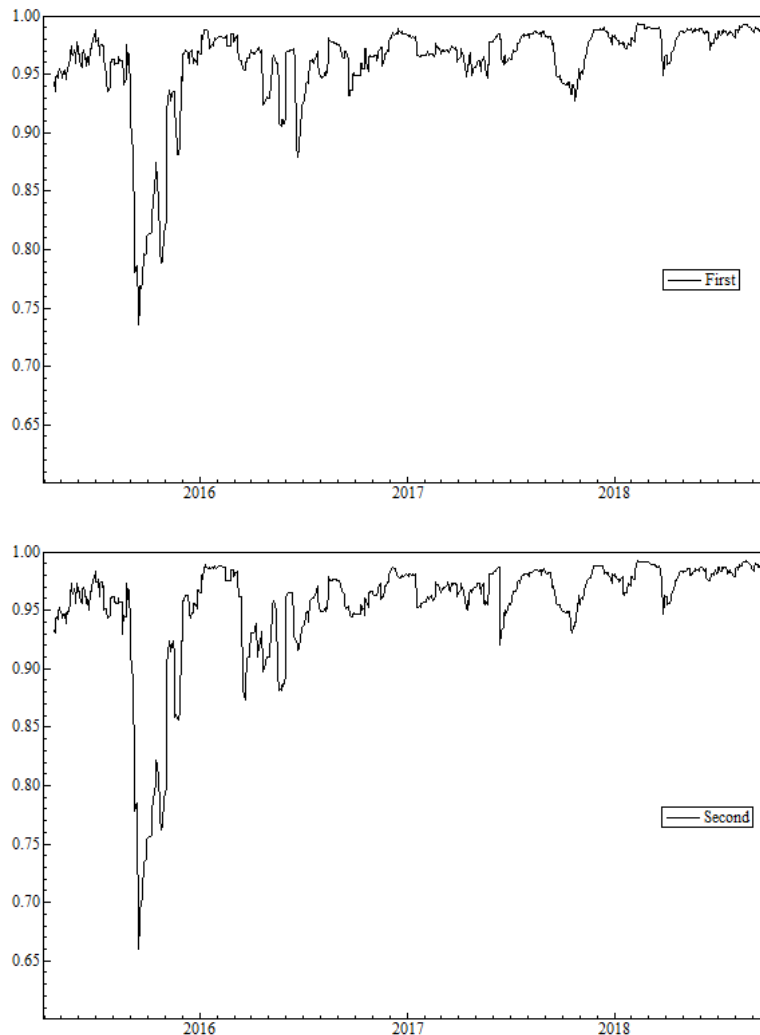


Figure 7: Robustness Check: Time-varying correlation across markets

Secondly, three control variables are then introduced to the VARX-MGARCH system. According to Chang et al. (2009), a maturity control (defined as an interaction term between a dummy variable and the near-maturity PCR) is added. The dummy variable takes the value 1 if there are one or more options about to expire on the next trading day; otherwise it is 0. And the near-maturity PCR is calculated by the options that will expire in the next trading day. For liquidity control, we choose the daily trading volume of the SSE50 index. For reversal and momentum control, we add in the past five-day SSE50 cumulative return, $R_{-5,-1}$. Table 10 shows the model estimation with the above control variables. Coefficient estimates suggest the robustness of the PCR asymmetry in the conditional variance equation that the PCR matters only when they are lower than its long-term average (by observing only g_{12} and g_{22} are significantly positive). Table 10 also shows that the trading volume of the SSE50 index plays a role in reducing the conditional variance of both markets.

5 Conclusions

This paper investigates the role of the put-call-ratio (PCR) implied by the SSE50-ETF option towards the forecast of the SSE-50 index and its futures. Empirical evidence indicates that the PCR predicts the conditional variance of the SSE50 return, but can hardly directly predict the SSE50 return. By using the univariate and multivariate models, we find no evidence that the daily PCRs of SSE50-ETF options can predict any direction of the SSE50 movements. These results are highly robust but different from past literature, and hence suggest a possible misuse of the PCR towards predicting the SSE-50 index return. Our results are also reinforced by detailed work on various control variables such as moneyness, maturity, etc.

This study also documents a robust, negative and asymmetric relationship between the PCR and the conditional variances of both stock index and index futures returns under a VARX-MGARCH model. Evidence shows that the PCR does forecast the conditional variances significantly but in an asymmetric way. Specifically, coefficient estimates suggest an asymmetric V-shaped curve: the conditional variances of the spot index and index futures returns both increase as the PCR either goes up or goes down from its long-term average, but more dramatically when the PCR goes down. These results imply that the PCRs of large deviations from its long-term average are informative and they predict future swings in both the stock market and futures market. Furthermore, low PCRs are more informative than the others. Our results are robust to moneyness, trading volumes, and different methods of building continuous futures price series.

To conclude, this study is among the very first research on the PCR implied by the SSE50-ETF options. Our results show different results from past literature exploiting information from the PCRs. Our research indicates the widely misuse of the PCR as a useful indicator in the Chinese financial market, and, instead, provides with a correct way of using it - to trade on volatility.

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Population Aging and Money Demand*

By WANG LEI AND ZHU TAIHUI*

Abstract: *This paper proposes the hypothesis that population aging could lead to higher demand for money. A testable implication is derived from this hypothesis on the basis of Friedman's money demand function, which is that the proportion of old-age population is negatively correlated with the velocity of money. The testable implication is verified with the cross section data of 204 countries and the time series data of the US. This paper's study provides a partial explanation for why the quantity theory of money appears ineffective in developed countries.*

Keywords: Money Demand; Population Aging; the Quantity Theory of Money

1. Introduction

Inflation is missing in developed countries, and this occurs despite the central banks have pumped enormous amount of money into the economy. This naturally leads to some economists to doubt whether the quantity theory of money is still effective, for instance, Teles *et al.* (2016).

This paper proposes the hypothesis that population aging could lead to higher demand for money. A testable implication is derived from this hypothesis on the basis of Friedman's money demand function, which is that the proportion of old-age population is negatively correlated with the velocity of money. This testable implication is verified with the cross section data of 204 countries and the time series data of the US. Higher demand, given money supply, would lead to lower inflation. This paper's study thus provides a partial explanation for why the quantity theory of money appears ineffective in developed countries.

In the literature, some empirical studies find a negative relationship between demographic change and inflation in developed countries, for instance, Bobeica *et al.* (2017). However, the explanation proposed focuses primarily on the supply side. For instance, Goodhart and Pradhan (2017) argue that the including of China and East Europe into the global economy imposes deflation pressure through increased competition. Though abundant evidence does support this argument, however, it is an incomplete story. As Friedman has convincingly argued, "inflation is always and everywhere a monetary phenomenon". Demographic change has impacts on money demand too, which is the central message of this paper.

The rest of this paper proceeds as follows. The next section constructs a simple model on the basis of Friedman's money demand function. The testable implication derived from this model is verified in section 3. The last section concludes.

2. The Hypothesis of Aging Leading to Higher Money Demand

It is consistent with our common sense that as people become older, other things being equal, their demand for money might increase. This might be due to that, first, older people face with more uncertainty. The natural law states that, the longer you live, the higher is the probability that some parts of your body would dysfunction. More uncertainty would require a larger stash of cash in case of emergence. Second, older people make financial planning for a shorter time span, therefore short term and more liquid assets, money included, would be preferred. Furthermore, other things are not equal. For one thing, older people in general accumulate more wealth than younger people. For another, young people are more comfortable with newer payment technologies, such as credit cards, PayPal, bitcoin, etc. All these factors lead to higher demand for

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money as people get older. Therefore, we propose the hypothesis that population aging would lead to higher demand for money.

If it is to be taken seriously, the micro-foundation for this hypothesis is required. Such a task will be postponed for future study. Instead, this paper explores the implication of the hypothesis on the basis of Friedman's money demand function, which is subsequently contrasted with real world data. This is, of course, an indirect way to verify the validation of the hypothesis.

The money demand function of Friedman (1956) can be expressed as:

$$M^d = f\left(P^+W, \bar{r}_x, \bar{\pi}^e, u\right) \quad (1)$$

where M^d is the demand for money of a typical individual, P is the nominal price level, W is the real lifetime wealth, r_x is a vector of returns of all kinds of assets which are the opportunity costs of holding money, π^e is the expected inflation rate, and u stands for all other factors that affect money demand. The positive and negative signs above the variables stand for their correlations with money demand.

Friedman (1956, p.10-11) argues that people make decisions based on real variables instead of nominal variables. Technically, this means that equation (1) is homogeneous of degree one with respect to P . That is, for any positive constant λ , we have:

$$\lambda M^d = \lambda f\left(P^+W, \bar{r}_x, \bar{\pi}^e, u\right) = f\left(\lambda P^+W, \bar{r}_x, \bar{\pi}^e, u\right) \quad (2)$$

The demand for money of a country can be divided into two parts: the demand from old age people (those who are 65 or more) and that from the young, which are denoted as M_O^d and M_Y^d respectively. Assume that the population is N_d and the proportion of old age people is α , then the total demand for money (TM^d) is

$$TM^d = [\alpha M_O^d + (1-\alpha)M_Y^d]N_d \quad (3)$$

Substituting equation (1) into equation (3), we can express the total money demand function as

$$TM^d = \left[\alpha f_1\left(P^+W_O, \bar{r}_x, \bar{\pi}^e, u\right) + (1-\alpha)f_2\left(P^+W_Y, \bar{r}_x, \bar{\pi}^e, u\right)\right]N_d \quad (4)$$

where W_O and W_Y denote the wealth of a typical old age and young people respectively.

According to the hypothesis, other things being equal, old age people prefer to hold money more than young people ($f_1(\cdot) > f_2(\cdot)$), and their lifetime wealth is larger ($W_O > W_Y$). Therefore, equation (4) states that a larger proportion of old age population (α) would lead to higher total money demand.

The hypothesis proposed above is difficult to be tested directly because demand is unobservable. However, Friedman (1959) provides a genius approach to test money demand. He argues that the velocity of money is observable, and in equilibrium, the demand for money is equivalent to the velocity of money.

Set $\lambda = \frac{1}{PY}$ for equation (4) and rearrange, we have:

$$\frac{TM^d}{PY} = \left[\alpha f_1\left(\frac{W_O^+}{Y}, \bar{r}_x, \bar{\pi}^e, u\right) + (1-\alpha)f_2\left(\frac{W_Y^+}{Y}, \bar{r}_x, \bar{\pi}^e, u\right)\right]N_d \quad (5)$$

The quantity equation of moneystates that $\frac{M}{PY} \equiv \frac{1}{V}$. Combining with the properties of equation (4), we can deduce from equation (5) the following testable implication: a larger proportion of old-age population would lead to lower velocity of money.

3. Empirical Tests

We verify the testable implication with two sets of data. The first is the crosssection data of 204 countries, the second the time series data of the US. The empirical test using the cross section data finds that countries with higher proportion of old age people tend to have lower velocity of money. The empirical test using American time series data discovers that there is long run equilibrium between the velocity of money and population aging, and the two are negatively correlated. Considering the fact that population aging is exogenous to money demand, the empirical finding is best interpreted as this one way causality: population aging causes higher money demand.

Cross Section Data

The World Bank publishes data of its member countries on the proportion of people aged 65 or more over the total population and M2/GDP. In practice, GDP/M2, the inverse of M2/GDP, is used to measure the velocity of money. To ensure it is a long run relationship, we use the mean over the latest decade (2009-2019) of the proportion of old age people to measure population aging, and that of GDP/M2 to measure the velocity of money, and the data for 204 countries are obtained. The regression results are reported in table 1, which show that a country with a higher proportion of old age people tends to have lower velocity of money. This finding is consistent with the testable implication.

Table 1. Cross Section Data Regression Results

	c	Proportion of old age population	Adjusted R^2	S.E. of Regression
velocity of money	3.08 (20.91**)	-0.13 (-7.43**)	0.21	1.18

Notes: the dependent variable is the velocity of money, c is the constant and the independent variable is the proportion of old age people. The numbers reported in parenthesis are of t statistics. ** stands for significant at 5%, and * stands for significant at 10%.

Time Series Data

The time series data of the US are of four variables: the velocity of money v_t (measured by GDP/M2), the proportion of old age people α_t , and interest rate r_t (measured by the yields of 3-month treasury bills); the fourth variable, wealth W_t , is measured by Friedman's (1957, p.143-7) proxy measurement of permanent income. Specifically, wealth is defined as

$$W_t = \beta GDP_t + (1 - \beta + \alpha)W_{t-1}$$

where $\beta = 0.4$ and $\alpha = 0.02$ as estimated by Friedman.

The results of the ADF tests of the four series are reported in table 2.

Table 2. The Results of the ADF Tests

		W_t		r_t	
D(0)	D(1)	D(0)	D(0)	D(0)	D(1)
1.67	6.15	8.10	3.45	1.51	6.54

(0.75)	(0.00**)	(0.00**)	(0.01**)	(0.51)	(0.00**)
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Notes: The data of v_t and α_t are from the World Bank, the data of W_t and r_t are from FRED (<https://fred.stlouisfed.org/>). Data range: 1960-2019. D(0) stands for the level data and D(1) the first differenced data. The numbers reported in parenthesis are of p values.

The ADF test results suggest that the series of W_t and α_t are stationary, whereas the series of v_t and r_t are integrated of order 1. We can thus construct an ARDL (autoregressive distributed lag) model of the following form:

$$v_t = c + \sum_{i=1}^p \beta_i v_{t-i} + \sum_{j=0}^{q_1} \gamma_j \alpha_{t-j} + \sum_{k=0}^{q_2} \delta_k W_{t-k} + \sum_{n=0}^{q_3} \chi_n r_{t-n} + \varepsilon_t \quad (6)$$

Table 4. Estimation of the ARDL(4, 1, 0, 1) Model

c	v_{t-1}	v_{t-2}	v_{t-3}	v_{t-4}	α_t	α_{t-1}
1.25 (5.53**)	0.72 (5.67**)	0.04 (0.26)	-0.09 (0.57)	-0.26 (2.13**)	-0.60 (5.61**)	0.63 (5.63)
W_t	r_t	r_{t-1}	LM Test	F-bounds Test	Adjusted R ²	S.E. of Regression
-0.19 (4.57**)	0.01 (3.06**)	-0.02 (4.44**)	0.52 (0.72)	7.43	0.95	0.05

Notes: the dependent variable is v_t . The numbers reported in the parenthesis are of t statistics; the number in the parenthesis under LM Test is of p-value.

To estimate equation (6), the Schwartz criterion is employed to choose the lagged orders, and the results are $p = 4$, $q_1 = 1$, $q_2 = 0$ and $q_3 = 1$. The estimation results are reported in table 4. The F-statistics of the LM test suggests there is no autocorrelation in the regression residuals. The F-bounds test suggests that there is cointegration among these variables. It thus can be concluded that there is long run equilibrium among these four variables.

Table 5. Regression Results of the Long Run Equilibrium

c	α_t	W_t	r_t	Adjusted R ²	S.E. of Regression
2.07 (16.19**)	-0.08 (3.21**)	0.04 (0.57)	0.01 (2.17**)	0.52	0.11

Notes: the dependent variable is v_t .

Table 5 reports the regression results of the long run equilibrium, from which it is clear that the proportion of old age people (α_t) is negatively correlated with the velocity of money (v_t), and it is statistically significant. This is consistent with the testable implication.

Table 6. Regression Results of the ECM

c	Δv_{t-1}	Δv_{t-2}	Δv_{t-3}	Δv_{t-4}	$\Delta \alpha_t$	$\Delta \alpha_{t-1}$
0.03 (1.06)	0.29 (1.92*)	0.26 (1.73*)	0.07 (0.45)	0.03 (0.20)	-0.53 (1.41)	0.43 (1.13)
ΔW_t	Δr_t	Δr_{t-1}	ect_{t-1}	Adjusted R ²	S.E. of Regression	
-0.72	0.02	-0.01	-0.22	0.19	0.04	

(0.91) (3.49**) (2.52**) (1.96*)

Notes: The dependent variable is Δv_t . Δ stands for differencing; *ect* is the error correction terms, which are the regression residuals of the regression of the long run equilibrium, as reported in table 5.

Finally, we check whether the long run equilibrium is stable. The estimation results of the corresponding error correction model (ECM), reported in table 6, show that the coefficient of the error correction terms is negative, and the estimation is statistically significant, which suggests that the long run equilibrium is stable.

4. Concluding Remarks

The missing inflation in developed countries is puzzling. The theories proposed, such as the globalization hypothesis, put too much weight on the supply side. But inflation is ultimately a monetary phenomenon. As the supply of money is relatively stable, research would gain more to unravel this puzzle by shifting focus on factors affecting money demand. One of such factors is population aging. We hope this paper could stimulate more rigorous empirical and theoretical studies of the structural changes of money demand in developed countries since the 1980s.

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