

Summary of Proceedings
6th Asian Monetary Policy Forum (AMPF)

“I argued that for the world economy to be stable, it needs a stabilizer, some country that would undertake to provide a market for distress goods, a steady if not countercyclical flow of capital, and a rediscount mechanism for providing liquidity when the monetary system is frozen in panic ... Britain, with frequent assistance from France, furnished coherence to the world economy along these lines during the 19th century and through the “belle époque”. The United States did so from 1945 (or perhaps 1936) to 1968 (or 1963 or 1971).”

Charles P. Kindleberger (1981)

The 6th Asian Monetary Policy Forum was held on 31 May 2019 at the MAS Building, Singapore. It was convened under the auspices of the Asian Bureau of Finance and Economic Research (ABFER), with support from the University of Chicago Booth School of Business, the National University of Singapore Business School and the Monetary Authority of Singapore (MAS). The Forum brought together central bankers, academics and private sector analysts to share perspectives on pressing monetary policy issues in Asia. This year’s deliberations revolved around several themes: (1) the dominant role of the US dollar in the global economy and its implications for Asian policymakers; (2) the challenges to central banks and governments in a low interest rate environment; and (3) the challenges posed by the advent of digital currencies.

Joint ABFER/AMPF Dinner

The forum officially opened with a joint ABFER/AMPF dinner on the day before the proceedings. Sir Paul Tucker, Chair of the Systemic Risk Council and Senior Fellow at the Center for European Studies at Harvard University, delivered a speech on “The International Monetary and Financial System in the Face of Shifting Geopolitics.” In his speech, Sir Paul highlighted that the international monetary order is intricately intertwined with geopolitics, which in turn plays back into the domestic economic policies and politics of the

anchor currency country. We are in one of those phases of history when economic and foreign policies converge, and the global economic order could well be reshaped as a result.

Much has changed in the wake of the 2007–09 Global Financial Crisis which ushered in new geopolitics, transforming the international monetary and financial system. Indeed, the future of the system will be determined by geopolitical dynamics and although it is hard to make predictions about the future, Sir Paul sketched four broad possibilities: (i) a dollar system under a modified Washington consensus; (ii) a multipolar world of checks and balances; (iii) rival reserve currencies in a tense world; and (iv) protectionism and autarky. Each of these four scenarios has important implications for policymakers at central banks as well as the IMF.

In the first scenario, a dollar system with continued dollar centrality is most likely provided that the US economy continues to perform well and the US exercises its power prudently, through avoiding major boom-bust cycles and ensuring sustainability in long-run fiscal and external balances. With continued dollar centrality, the IMF is likely to continue functioning as in the status quo.

The second scenario is a world with a number of countries at the “top table”, which could include India, Indonesia, Brazil and others. This is a world where the role of the dollar might be sustained as a matter of choice by the other economic powers. Some adjustments in the rules of the game for the international monetary and financial system would be necessary, such as the rotation of leadership at international institutions. This scenario involves a transition to a structure where no country would have a veto in the IMF, making it less of an instrument of one country’s foreign policy. By the same token, the IMF, while remains as a lender of last resort to central banks, is less likely to intervene to provide support to countries when they face difficulties, thus compelling them to seek greater self-insurance.

The third scenario of rival reserve currencies in a tense world is a multipolar setup where a single numeraire and common medium of exchange for international economic activities unravel. This is a world where two economic superpowers compete economically and politically. The dollar’s status would be reduced, currency politics become even more intertwined with territorial politics, and finance would be at risk of being weaponised. The main currency issuers would reward allies with currency swap lines, which turn into an instrument of foreign policy.

The last scenario is one of a global retreat into economic and financial protectionism, even autarky. With the great powers struggling for strategic and military supremacy, the world would be a dangerous and

impoverished place. The international monetary and financial system would fragment and segment. In the event that macroprudential measures could not insulate small open economies from extremely volatile capital flows, administrative controls become an option.

Opening Remarks

In the morning of 31 May, MAS Deputy Managing Director (Economic Policy) and Chief Economist Edward Robinson initiated the AMPF 2019 proceedings with a review of past fora and the agenda for the day. He noted that the themes over the past five years have centred on perennial concerns with capital flows and domestic monetary policy autonomy. The inaugural 2014 commissioned paper, by Maurice Obstfeld, was on trilemmas and trade-offs, with the key takeaway being that globalisation places some limits on monetary policy autonomy, even with flexible exchange rates. Olivier Blanchard in AMPF 2016 concluded that, if constraints on fiscal policy are binding, and the room for international policy coordination is limited, then judicious capital flow management measures (CFMs) can bring about a welfare-improving outcome. Jeffrey Frankel argued the following year that central banks can intervene effectively in foreign exchange markets to dampen fluctuations in the real exchange rate caused by external shocks by way of “systematic managed floating”. Focusing the spotlight on market structure, Barry Eichengreen at AMPF 2015 argued that governments in Asia can help develop the securities markets, especially bond markets, which would allow these economies to reap efficiency gains from cross-border market integration. Last year, Hyun Song Shin rigorously examined the changing circuitry of cross-border capital flows, including the build-up of vulnerabilities associated with the procyclicality of banks’ balance sheets.

As regards the present global economic conjuncture, the Chief Economist noted that the synchronised global expansion a year or two ago has waned and a significant step-down in activity became apparent by Q4 2018, with the weakness persisting into Q1 this year. He observed that in a global environment characterised by an excess supply of uncertainty around the tyranny of suspended risks – including but not limited to unresolved trade tensions – business cycles appeared to have shortened and the path of monetary policy normalisation has become more unpredictable. Through these vagaries, inflation has remained uncharacteristically low in many parts of the world.

Keynote Address

Against this backdrop, Dr Philipp Hildebrand, Vice Chairman of BlackRock Inc., offered three viewpoints in his opening address. First, central banks and governments currently may not have a proper, robust framework to deal with the next recession. Doing more of the same – as in the actions undertaken in the aftermath of the Global Financial Crisis – may not be enough. In particular, forward guidance and unconventional monetary policy work mainly by depressing long-term rates and through the portfolio rebalancing channel. However, in the present environment, long-term rates are already very low; indeed, approximately 45% of global bonds are now trading with negative yields. Current proposals for a change to the monetary policy framework centred around price level targeting or average inflation targeting. But these are no more than make-up strategies that would not be sufficient to address the key challenge for policymakers: how to obtain policy traction when rates are near the zero lower bound? Therefore, while interesting, these proposals represent more of the same and are likely to be insufficient in countering the next downturn.

Second, future countercyclical policy measures will likely blur the distinction between monetary policy and fiscal policy. Any new set of measures will need to have a more direct channel on economic activity in order to be effective, by-passing essentially the interest rate channel and forward guidance. In Dr Hildebrand's view, given the low interest rate and low inflation rate environment, we may require a more aggressive form of quantitative easing that will directly channel resources onto real spending and investment. Helicopter money is the extreme next step but would require central banks to put money directly in the hands of the people. Such policies will blur the lines between monetary and fiscal policy, raising important and challenging questions about governance and central bank independence. One way to circumvent this conundrum is to have explicit coordination between these two types of policies, but this is not likely to be trivial in practice and could still call into question the independence of central banks.

Another extreme option would be to recognise openly that the current deficiency of aggregate demand is ultimately a fiscal issue and the central bank should simply not get involved. In this regard, as long as the interest rate r is lower than the growth rate g , there is room for expansionary fiscal policy to do the heavy lifting without significantly undermining debt sustainability. But the period during which r would be less than g would not last forever. At some point, a high debt level would put pressure on interest rates. Central banks may then be tasked to ensure that r stays below g . In any case, it is difficult to envisage that fiscal policy can

be deployed in a timely and effective manner to address the situations that would arise during a severe downturn or recession. As such, it may be difficult in practice for the central bank to step aside and simply let the fiscal authorities do the heavy lifting.

Third, we cannot assume that central banks would remain insulated from political influence. This implies that they have to pay even more attention to the distributional impact of policy choices and explain their policies more clearly to the public. Any form of helicopter money or the action of putting money directly into the hands of the people, as opposed to owners of specific assets, would still be considered to be a form of quantitative easing. While technological and digital innovation may provide an opportunity to smoothly administer such a new policy tool, this option is not straightforward and would certainly be unprecedented. If central banks fail to communicate clearly the social and distributional implications of their policies, they can be made a scapegoat for political discontent, which could jeopardise their independence.

In conclusion, Dr Hildebrand opined that central banks are at a critical juncture in which they face unprecedented challenges to the way they operate. In addition, elevated debt levels are an important concern in Asia, constraining the ability of the regional economies to respond effectively in the next downturn. In the event of a global recession, Asia may not be able to provide the same level of support as seen during the Global Financial Crisis. Given the vulnerability of the western economies despite a decade of recovery and the current constraints on monetary policy in the US and Europe, policymakers in Asia should put economic resilience at the top of their policy agenda.

AMPF Commissioned Paper

Taking an expansive view of the international monetary system, this year's commissioned paper by Pierre-Olivier Gourinchas from the University of California, Berkeley explored the implications arising from the US dollar as a "hegemon" currency, emanating from its widespread use and role as global reserve currency. In his presentation titled "The Dollar Hegemon? Evidence and Implications for Policy Makers", Professor Gourinchas first reviewed the dominance of the US dollar in global trade, finance and the international monetary system and proposes an explanation based on the growing complementarities between these roles. He began by summarising the substantial body of research in recent years that has documented the pervasiveness of dollar usage in the global sphere. On the real side, global trade is invoiced in US dollars; on

the financial side, a significant portion of cross-border financial flows and securities issuances are denominated in dollars. On the policy side, monetary authorities anchor their currencies to the dollar more than any other currencies, and their holdings of international reserves are largely in dollars. Hence, the dollar has become the “hegemon” currency and the world informally remains a dollar standard.

Indeed, the extent to which we live in a dollar world is greater today than it has ever been in the past, including the Bretton Woods era when the dollar was formally at the centre of the international monetary system. On the real side, Gopinath (2016) reports that the dollar’s share as an invoicing currency is about 4.7 times the share of US goods in imports, and about 3.1 times its share in world exports. For most countries, more than 50% of their imports and exports are invoiced in dollars even though the actual volume of trade involving the US is much smaller. There is evidence that dollar invoicing is a practical outcome, given strong network externalities. For the EU countries, although the euro is used for trade within Europe, trade outside of the EU is mostly invoiced in dollars. The currency of invoicing matters because prices tend to be sticky and are not revised frequently.

On the financial side, the dollar is often used for short-term investment needs as they are among the safest instruments available.¹ But, the dollar popularity goes beyond that. Using disaggregated data on international mutual fund positions, Maggiori *et al.* (2018) show that while investors prefer home currency instruments issued at home, they choose securities issued in the dollar when investing abroad. Thus, for example, when Canadian borrowers issue bonds to non-residents, their bonds are denominated mostly in the US dollar. Another striking fact in recent years is the sharp increase in the amount of non-US resident dollar borrowing. Bank loans and international debt securities issued by non-residents in US dollar as a share of global output has doubled from around 7% in 2000 to about 14% last year.

On the policy side, when comparing the world of 1950 and 2015, Ilzetzki *et al.* (2019) document the considerable rise of the dollar zone. According to them, until 1970, only about 30% of countries were anchored to the dollar. The remainder was divided between the UK pound, French franc and Soviet ruble. However, by 2015, the dollar zone had expanded intensely. There is very strong evidence that many countries have moved towards anchoring their currencies *vis-à-vis* the US dollar even after the demise of Bretton Woods. The anchor currency naturally determines the reserve currency, i.e., the currency in which most of the world’s

¹ A safe asset is a simple debt instrument that is expected to preserve its value during adverse systemic events.

official reserves are held. Gourinchas *et al.* (2019) report on the distribution of central bank reserves by currency over time and confirm that US dollar reserves essentially outweighed reserves held in euros and other currencies.

The dominance of the dollar in invoicing and payments, in financing, and as a currency anchor is a mutually-reinforcing phenomenon. On the real side, in a world with dollar pricing, a change in the exchange rate does not affect the relative prices of imports and exports, but a change in the exchange rate vis-à-vis the dollar affects the price of residents' consumption basket. Central banks will therefore focus more on stabilising the consumption basket's price and thus aim to reduce dollar-vs-home currency exchange rate volatility. As a result, an increase in trade invoicing in dollars incentivises central banks to anchor their currencies against the dollar. Conversely, the more central banks anchor to the dollar, the more desirable it is for trade to be invoiced in the dollar. Furthermore, in the private sector, if the dollar is the currency of determination in cashflows, borrowing will be anchored to the dollar to limit the impact of currency fluctuations on the balance sheet. Thus, there are important complementarities between the different roles of the dollar as a unit of account, means of payment and store of value. Non-financial corporations' dollar debt or local banks' dollar based funding further reinforces central banks' need to monitor the dollar exchange rate, intervene on currency markets or accumulate more dollar reserves (Gopinath and Stein, 2018).

These mutually reinforcing factors enhance the global dominance of the US dollar. Professor Gourinchas illustrates the global pattern using countries in Asia: they all started anchoring to the dollar during or in the immediate aftermath of the Bretton Woods collapse, i.e. between 1969 and Mar 1973, by tying their currencies to the dollar when it began to float freely.

There are four implications for policymakers living in a dollar world. The first focuses on how dollar invoicing affects the pass-through of exchange rates to domestic prices and the terms-of-trade. The second implication is on the impact of US monetary policies on other countries' monetary policies and output. The third implication concerns the desirability of flexible exchange rates in the "trilemma versus dilemma" debate, which is intimately related to financial spillovers of a change in the dollar value across economies via dollar based financing. The final implication is the challenge posed by the dollar standard for the scarcity of global safe assets and the stability of the international financial system.

The US dollar invoicing gives rise to a new paradigm – dominant currency pricing (DCP). Traditional economic thinking is that exports are priced in exporters' currencies and thus bilateral exchange rate changes

affect the relative prices of imports and exports. However, in practice trade is often invoiced in a small number of dominant currencies such as the US dollar. Under DCP, a nominal depreciation of a bilateral exchange rate has no effect on the terms-of-trade. Examining the determinants of import prices and import quantities, Gopinath *et al.* (2019) confirm that the bilateral exchange rate between exporting and importing countries has almost insignificant explanatory power once the regressions are controlled for the dollar-home-currency exchange rate. The results suggest that some expenditure switching still operates, but mostly through the dollar exchange rate, and the magnitude is less than if exports were priced in exporters' currencies (PCP). Under DCP, changes in bilateral exchange rates lead to little expenditure switching as they do not affect the home currency prices of either imports or exports, which are priced in the dollar. However, a unilateral depreciation of the domestic currency against all currencies (including the US dollar) will quickly pass-through into the domestic prices of imported goods but has very little impact on export volumes. Thus, the trade balance is improved mostly through a fall in imports.

An important implication from these findings is that the local monetary authorities will face a more adverse inflation-output trade-off under DCP than under PCP. In a theoretical simulation, Gopinath *et al.* (2018) show that an expansionary monetary policy is typically translated into a decline in interest rates and depreciation of the nominal exchange rate. However, its implications for inflation and output dynamics vary according to the assumed price regime. Under both DCP and PCP, a depreciation leads to an increase in the price of imports and consumer price inflation. However, under DCP, unlike under PCP, the depreciation does not enhance exports and thus has little effect on output. In summary, in a world of dollar invoicing, the advantages of flexible exchange rates are reduced. Insofar as the local monetary authorities are concerned, a stable dollar exchange rate is more desirable.

The second implication concerns the dollar and global trade. Intuitively, US monetary policy matters more the larger the portion of trade invoiced in dollars. Gopinath *et al.* (2018) show the simulated impact of a US monetary contraction in a three-country model with DCP. Under PCP, a contractionary US monetary policy appreciates the dollar, reduces US output and lowers US inflation. Under DCP, when the US dollar appreciates, the impact on US price changes is limited but non-US countries' import prices rise. To counter the inflation, foreign central banks tighten their monetary policies. If that happens, a contractionary monetary policy in the US triggers a reduction in global output and trade. (On the contrary, the conventional wisdom is that an appreciation of the dollar will expand output abroad through expenditure switching effects.)

The third implication focuses on the desirability of exchange rate flexibility in the trilemma versus dilemma debate. According to the open economy trilemma, it is impossible for a central bank to have a fixed exchange rate, free capital mobility and an independent monetary policy simultaneously; the central bank has to forgo one of the three. However, in 2013, a celebrated contribution by H el ene Rey suggested that there is a global financial cycle in capital flows, asset prices and credit growth. When capital is freely mobile, the global financial cycle restricts the room for monetary policy autonomy regardless of the exchange rate regime, reducing the desirability of flexible exchange rates and turning the classical trilemma into a dilemma. Yet, Gourinchas (2018) argued that in an environment with financial spillovers, flexible exchange rates may become more, not less, desirable.

The argument runs as follows. A US monetary tightening raises the financial burden of a US dollar borrower (a balance sheet effect) and thus can be contractionary for her and for her country as well if many in her country borrow in US dollar too. The logical countering response for the borrower's country is to loosen monetary policy. Hence, exchange rate flexibility is desirable. However, the degree of financial spillovers is a modulating factor. To illustrate, Gourinchas (2018) constructed a Neo-Keynesian model calibrated to Chile with DCP and financial spillovers. The simulated impulse responses from a rise in US interest rates show that when financial spillovers are low, a US monetary policy tightening is expansionary in a small open economy due to the latter's currency depreciation against the dollar and the resultant positive trade effect. However, when the degree of financial spillovers are at the moderate or high levels, a US monetary tightening raises the financial burdens of a small open economy, which may even hurt the economy if this financial spillover effect is large. It follows that when financial spillovers are low, a local monetary policy tightening is contractionary because the home currency appreciates; with higher levels of financial spillovers, the same appreciation relaxes the financial constraints on the dollar borrowers, which moderates the contractionary effect. The conclusion is that even though dollar invoicing and financial spillovers reduce the effectiveness of flexible exchange rates, they do not necessarily make the latter less desirable in emerging market economies; the Trilemma may be reinforced instead of weakened by global financial cycle, depending on financial spillovers from the exchange rate and on the transmission of US and local monetary policies.

Finally, the dollar standard has implications for the stability of the international monetary and financial system. The transition to a dollar standard has put the onus on the US for the supply of global safe assets. However, Caballero *et al.* (2017) have identified a number of factors that could contribute to the scarcity of

global safe assets. These include a rise in capital mobility, more rapid economic growth in emerging market economies – China in particular – ahead of their level of financial development, and new regulatory changes for banks and insurance companies in the wake of the Global Financial Crisis². The relative scarcity of safe assets is consistent with one of the main macroeconomic phenomena of the past few decades – the secular decline in global real interest rates since the early 1980s. The real safe return dropped by about 6% points between 1980 and 2016 whereas the real return on productive physical capital remained largely unchanged. The result is a growing divergence between the safe real interest rate or the so-called “risk-free” real rate and the rate of return on productive physical capital.

Caballero *et al.* (2016) argue that the scarcity of safe assets mutates once the economy reaches the effective lower bound (ELB) interest rate. Generally, central banks can offset output gaps by lowering interest rates. But this can only happen within a range – above the ELB, the scarcity is benign: a country that has a shortage of safe assets will run a current account surplus *vis-à-vis* its safe asset counterpart. As domestic residents’ holding of foreign assets increases, it will exert a downward pressure on the real rate of return on safe assets. With the supply of safe assets not keeping up with global demand, the immediate implication is that global real safe rates will fall closer to the ELB. An acute scarcity of safe assets creates a situation similar to a liquidity trap, which is dubbed a *safety trap* (Caballero *et al.* 2017). At the ELB, the scarcity becomes malign: since the equilibrium real rate cannot fall any further to equilibrate the market for safe assets, monetary policy reaches its limit and global output becomes the only adjustment variable. Aggregate demand falls below potential output, and the global economy enters into a recession.

In short, when markets cannot be cleared via prices, they will be cleared via changes in quantities. Under this environment, countries will be tempted to depreciate their currency at the expense of their neighbours. Devaluations become “beggar-thy-neighbour” policies as countries gain output and employment only at the expense of others. As a result, currency wars and trade wars are much more likely to break out. Any self-oriented policies such as fiscal austerity, reserve accumulation or stricter liquidity requirement in the banking sector, which are deemed appropriate at the country level, may be self-defeating globally as they

² In particular, the collective growth of the advanced economies that produced safe assets has been lower than the world’s growth rate. If demand for safe assets is proportional to global output, the shortage of safe assets is unavoidable.

would further increase the global demand for safe assets. To date, the scarcity of safe assets remains a key source of vulnerability for the global economy.

The concerns identified above seem unlikely to reverse anytime soon. In the short to medium term, the global factors supporting the dominance of the dollar are strong and there is little risk of the dollar being displaced. However, in the very long run, there is a greater chance that the dollar's pre-eminent position will be eroded. This is because the share of US output in world output is declining and is expected to decline further. According to projections by the *International Monetary Fund*, the share of the US economy will fall from 15.5% of world GDP in 2016 to 13.7% in 2024. This secular decline in the relative size of the US economy implies that even though the dollar hegemon is locally stable, it is not sustainable. The global economy will transit either to another single anchor or to a multipolar environment, with the former being much less likely than the latter since no one would expect a full displacement of the dollar. The most likely outcome is thus one where the dollar co-exists with one or two other international currencies. This may happen more rapidly than we think, as the world may already be in a shadow RMB era.

In his discussion of Gourinchas' paper, Ricardo Caballero, Ford International Professor of Economics at the Massachusetts Institute of Technology, agreed with the central role of the US dollar, but thought that a clearer distinction should be made between the safe asset role played by US Treasuries, as opposed to the fact that they are denominated in US dollars. Caballero pointed to recent research which showed that it is the increase in the convenience yield³ enjoyed by US Treasuries that leads to the violation of uncovered interest rate parity and causes an appreciation of the dollar; that is, the greater than anticipated rise in demand for US Treasuries (perhaps during global risk-on moments) drove the US dollar appreciation. In Caballero's view, the currency of denomination of a bond is not really informative about whether investors have confidence in the currency as a store of value but the underlying safety.

The second discussant, Dr Gian Maria Milesi Ferretti, Deputy Director of the Research Department at the *International Monetary Fund*, observed that the rise in the dominance of the dollar after the Global Financial Crisis was in part a reflection of the diminished global role played by the euro, itself a consequence of the Eurozone sovereign debt crisis. In contrast, the US economy has done remarkably better, as reflected

³ The lower return offered by US Treasuries against comparable risk-free assets is the "convenience yield" which stems from the high liquidity (and thus low transaction cost) of the US Treasuries market, the thickest and the most well organized in the world.

in asset prices and US dollar valuation. He pointed out that foreign demand of a country's government-issued securities depended on a number of factors, including capital market size, level of economic development and financial openness – not just on the reserve currency status of a country. As governance and institutional standards in emerging economies improved, monetary policy frameworks strengthened and inflation brought under control, he noted that many emerging economies' borrowers are now able to issue debt to foreigners in their own respective domestic currencies, in contrast to the situation a decade or two ago. In recent years, foreign holdings of US Treasuries have in fact declined. Dr Milesi Ferretti nonetheless agreed with Gourinchas' view on the usefulness of exchange rate flexibility for emerging economies. Finally, he queried the purported negative relationship between the appreciation of the dollar and global trade, and made the observation that both the dollar value and global trade were driven by many factors. Empirically, over the period 1981–2018, he could not detect any strong relationship between movements in the dollar and global trade.

In his response to the discussants, Professor Gourinchas acknowledged the importance of making a distinction between investment in US Treasuries versus the dollar. He noted that this is a limitation of the model employed in the study. A further refinement could involve a clearer separation between the role of US Treasuries as a store of value and the dollar as a unit of account. He also agreed with Dr Milesi Ferretti's observation that the correlation between the dollar and global trade does not imply causation.

(There was a closed-door AMPF Dialogue after lunch)

Policy Note

The final session of the AMPF, the Policy Note, was devoted to the challenges posed by digital currencies to central banks and the existing banking system. The discussion was chaired by Professor Andrew Levin, Professor of Economics, Dartmouth College. The two presenters were Dr. Darrel Duffie, Dean Witter Distinguished Professor of Finance from Stanford University and Professor Beatrice Weder di Mauro, President of the Centre for Economic Policy Research, and Distinguished Fellow at INSEAD Emerging Market Institute, Singapore. The presenters noted that technological advancement leads to the decline in the use of cash, the rise of digital payments, and the creation of private digital currencies; they discussed reasons for central banks to be concerned. They also discussed alternative approaches and the pros and cons in issuing

central bank digital currency. The presenters drew the audience's attention to that the fundamental technological change in digitalization has implications on monetary policy transmission and financial stability.

More and more payments are now made electronically. Correspondingly, currency in circulation as a percent of GDP has declined substantially across all countries; the lowest is Sweden which leads the world in adopting cashless payments. Technology nowadays allows the issuance of multiple private digital currencies.⁴ Private digital currencies do more than just threaten central banks' monopoly on currency issuance, they could be a means for money laundering, illegal transactions and tax evasion. In a very decentralized system, monetary authorities do not have the information to mitigate these activities societies collectively deem undesirable.

Central banks could introduce their own digital currencies (CBDC), which would have a distinct advantage over private digital currencies for they have political legitimacy and are better trusted than most private institutions. One type is general CBDC. One version would be to provide an account to everyone in the population and all transactions will be recorded as changes in corresponding accounts accordingly. Another version of general CBDC is for central banks to allow the population to receive tokens instead, which will be cryptocurrencies with a stable value tied to major fiat currencies (such as the US dollar) and tokens spent would make cryptographic transfers on a distributed ledger. Payments with the tokens will be backed by bank deposits and banks maintain their key role in handling transactions. A more limited approach is classified as "wholesale CBDC:" these accounts or tokens are only at the wholesale level, e.g., at inter-bank money markets. Prof. Duffie shows that in a 2018 survey of 80 central banks 70% of them are considering issuing CBDC.

There should be no illusion that CBDC will eliminate private digital currencies completely; for example, private digital currencies can survive as long as monetary authorities allow trading between them and legal CBDC tokens.

However, installing CBDC, monetary authorities would have access to huge transactions information. Accompanying that is the direct responsibility in defending against money laundering and thus absorbing the responsibility of "knowing your clients," which are traditionally delegated to private sector financial

⁴ Prof. di Mauro shows that, interestingly, while there are many proposed digital tokens and coins, only 3.8% managed to trade and another 1.8% remained promising. Yet, bitcoin is still around and private issuers are increasingly coming out with stable-coins and the like.

institutions. Also, central banks would have to take on more direct responsibility in protecting the system against breaches in cyber-security.

The establishment of CBDC will lead to multiple major changes. First, moving from fiat money to CBDC expands central banks' policy freedom, in the sense that monetary policies can go past the zero-interest-rate lower (ZLB) bound; that is, negative interest rate monetary policy becomes feasible when cash is eliminated. Generically, monetary policies' efficacy will be enhanced. As all CBDC deposits are directly linked to the central bank, monetary authorities would have immediate and direct influence on deposit interest rates. In addition, CBDC transactions will contain useful economic information that facilitates timely, sharp and effective policy decisions. But, central bankers and policy makers in general would have to be cognisant of that this may expand monetary authorities' responsibility into fiscal policy areas. There will be heightened temptations to weaken central bank independence.

Second, an extensive presence of CBDC will vastly expand central bank balance sheets and the nature of financial intermediation and stability. Straightforwardly, since a general CBDC implies that virtually all deposits will be kept with the central bank, its balance sheet will be much larger than it is today. Furthermore, transactions via CBDC at central banks will eliminate financial institutions' profit-making role in handling transactions. Also, with CBDC accounts, banks would have to offer competitive savings deposit rates benchmarked tightly with CBDC deposit returns. Losing these earnings, banks' role will have to focus sharply on credit intermediation. This can weaken their stability as any sign of weakness can lead their creditors to run away from them towards central bank CBDC accounts. All these induce banks to take less risks in financial intermediation. Yet, given the interlocking nature of credit creation, significant stresses on banks could have large adverse spillovers onto other banks and the banking system as a whole. Accordingly, there might be a need for increased liquidity coverage requirements or other ways to protect the weaker banks. There could also be unforeseen operational risks if central banks were to run an entirely new payment system.

These important changes in banking stem from the fact that savings deposit rates would have to be tightly benchmarked against market alternatives and the erosion of fee-based earnings. These changes are fundamentally due to technological progress and not necessarily linked to whether central banks adopt CBDC. Currently, payment rails operate in most countries during business hours on 5 days a week basis. However, a number of countries, e.g., Korea, have introduced fast payment systems that run around the clock throughout

the year⁵. The next generation of payment systems will be an improvement over the current fast payment systems in Asia, Europe and the US using cryptocurrency and an open source application program interface (API).⁶ There will be radical improvement in efficiency over the current banking payment rails and can apply in cross-border payments. Technology firms and platforms in China such as Alibaba and Tencent, through Alipay and WeChat, have already entered the country's payment system and dramatically changed it. Others are going to do the same elsewhere. An efficient and convenient payment system expands depositors' freedom of choice and raise the competition for deposits.

The presenters submitted that the technology is ready but there is resistance. For example, the US and the global payment systems are very inefficient. There is a significant amount of rent-taking along the payments system. In the US, a significant amount of the profits generated by credit card businesses goes to the banks, of which a substantial portion comes from transaction fees, the provision of liquidity to clients for facilitating transactions, and cross-border payments. If one of the fast payment systems, whether running on cryptocurrency or based on improvements in the current payment rails, were to succeed, then much of their "rents" would disappear. The rent-seeking extends on the deposit side of banks. Due to the inefficiencies in the current system, consumers are getting a low interest rate on their bank deposits, relative to the return that banks can obtain by depositing their funds with the central bank. The difference between these two rates will shrink dramatically with the introduction of fast payment systems or digital currencies.

The belief is that substantial financial changes will take place in the next ten years in the developed markets. Fast payments will be the norm, whether it is through banks' payment rails, a CBDC or a private stable-coin. The payment systems that are most likely to prevail are those which would continue to utilize the current bank payment rails but operate with faster and more efficient technology. Irrespective of how this will transpire, banks will be disrupted on both the payment and deposit sides. Their credit card operations will also be impacted. Central banks will encourage the development of fast payment systems that are safe and effective, while ensuring financial stability and keeping operational risks to a minimum. If that appears not to be the dominant outcome, and if there is a risk that private stable-coins can replace official fiat currencies and disrupt

⁵ Prof. Duffie provided many more other examples, including Mexico, Switzerland, Singapore, EU and a proposal by the Fed in the US. All these countries now have a fast 24-7 bank-based payment systems.

⁶ When an individual wants to make a payment, he or she will use the API and make a cryptocurrency transfer. The payment is made instantly using two ledgers – one for the individual to transfer the funds out of his or her bank account ledger and the other for the bank to move the funds across the interbank ledger. While the concept is not new, technological advancement gives everyone with a smart phone easy access to the system for easy funds transfers within or across borders.

the business model of banks, then it is very likely that central banks will step in and issue their own CBDCs. However, Professors Duffie and Weder di Mauro are skeptical that this will happen.

During the ensuing discussion, the moderator shared his optimistic perspective on CBDC. Overall, Professor Levin opined that central banks can improve the monetary and financial system through introducing a CBDC. In particular, an account-based CBDC provided directly by the central bank or via public-private partnerships with commercial banks could serve as a practically costless medium of exchange as well as a secure store of value with a rate of return in line with other risk-free assets. However, to foster price stability, the central bank needs to ensure that the real value of the CBDC remains stable over time in terms of a broad consumer price index. To entrench the CBDC, a fee should be imposed on large transfers between paper cash and CBDC, thereby curtailing arbitrage. With a CBDC in use, the effective lower bound on interest rates is no longer binding and central banks will have more policy space to respond to adverse shocks. By the same token, lowering the CBDC interest rate below zero would prevent a run from other assets into CBDC during a financial crisis. Finally, Prof. Levin opined central banks with CBDC may have greater ability to engineer a relatively steep yield curve than those without CBDC.

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