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Following the "general theory of macro-finance", IMI aims to become a world-class think tank, focusing on the studies of international finance, in particular the international monetary system and RMB internationalization. Despite its relatively short history so far, IMI has established itself as a leading research institution and important forum, where industry leaders, policy makers and academic experts from home and abroad share their insights and expertise.

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China

China Adjusts to the New World Order*

By ANDREW SHENG AND XIAO GENG*

On October 1, the People's Republic of China celebrated the 70th anniversary of its founding with impressive military and civilian parades meant to showcase the extraordinary progress the country has made under the leadership of the Communist Party of China. Formidable challenges lie ahead. But China's record so far, and the resources it has at its disposal, indicate that it may well be up to the task.

China's achievements are undeniable. In the last 40 years, it realized the fastest-ever sustained expansion by a major economy, enabling more than 850 million people to escape poverty. As investment in infrastructure, science and technology, education, and health has expanded, living standards have skyrocketed.

But in the third quarter of 2019, the nation recorded just 6 percent annual growth, the slowest since March 1992. And prospects for boosting that rate are limited, not least because the world is facing a synchronized slowdown. In its latest World Economic Outlook, the International Monetary Fund downgraded its 2019 global growth estimate to 3 percent, the lowest rate since the 2008 crisis.

The outside world is also increasingly rejecting engagement, with the United States leading the way. President Donald Trump's trade war has left no doubt that the US regards China as a strategic competitor, not a potential partner. Some in the US now advocate a complete decoupling of the world's two largest economies, unless China makes fundamental changes to its political system, economy, and foreign policy.

China has not been the only victim of US protectionism; Trump has also targeted India, the European Union, and others. So, beyond direct animosity from the US, China must contend with profound and unpredictable geopolitical and economic shifts, driven partly by a backlash against globalization – the very process that enabled China's rise.

Chinese leaders have been working to counter that backlash by highlighting the benefits of international trade and cooperation. They have also reconfirmed their commitment to continued structural reform and opening up.

As a recent McKinsey Global Institute (MGI) report showed, China has plenty of room for progress. The country accounts for 11 percent of global trade in goods, but only 6 percent of trade in services, underscoring the growth opportunities that a more developed services sector would provide.

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*This article appeared in Project Syndicate on October 28, 2019.

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Moreover, foreign ownership in China's banking, securities, and bond markets remains below 6 percent. And while Chinese tourists made 150 million outbound trips in 2018, the country receives only 0.2 percent of global migrant inflows.

Increased Chinese engagement with the rest of the world could, MGI estimates, would generate US$22-37 trillion of value for the global economy by 2040. In particular, China would benefit from import growth (US$3-6 trillion), liberalization of services (US$3-5 trillion), globalization of financial markets (US$5-8 trillion), collaboration on providing global public goods (US$3-6 trillion), and flows of technology and innovation (US$8-12 trillion).

This is not to say, however, that China needs the world, at least not as desperately as Trump and his advisers seem to believe. While openness is in China's interest – and the interest of those with which it engages – recent trade hostilities have highlighted the Chinese economy's resilience.

In fact, given China's scale, there is enough domestic economic competition to continue driving progress, even without external engagement. Few economies are large enough to test different development models in parallel, without worrying about systemic shocks. But that is precisely what China is doing.

China has a long tradition of experimentation and adaptation, with competition among cities, in particular, bringing development breakthroughs. The central government is now cultivating much larger urban clusters – the Greater Bay Area (covering nine cities around the Pearl River Delta in Guangdong province, plus Hong Kong and Macau); the Yangtze River Delta (centered on Shanghai); and the Beijing-Tianjin-Hebei cluster – to serve as platforms for further experimentation and competition.

Add to that significant scope for fiscal and monetary stimulus – thanks partly to a high domestic saving rate – and China's leaders are more confident than ever that they can resist outside efforts to dictate its policies. The West should expect China to adhere to its policy of strategic patience, pursue further efficiency gains, and implement difficult but necessary reforms.

Throughout this process, China will continue placing the highest priority on maintaining social and political stability – a prerequisite for long-term economic development. As Harvard's Dani Rodrik recently observed, "Give the state too much of an upper hand over society, and you have despotism. Render the state weak vis-à-vis society, and you get anarchy."

For China, ensuring that greater openness does not bring problems like instability or corruption demands a strong state.

The US-led unipolar global order is disintegrating fast, not because the world wanted that outcome, but because the hegemon did. This is a tragedy. But all China – or any country – can do at this point is adapt to the new reality. For now, that means maintaining internal stability and advancing development, while resisting outside pressure to act against its own interests.

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LPR: China's Market-based "Policy" Rate*

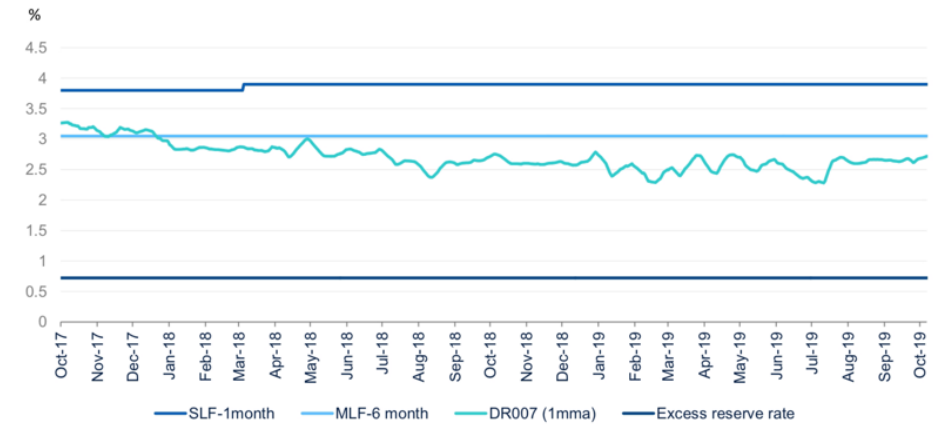
By DONG JINYUE AND XIA LE*

The PBoC eliminated benchmark lending rate to break the "dual-track" system

On August 24th 2019, the People's Bank of China (PBoC), China's central bank, announced the elimination of its previous benchmark lending rate as monetary policy rate. Moreover, they made a market-driven Loan Prime Rate (LPR) as the reference rate for banks to price their financial products. The PBoC's move signals the transformation of the previous "dual-track" interest rate system to the new "single-track" system.

As introduced in our previous reports *China Economic Watch: Monetary Policy: New Framework, NewStance* and *Putting the final piece into the new monetary policy framework: timing is the key*, the previous "dual-track" policy rate system featured the existence of two policy interest rates at the same time. On the one hand, the authorities have already established a "corridor" interest rate system in which the pledged 7-day interbank market rate (DR007) is the central bank's policy rate, whose movement is confined to a narrow corridor by design. On the other hand, the PBoC continues to set and announce its benchmark lending rate, which dictates commercial banks' lending rate offered to their customers with certain flexibility. Indeed, a chunk of banks' loans and deposit products are still linked to the benchmark policy rates. (Figure 1)

Figure 1. **The corridor system of China's new monetary policy framework** (%)



Source: CEIC and BBVA Research

The "dual-track" policy rate system has certain inherent problems. Commercial banks could be insensitive to the change of DR007 as a chunk of their loans and deposit products still based on the benchmark interest rates. As a result, it could hamstring the central bank's policy loosening. For instance, the PBoC started to ease monetary policy in the second of 2018 while the growth of both total social financing and new yuan loans remained anaemic over the same period. (Figure 2) Moreover, the weighted average lending rate in the economy remained

*This article appeared in BBVA Research on November 1, 2019.

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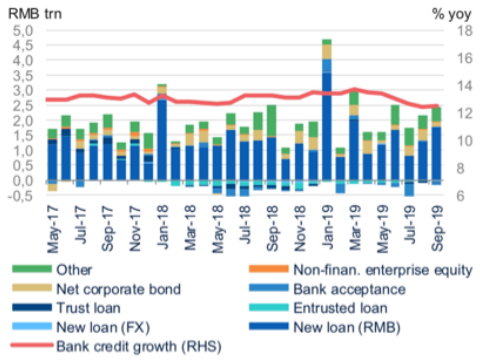
stubbornly high even though the authorities have manged to press DR007 down to a lower level. (Figure 3)

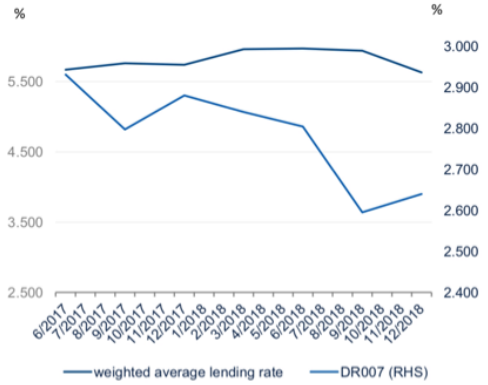
Thus, by eliminating the previous benchmark lending rate and designating LPR as a new reference interest rate, the central bank aims to improve the monetary policy transmission.

Figure 2 Although the PBoC implemented easing monetary measures, the total social financial and new yuan loans still weak before the reform



Source: BBVA Research and CEIC

Figure 3 A combination of higher weighted lending rate and a lower money market rate due to the weak monetary transmission mechanism



Source: BBVA Research and CEIC

How does the new LPR pricing system function?

The new LPR pricing system is a market based one which delegates the price-setting power to the 18 designated banks. These 18 lenders are required to submit their loan prime rates (LPR), the lowest rate offered to their best clients, to the central bank on a monthly basis. Apart from the big Chinese banks, the group of lenders also includes foreign banks (only Citi Group and Standard Chartered), rural commercial banks, and city commercial banks.

More importantly, the PBoC artificially linked the LPR with the rate of one-year medium-term lending facilities (MLF) by setting a uniform LPR pricing formula for all 18 designated banks. The MLF is the PBoC's facilities through which the central bank injects liquidity into the money market with maturities from three-month to one-year. The 18 lenders determine their adding points in the formula based on their risk premium, cost of funds etc.

Loan Prime Rate (LPR) for individual bank

= one year medium-term lending facility (MLF) + adding points (1)

After obtaining all 18 lenders' quotes for LPR the central bank will then calculate the average of those rates and publish it at 9:30 am on the 20th of every month, as the reference rate for the entire banking industry to follow. In addition, banks have been told by the PBoC that the LPR must be used in all new loan agreements – a major change from the existing practice where all loan contracts use the official benchmark lending rate.

The meanings of the LPR reform are multi-faceted

First, the move was expected to make Chinese monetary policy transmission mechanism smoother by combining the previous "dual-track" interest rate systems into "one-track".

Under the previous monetary policy framework, it is difficult for monetary policy transmitted from the money market rate to the credit market rate. Thus, we often observed a combination of low monetary market rate (such as DR007 etc.) and a high lending rate in the credit market. The reason is that unlike the banking system in Europe or the US, the deposit, instead of the interbank borrowing from the money market, is the main funding source of Chinese commercial

banks. Thus, the reduction of money market rate might not influence commercial banks' lending rates that much.

Now the new mechanism makes it easier for the changes of interbank market rates in the money market to flow to the real economy in the credit market as the monetary transmission becomes "from monetary policy rate to LPR to lending rate", instead of the previous "from benchmark lending rate to lending rate". Thus, by linking interbank rate to LPR, the PBoC is trying to solve the previous monetary policy transmission problem under the old "dual-track" monetary framework.

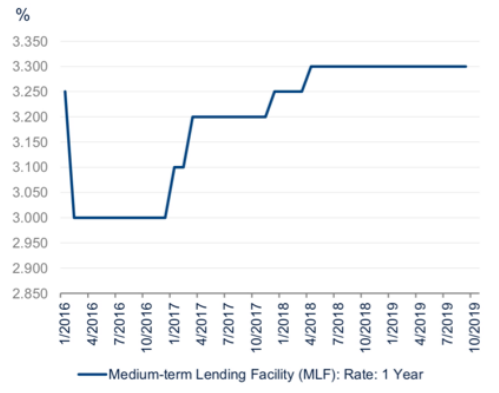
Second, the move will effectively lower the market interest rates amid growth slowdown and unsettled China-US trade war. The benchmark lending rate under the old regime was 4.35%, while the one-year medium-term lending facility (MLF), to which the new LPR will be linked, was 3.3%. Together with the adding points in the formula (1), the new LPR was set to be 4.25% in August, 0.1% lower than the previous benchmark lending rate, indicating an effective interest rate cut. In any case, since policymakers are keen to lower the funding cost in the real economy, we believe both the LPR and average loan rate will probably drop modestly after the new mechanism starts.

Forecasting the future LPR

Given that the new monetary target rate LPR pricing formula by individual bank becomes MLF plus some adding points, intuitively, the prediction of future LPR becomes mostly the forecasting of MLF. However, at the beginning of the new LPR scheme, the one-year MLF remained same level at 3.3% from August to October, while LPR dipped from previously 4.31% to 4.2%. This indicates the PBoC's intention to cut interest rate by lowering the "adding points" term instead of MLF at the beginning of the transformation. (Figure 4)

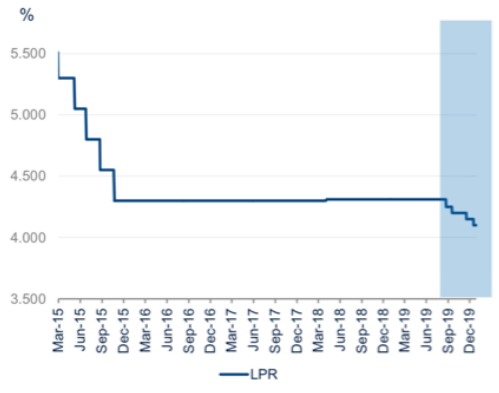
After the LPR reform in August, the path of LPR cut by the PBoC is: from 4.31% to 4.25% in August; from 4.25% to 4.2% in September; no LPR cut in October.

Figure 4 MLF one year rate remains at 3.3% from August to October after the LPR reform



Source: BBVA Research and CEIC

Figure 5 We forecast LPR will reduce in a monthly base, and it will decline to 4.1% at end of this year



Source: BBVA Research and CEIC

The future path of LPR cut will be more balanced. On the one hand, the economic growth slowdown, together with the US FED interest rate cut calls for further LPR cuts. On the other hand, as the authorities do not want to fill the economy with a flood of debt like what they did in the 2008 global financial crisis, the step of reducing LPR will not be that fast. The good progress of China-US talk, especially the achievement of Phase One deal in October, will also lower the PBoC's intention of a fast LPR cut. In addition, the currency pact in the Phase One deal, by refraining China from currency devaluations to seek trade advantage will trigger a RMB

appreciation, which puts pressure on a fast interest rate cut. Actually, after the two LPR cuts in August and September respectively, the PBoC chose to maintain LPR at 4.2% in October 20th, sending the signal of a slower step of LPR cut.

In the final two months of this year, we predict the LPR will be reduced by 0.05% every month. That means, at end of this year, the LPR will reduce to 4.1%. And we forecast LPR at end-2020 will be reduced to 3.9%. (Figure 5)

Some caveats are still noteworthy

Altogether, developing the LPR as the new monetary reference rate in August is a welcome move. It is a significant milestone for China's interest rate liberalization reform and helps to improve the new monetary policy "corridor" system. However, some caveats are still noteworthy:

First, changing to LPR scheme might not indicate the full interest rate liberalization in China as there are still some obstacles ahead for full interest rate liberalization. For instance, the PBoC will probably remain involved in the LPR pricing for the current transition period, in order to safeguard the transition and prevent potential spikes in interest rate volatility.

In particular, as Chinese commercial banks always have motivations to report their LPR with upside bias in order to have higher interest rate margin, the PBoC might have to window guidance their LPR pricing formula (especially the adding points part) and may also regulate a range for adding points pricing in the future. If this situation materializes, it indicates the PBoC still has pricing power for the LPR.

Second, it will be quite challenging for Chinese banks' balance sheet management. As the PBoC's tension is to reduce the market lending rate in initiating the LPR reform this time, given that banks always are competing to increase their deposit rate to attract depositors, banks' profit margin under the new LPR pricing mechanism might be shrink significantly. Thus, how to transit the lending rate cut to deposit rate reducing will be another challenge for commercial banks.

Third, it is notoriously difficult for a central bank to stimulate the economy by easing monetary policy, even though the new LPR pricing system tries to link the credit market rate with the money market rate. In retrospect to the previous economic downturns, both the US and Euro zone were unable to use traditional monetary policy tools to put the growth back on track and therefore chose to implement some unconventional monetary policy tools including quantitative easing, forward guidance, negative interest rate, TLTRO etc.

Indeed, a more relevant problem to the policy transmission is banks' aggravated risk appetite in the face of increasing growth headwinds. The clampdown of shadow banking activities has forcefully driven a lot of borrowers out of the credit market and led to growth slowdown. The still unsolved trade war with the US not only stalls the export sector but also hits consumers and producers' confidence. At such a juncture, banks' concerns over asset quality may override the authorities' efforts of policy easing so that these risk-averse banks are reluctant to transmit the lower financing costs to their clients thus choose not to expand their lending to the real economy.

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Outlook 2020: Going the Distance*

By HONG HAO*

Abstract

Global healing of economic cycle. 2019 truly has been a year of "Turning a Corner" – contrary to the prevailing pessimism at the end of 2018. Now, our leading indicator of China's economic cycle is peaking, and will likely moderate in the coming months. Given the leading nature of our cycle indicator, assuming some progress on the trade front, nominal economic variables in China, such as IP and earnings growth, will likely begin to recover. The cycle in the US and EU is bottoming out, following China's lead with a lag. That said, these are coincidental or lagging variables. Their reflation is likely to have been reflected in a market that has rebounded significantly from the 2018 selloff – barring significant upside surprise in fundamentals.

But China's super hog cycle intensifies inflation outlook. The swine flu has devastated China's pig stock by almost the entire pig population in the EU of ~150m. The change in China's pig stock tends to lead the hog inflation by ~6 months. As such, inflation is likely to surge well past the Chinese New Year, hamper monetary choice in the near term, and retard the momentum and upside in stocks. In the coming 12 months, the Shanghai Composite's bottom will likely be ~2,700, with 3,200 being the peak level on the 850-day moving average since 2010. The actual forecast of trading range dispersion by our EYBY model is indeed 2,500-3,500. Spot price could temporarily break above this level. But the underlying trend of the moving average is declining. Unless exogenous factors are introduced, such as significant inflow of foreign liquidity, China's stock market will remain a zero-sum game.

Although broader market offers limited opportunity, the "leader effect" will persist. Both Chinese and US industries have been increasingly concentrated over the past decade, with industry leaders reaping greater shares of industry revenue and enjoying higher ROE. For China, large caps are earning an ROE > cost of capital, but this is not the case for the small/mid-caps. Given that the mobility to move up to the top ranks within an industry has been very limited – only 4% chance, the "leader effect" in stocks will persist. And indices that best capture this effect, such as CSI300, A50, SSE50, and offshore Chinese large caps, will continue to offer opportunities.

Falling global return suggests the secular underperformance of cyclicals, small caps and EM has not ended, but some may be tempted by near-term oversold rebound. China's ROE has been falling since 2010, concurrent with the global investment return measured by US EBITDA/capex. Glooms about the future have created a global savings glut and depressed return. As such, the ability to earn a return above capital costs should command premium, such as China's industry leaders. The secular underperformance of cyclicals, small caps and EM is highly correlated with falling global return. This secular trend has not ended, so long as global return continues to fall. That said, traders may be tempted by an oversold technical rebound in these assets spurred by global central banks' re-QE in the near term. The US is heading for new highs. In the long run, however, secular trends trump technical moves.

*This article appeared in the author's Wechat public account (ID: honghaochinastrategy) on November 11, 2019.

*Hong Hao, Senior Research Fellow of IMI; Managing Director and Head of Research, BOCOM International

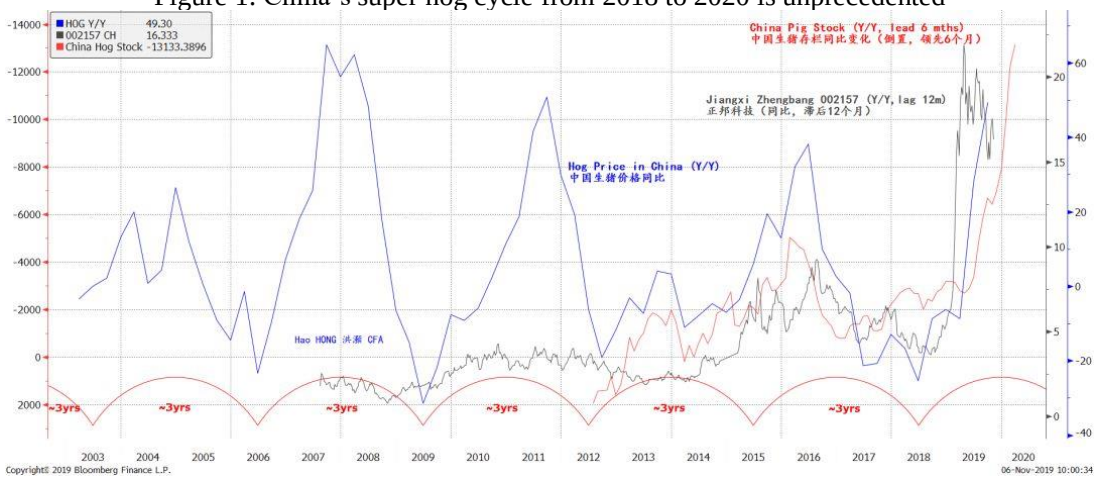
China's Super Hog Cycle in 2018-2020

Since March 2017, we have researched extensively into the well-defined short cycles in the US and Chinese economies. These cycles by themselves are endogenous to the underlying dynamics in the economy. When economic cycles move, they fluctuate with regular cyclicality and simultaneity across a vast array of economic variables, and engender ebbs and flows in the economic trajectory.

Based on our economic cycle theory and quantitative models, from 2H2017 to FY2019, our outlook reports were titled "*Going for New High*" (for 2H2017), "*View from the Peak*" (for FY2018), "*Rough Sailing*" (for 2H2018) and "*Turning a Corner*" (for FY2019), respectively. With hindsight, the direction of China's economy and its markets has been largely consistent with our cyclical models' forecasts.

In the coming months, China's leading economic cycle indicator, which has been stabilized by the property investment in 2019, is likely to moderate. The signal of an inflection year from our leading cycle indicator has been reflected in the general recovery of the stock market in 2019. If the trade negotiation can further progress amid the already reconciliatory tones from the US and China, a global recession can be dodged. If so, 2020 will be a year of greater domestic focus, with the US getting on with its presidential election, and China trying to regroup to steady its economy. But the inflation outlook is less certain.

Figure 1: China's super hog cycle from 2018 to 2020 is unprecedented



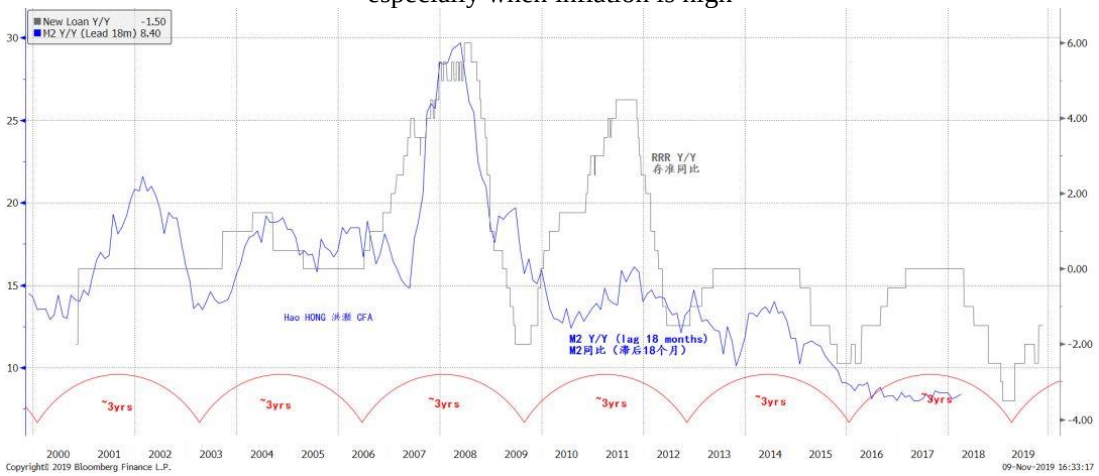
Source: Bloomberg, BOCOM Int'l

The shortfall in pig stock tends to lead hog price inflation by about 6 months historically (Figure 1). Since the second half of 2018, the pig stock in China has been devastated by the severe outbreak of the African Swine Fever. The country's pig stock has now fallen by ~130 million year on year, which is close to the entire pig population of ~150 million in the EU, and almost double the size of that of the US.

The intensity of the current hog price inflation in China rivals the previous peaks in history (Figure 1). However, the reduction of pig stock in China is unprecedented, and is likely to induce a super hog cycle unseen before. The hog cycle in China tends to run for approximately three years, and its wave length has been largely consistent with that of China's short economic cycle. Given the severe pig shortage, this hog cycle can run substantially higher than previous

cycles. It will hamper the choice of monetary policy in the near term, lessening the chance and the depth of any potential rate cut.

Figure 2: The effect of RRR cuts on monetary condition has a long lag, especially when inflation is high



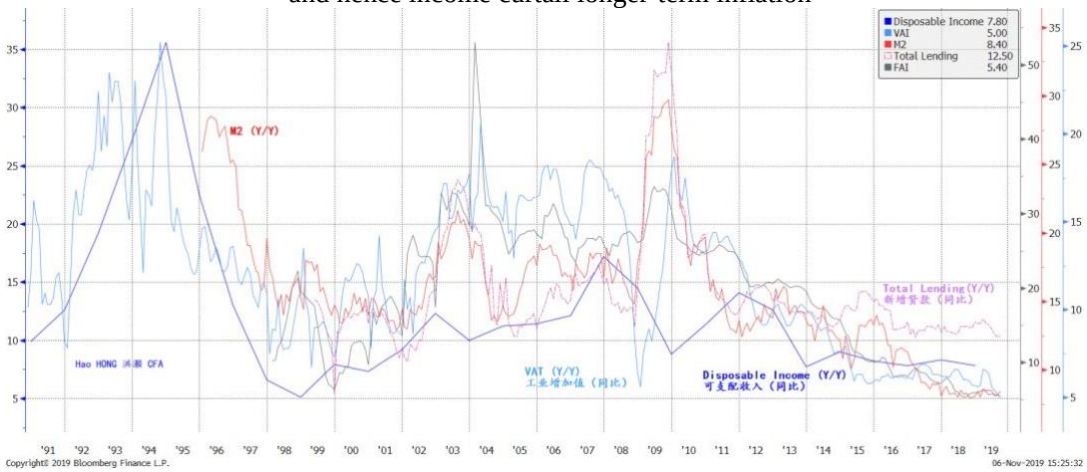
Source: Bloomberg, BOCOM Int'l

China's RRR cuts have so far failed to generate sustainable lending growth. This is because RRR cuts tend to influence monetary conditions with a lag of up to 18 months (Figure 2). The change in RRR also runs with a cycle of roughly three years. In early 2019, we have seen this long leading indicator bottoming out. As such, easing liquidity conditions will come eventually, although we must wait a little while longer - till the inflation pressure starts to dissipate.

Even though inflation pressure driven by China's super hog cycle is likely to mount in the coming months, we believe the longer-term trend for inflation is still declining. The PBoC's monetary objective has remained surprisingly neutral and restrained, with a stated policy objective to keep M2 growth consistent with nominal GDP growth.

Money supply growth determines lending, investment, economic growth, and ultimately the growth of disposable income. If the longer-term trend of M2 growth is falling, so will disposable income growth (Figure 3). As such, as long as productivity gain, which is increasingly from the exponential growth of computing power, rises faster than income, as it has been, the longer-term outlook for inflation should be declining as well.

Figure 3: Falling money supply, investment, growth and hence income curtail longer-term inflation

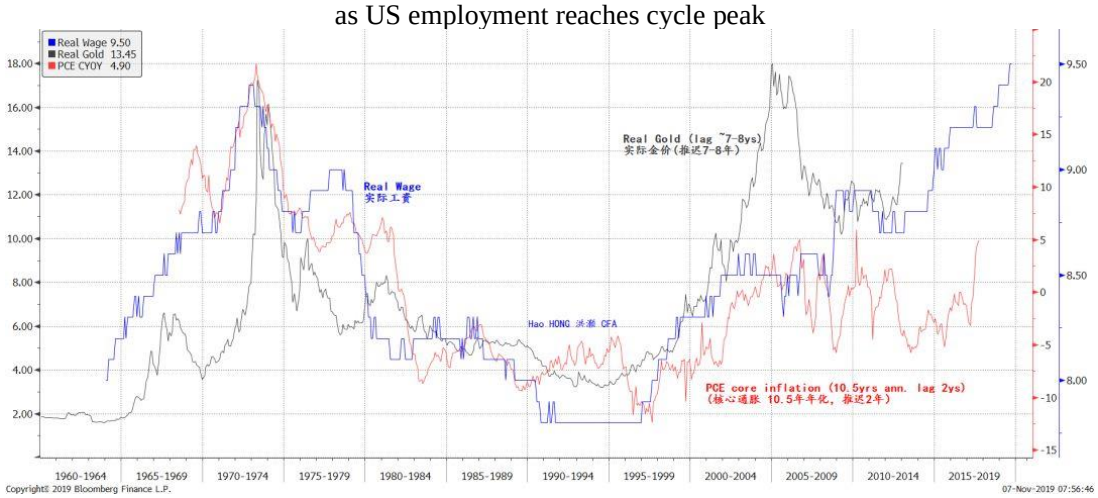


Source: Bloomberg, BOCOM Int'l estimates

In the US, we find that inflation pressure is slowly building as well. We note that the real wage in the US has returned to its previous highs seen in early 1970s. If we compare the US real wage with US PCE core inflation annualized on a 10.5-year basis with a roughly two-year lag, we can see a clear correlation, and a trend of rising US core inflation (Figure 4; Note that the 10.5-year basis for our analysis is consistent with the wave length of an intermediate economic cycle consisting of three 3.5-year short cycles.

There is also close correlation between real wage in the US and the inflation-adjusted gold price, with a lag of roughly seven years (the wave length of an intermediate cycle consisting of two 3.5-year cycles). In short, real wage growth can forecast the direction of US inflation and gold price, with a substantial lead (Figure 4).

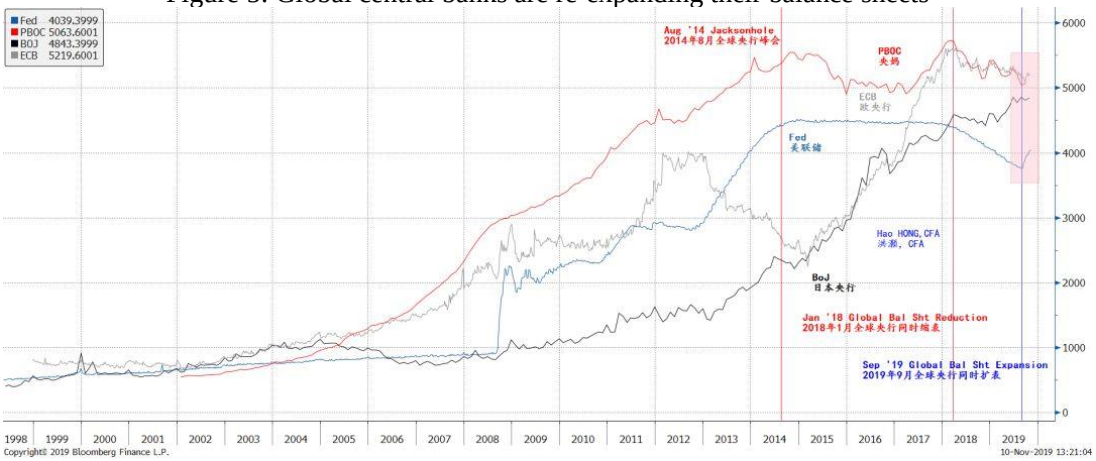
Figure 4: US core inflation pressure is slowly accumulating, as US employment reaches cycle peak



Source: Bloomberg, BOCOM Int'l estimates

If inflationary pressure in the US is indeed slowly rising, as suggested by Figure 4, and the short economic cycle is healing (to be discussed later), the Fed's path to rate cuts as anticipated by the market could be altered. But the Fed's plan to re-expand its balance sheet together with the other major global central banks is likely to be intact (Figure 5).

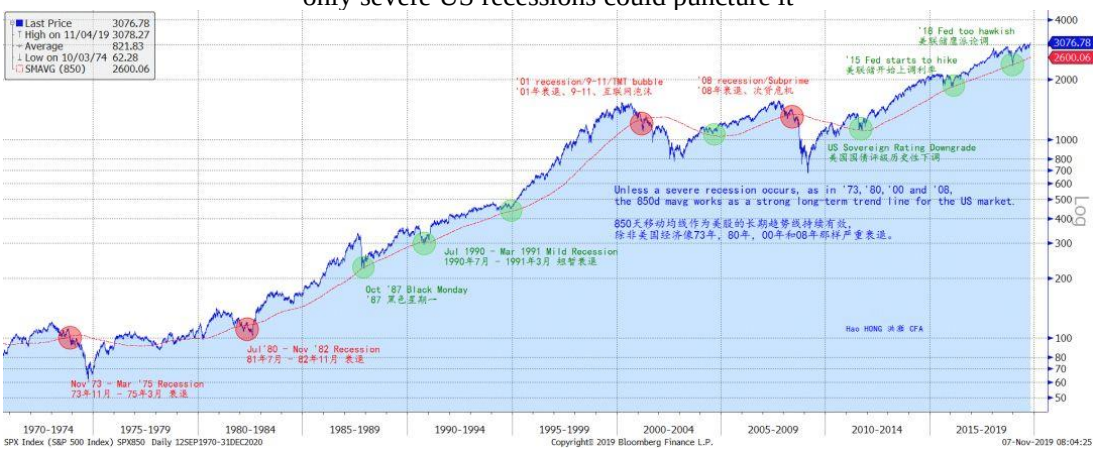
Figure 5: Global central banks are re-expanding their balance sheets



Source: Bloomberg, BOCOM Int'l estimates

Such a discrepancy in the market's expectation of rate cuts, though in part being gradually reflected in the Fed funds futures, can induce disruption in the stock market in 2020. That said, without recession, the rising trend in the US market will persist, with the 850-day moving average being the secular rising trend line (Figure 6). The last leg up will likely squeeze many doubters of the US market's strength, burying a lot of shorts and then the longs after the eventual market peak.

Figure 6: 850-day mavg is a secular rising trend line for SPX;
only severe US recessions could puncture it



Source: Bloomberg, BOCOM Int'l estimates

China's Leading Economic Cycle Indicator to Moderate

In our initial report on economic cycles with quantitative metrics titled "*A Definitive Guide to China's Economic Cycles*" (20170324), we demonstrated the 3-year short cycle in the Chinese economy. We derive our 3-year investment cycle by measuring the deviation of the actual property investment growth data from its long-term trend. There have been by now almost six, very clearly-defined 3-year cycles in China's economy: 2003-2006, 2006-2009, 2009-2012, 2012-2015, and the last quarter of 2015/early 2016 till the end of 2018.

To verify the 3-year short cycle, we compare it with other macroeconomic variables in terms of both volume and price in the Chinese economy. Rebar price, interest rate level, industrial output, stock market indices and earnings forecasts, for instance. We have demonstrated that these variables are closely correlated (not all comparisons are shown in this report; for detailed discussions on China's short economic cycle, please refer to our report "*A Definitive Guide to China's Economic Cycles*" on 20170324). That is, the 3-year short cycle can very well explain the movements in many other Chinese macroeconomic variables (Figure 7).

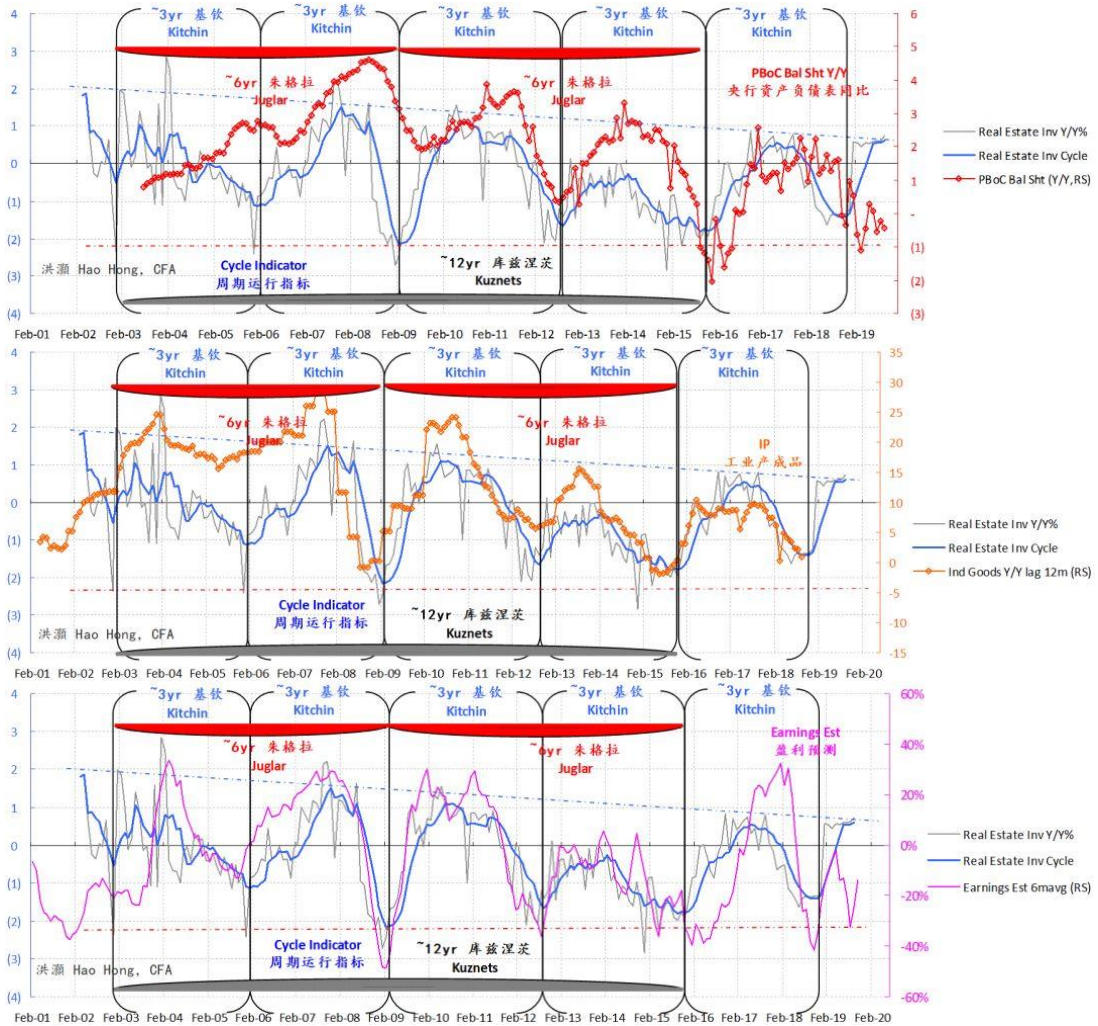
Further, we note that in the past two decades of which period we have data, the trend of investment growth is falling, with lower highs and lower lows in each of the cycle sequentially. This is not difficult to fathom: China's massive investment scale and increasing leverage are suppressing marginal investment return, and thus limiting the room for further productive investment.

We believe the duration of the 3-year cycle is related to China's building construction process. For instance, to build a 30-storey residential building, the building completion time is around 9-12 months, water and electrical installation around 3 months, plus some more time for safety inspection and miscellaneous approvals. The total time to completion is around 1.5-2 years. Then, the building inventory will take up to 1 year to clear, making the building inventory investment cycle of around 3 years.

We note that the current 3-year short cycle that started from late 2018 to early 2019 is peaking, driven by moderating property investment growth after double-digit growth in 2019. That said, as our cycle indicator is a leading measure, the momentum in nominal economic variables driven by surging inflation pressure can still show persistency in the coming months (Figure 7).

Investors should not be fooled by these nominal and lagging improvements that have been well foretold by our cycle leading indicator and thus are already priced in. Unless the nominal improvements beat market expectations significantly, stock prices will not respond. In general, in a slowing environment with persistent inflation pressure in the coming months, investors will find it difficult to commit capital to stocks or bonds.

Figure 7: China's leading economic cycle indicator will likely moderate in the coming months, but China leads

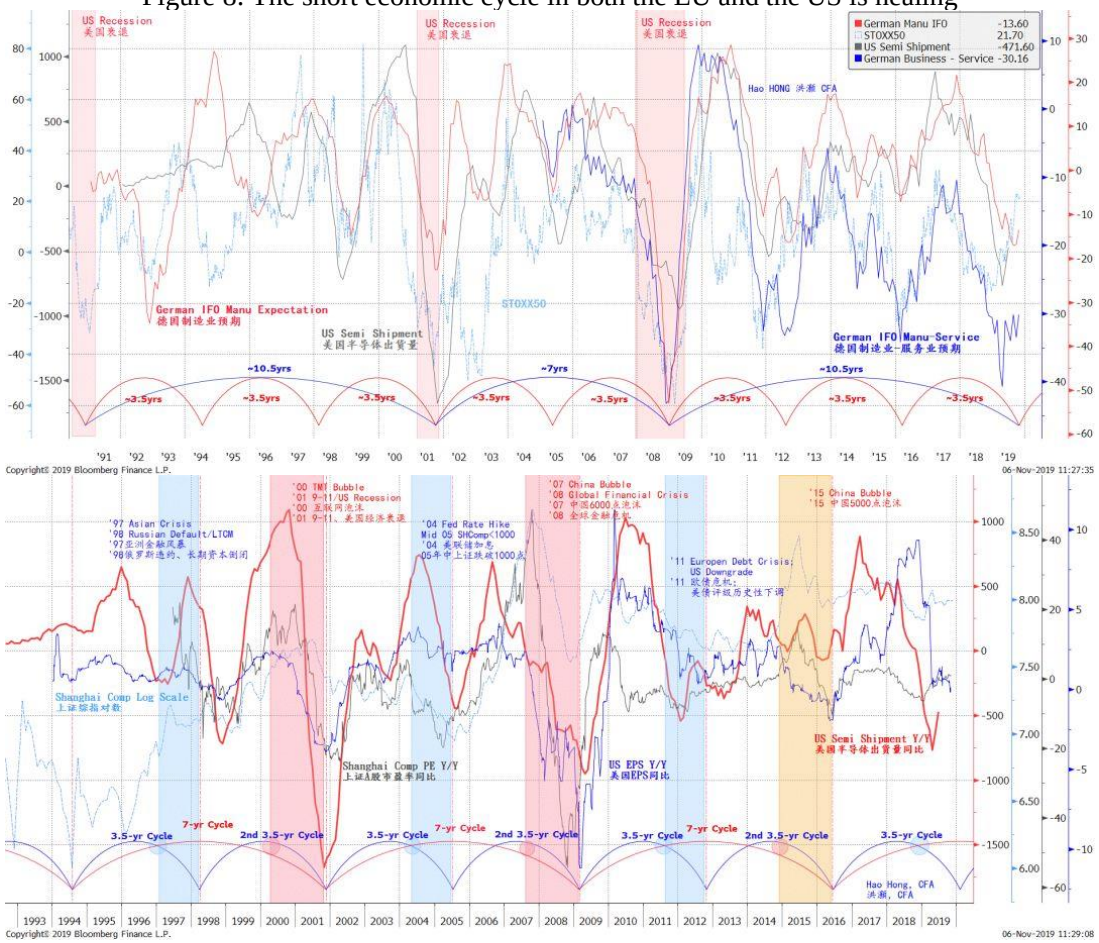


Source: BOCOM Int'l estimates

The Global Cycle is Healing

Globally, the short economic cycle appears to be bottoming out in both EU and the US (Figure 8). The short economic cycle in the EU and the US, as approximated by German manufacturing IFO, US semi shipment growth and EPS growth, operates with a wave length of roughly 3.5 years ("*The Colliding Cycles of the US and China*" 20180903 and "*A Definitive Guide to Forecasting China Market*" 20190920). Its length is largely consistent with China's short economic cycle, but runs with a lag.

Figure 8: The short economic cycle in both the EU and the US is healing



Source: Bloomberg, BOCOM Int'l estimates

Meanwhile, the US 10-year yield is bottoming out from a very depressed level that historically augured economic recession or market turmoil, as in 2001/02, 2008, 2012 and 2015/16 (Figure 9). Yield curve re-steepening can alleviate the recession fears. As China's cycle of stock market return continues to recover from the bottom of a 7-year cycle seen in late 2018 and early 2019, the US Leading Economic Indicator is reflating concurrently (Figure 10). Yet, the market remains skeptical about the health of the US economy, despite the help from the Fed.

Figure 9: The global cycle is healing (cont'd)

Source: Bloomberg, BOCOM Int'l estimates

Figure 10: China's cycle is leading the global cycle

Source: Bloomberg, BOCOM Int'l estimates

As such, the strength of the US market rebound can surprise many bears – as the final short squeezes prior to the eventual market downturn always do. In 2020, we would also watch the US election closely. It will be a showdown between the capitalists and the socialists. For now, it is difficult to fight the global central banks that are re-expanding their balance sheets simultaneously.

A History of US Investment Return and its Implications

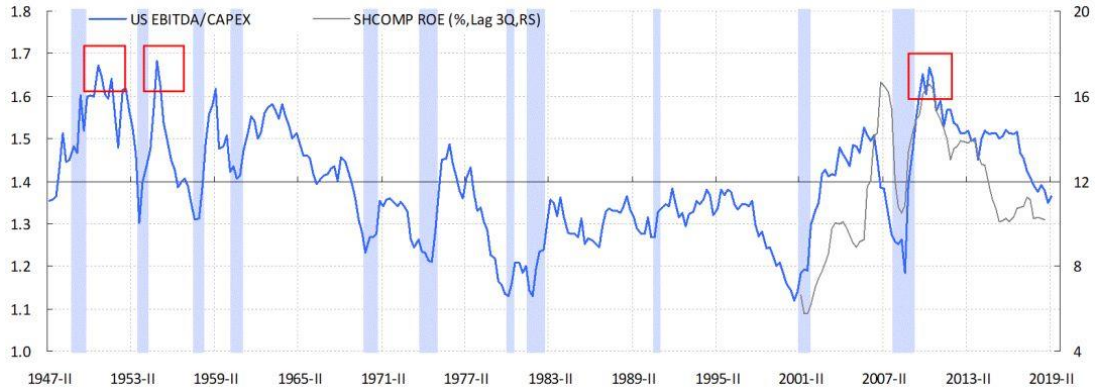
In our previous report titled "*A Definitive Guide to Forecasting China Market*" (20190920), we discussed that 2010 is the watershed year in asset allocation in China. Current account surplus to GDP ratio, money supply growth and FAI growth all peaked around 2010 and have declined ever since then.

Consequently, the 850-day moving average of the Shanghai Composite has not made any new high above ~3,200 since 2010. China's stock market has turned into a zero-sum game since then.

Even the bubble in 2015, though significantly breaking through 3,200, did not take the moving average to new higher levels.

Globally, we notice a similar development. Using the US Flow of Funds data, we calculate the EBITDA-to-Capex ratio in the US economy, and use this ratio as a proxy for investment return in the US. We find that investment return in the US has also peaked around 2010, and has been falling ever since, albeit not to the recessionary levels seen during the recessions since 1970s. As our analysis shows, the ROE of the Shanghai Composite and the US investment return are closely related (Figure 11).

Figure 11: US investment return and China's ROE have both been falling since 2010/11



Source: Bloomberg, BOCOM Int'l estimates

It is difficult to dismiss this correlation as mere coincidence, given the inter-dependence between the US and Chinese economy. Historically, China produces and US consumes. The US spends and China saves. The accumulations of positions for FX purchases, or the PBoC's sterilization operations, have been the most important source of liquidity for China.

Since the Great Recession in 2008, however, the US has been disenchanted by gloomy outlook and has been saving hard. This change in saving habit can be seen in the rising national savings rate in the US, concurrent with the rising current account surplus. The savings glut depresses investment return, and affects the investment outlook for the US public, who in turn saves even harder. Consequently, investment return in the US continues to fall, as seen in Figure 11.

Meanwhile, in China, because the foreign source of liquidity is dwindling, Chinese growth that used to be driven by credits starts to slow, and hence ROE. Indeed, we observe falling ROE across all market caps in China since 2010. And the ROE of mid/small caps is falling much faster than that of large caps, and is now well below the equity discount rate. That is, the mid/small caps are now earning negative economic return, while the large caps are managing to stay above the general equity discount rate (Figure 12).

Figure 12: Return in China has been falling; divergence between large and mid/small caps

Source: Bloomberg, BOCOM Int'l estimates

Such diverging ROE between large and mid/small caps explains the "leader effect" in recent years, as the leading companies in their respective industries substantially outperform the rest of the industry. Similar market performance as a result of industry concentration is also seen in the US.

The relationship of the large-cap index with its 850-day moving average contrasts starkly with that of the small/mid-cap index. For the large-cap indices represented by the SSE50 or CSI300, they stay well above the 850-day moving average. The average has been acting as a strong support for the underlying rising trend of the large caps. On the contrary, the moving average is acting as a strong resistance for the small/mid-cap indices represented by CSI700, and the overall broad market index of the Shanghai Composite (Figure 13).

As such, without a major paradigm shift for the small/mid-caps, we should expect continuing relative outperformance from the large caps. Even the targeted policies to help out the small businesses may not be able to turn the tables for now.

Figure 13: The 850-day mavg is a strong resistance for the Shanghai Comp, but a strong support for SSE50

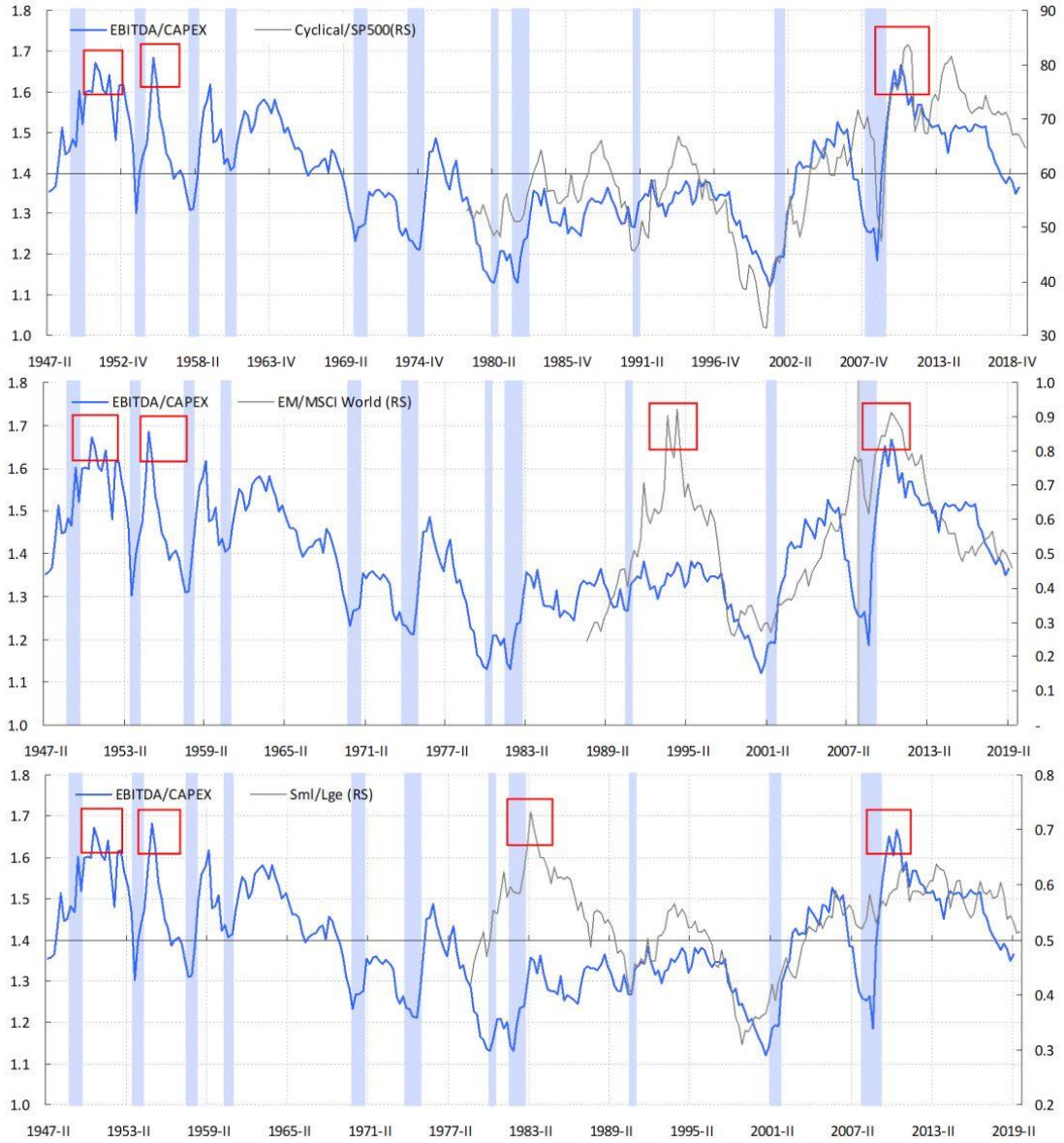
Source: Bloomberg, BOCOM Int'l estimates

The US investment return, as measured by the ratio between EBITDA and Capex, is also an excellent proxy for the global investment environment. Our analysis finds the US investment return highly correlated with the relative performance of global cyclicals vs. defensive, EM vs. the world, and small vs. large caps (Figure 14).

Since around 2010, cyclicals, EM and small caps have been underperforming. That said, even though by now the underperformance has persisted for years, and may be prone to a technical rebound in the near term, it is unlikely to have run its course. Ever falling interest rates, and the prospect of negative interest rate, will prompt people to save harder, as suggested by the Japanese experience.

And as long as the glut of savings persists, investment return will remain depressed, auguring ill for the relative performance of small caps, EM and cyclicals. One should not mistake a technical rebound in these risk asset classes, however strong, for the ultimate turn of the secular trends that have been persisting since 2010.

Figure 14: The world's investment return is sinking

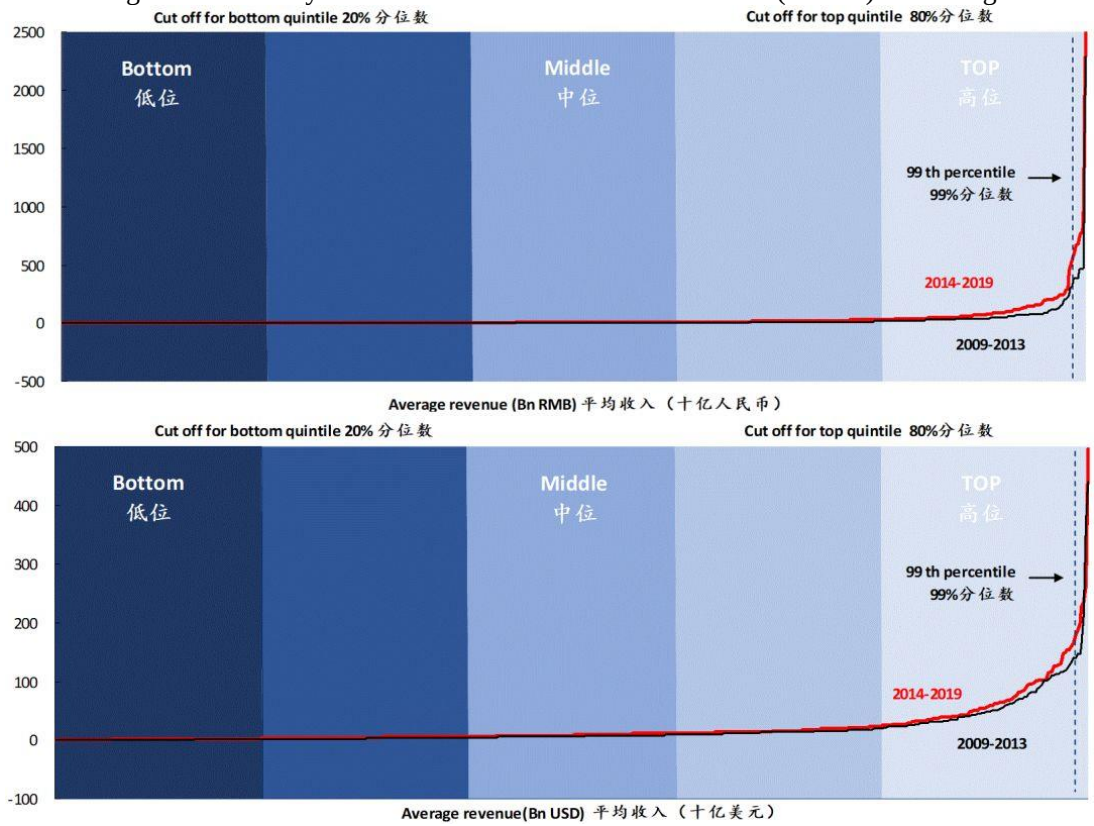


Source: Bloomberg, BOCOM Int'l estimates

The reign of large caps will probably end once their return on equity falls below the discount rate. Further, our research shows that, in the past decade, leaders' market power, as measured by their share in total industry revenue, has become even more concentrated (Figure 15). And once the industry structure is set, there is little mobility between different tiers of industry ranks. For instance, there is only a 4% chance for lower-ranked companies to move into the top rank in both the US and China (Figure 16).

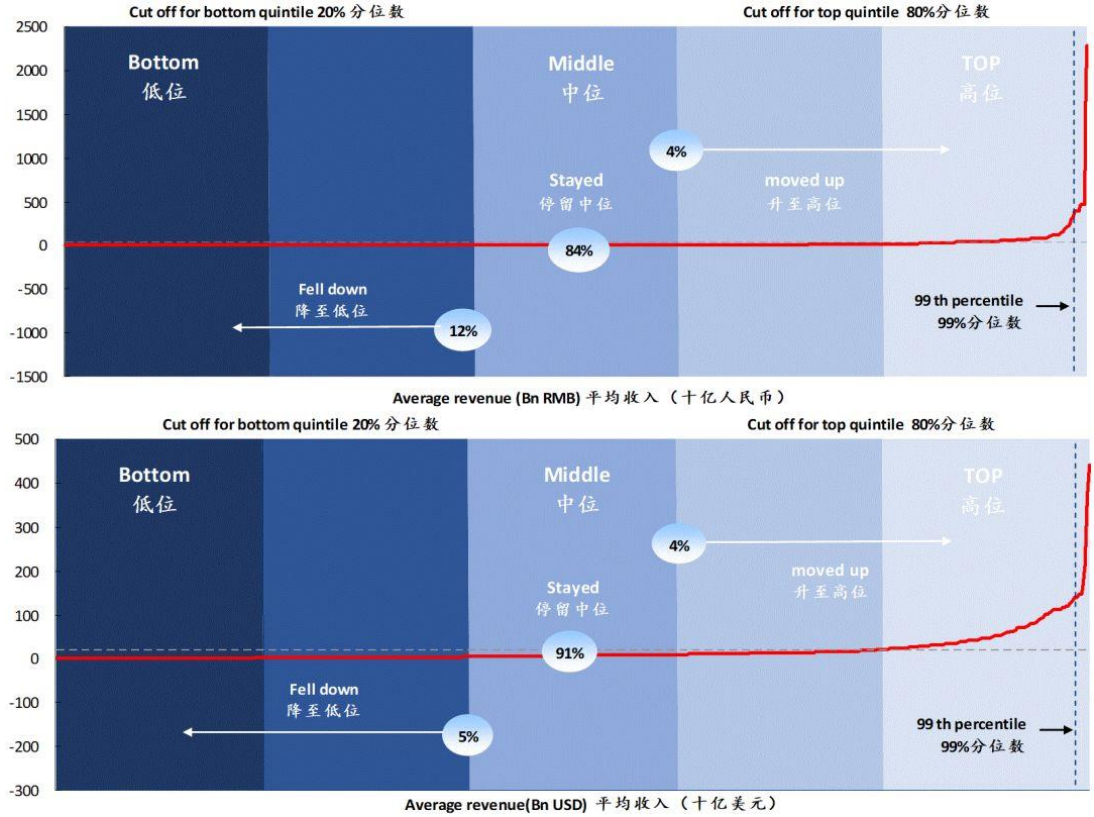
As such, the relative performance of the large caps will likely persist for now, given their ROE above discount rate, increasing industry concentration, and limited mobility between ranks.

Figure 15: Industry concentration in both China and the US (bottom) increasing



Source: Bloomberg, FactSet, Wind, BOCOM Int'l estimates

Figure 16: Mobility among industry ranks is limited in both China and US (bottom)



Source: Bloomberg, FactSet, Wind, BOCOM Int'l estimates

Market Outlook

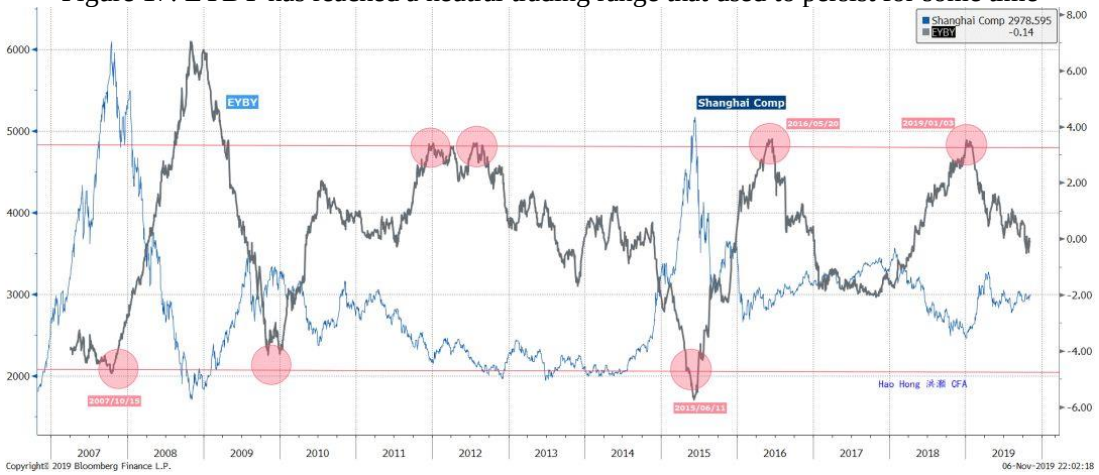
Our earning-yield-bond-yield model (EYBY) has a long and consistent forecasting track record. The trading range forecast for the Shanghai Composite in 2019, published in our outlook report titled "*Outlook 2019: Turning a Corner*" on 19 November 2018, was between 2,000 and 2,900, with 2,450 most likely to be bottom and 2,000 to be the extreme risk scenario with an event probability of 1%.

While the composite traded above 3,200 at its highest in April, in the past 12 months, the volume-weighted average of the composite's trading range has been ~2,900, and ~80% of the time below 3,000, with the range between 2,900 and 3,000 being a significant resistance level. Further, the Shanghai Composite has really "turned a corner" in 2019, and is ranked one of the best-performing major indices in the world.

Indeed, we estimated the bottom for the composite at 2,450 in our report titled "*Market Bottom: When and Where?*" on 6 June 2016 – more than two years before the market eventually bottomed at 2,440 on 4 January 2019.

Given the track record of our EYBY model, we continue to apply it to forecasting 2020. We note that our EYBY model is now stuck at a neutral range that tended to linger for some time in history (Figure 17). This is a range where the Shanghai Composite tends to take a breather after a year of substantial move, and tries to reflect new data and information before resuming its uptrend, as the EYBY model grinds lower.

Figure 17: EYBY has reached a neutral trading range that used to persist for some time



Source: Bloomberg, BOCOM Int'l estimates

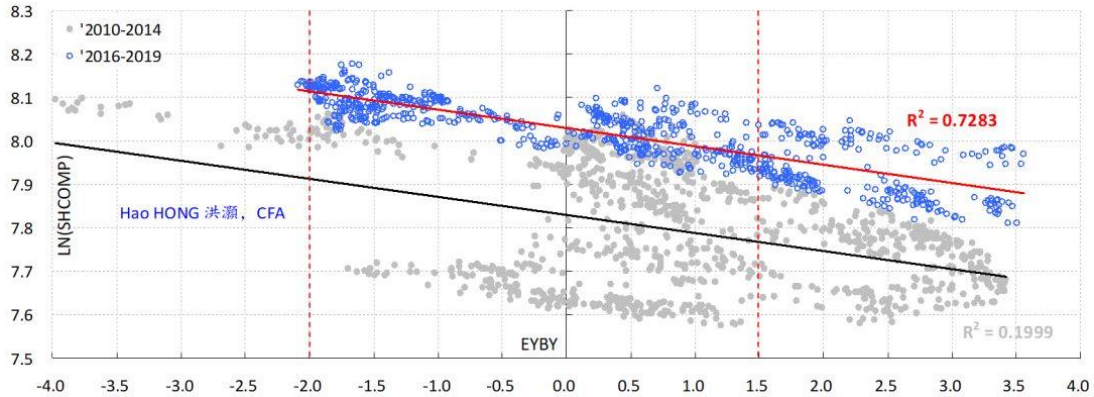
For now, the Shanghai Composite is running into resistance defined by the 850-day moving average of ~3,200. This is a level that the moving average has been failing to break through since 2010 (Figure 13). That is, since 2010, the composite has been stuck in a range, as China's saving-investment habit changes. China has been saving less, investing less and growing slower, as suggested by the country's falling current account surplus to GDP ratio, money supply, FAI and IP. We have discussed these secular macro changes in our previous report titled "*A Definitive Guide to Forecasting China Market*" on 20 September 2019.

We have plotted EYBY and its corresponding composite levels on logarithmic scale in Figure 18. To eliminate the distortion from extreme data as the result of an abnormal trading year, we have excluded the data from 2015 – the year of stock market bubble. Further, we have grouped the data into pre- and post-bubble years starting from 2010 – the watershed year in the trading patterns in the Shanghai Composite discussed above.

As the Shanghai Composite has an internal compound rate of return that equals the economic growth target implicitly embedded in China's Five-year Plan, the composite has a rising bottom that doubled every decade since 1996 ("*The Market Bottom: When and Where?*" 20160606). As such, we have explicitly based our 2020 forecast on the data points between 2016 and 2019 (Figure 18, blue dots). We believe EYBY will be stuck between the value of -2 and 1.5, given the inflation outlook and its implications for bond yield.

Consequently, the bottom trading range in 2020 is likely to be around 2,700, and 3,200 will remain a significant resistance for the 850-day moving average. It is likely that the moving average will continue to decline, if no exogenous factors are introduced into the Chinese market. The bottom level is calculated by growing the previous bottom of 2,450 by the EPS growth rate. Even if spot price temporarily surges above the 850-day moving average of 3,200, it is unlikely to change the top of the moving average established since 2010 – unless exogenous factor, such as significant foreign capital inflow, is introduced into the Chinese market. Not even the bubble in 2015 could change that.

Figure 18: The trading range = ~2,500-3,500; most likely bottom level = ~2,700



Source: Bloomberg, BOCOM Int'l estimates

Within the broader market, our quantitative analysis shows that cyclicals have substantially underperformed defensive, and small caps underperformed large caps. Some traders may be tempted to take advantage of a technical rebound. But as our analysis above shows, the leading steers of their respective industries will continue to consolidate their market power, and thus increase industry concentration. Meanwhile, as global investment return continues to fall, as suggested by the falling EBITDA-to-capex ratio in the US, the secular underperformance of EM, cyclical and small caps is not yet over. In the long run, secular trends trump technical moves.

IMI International Monetary Review

China's Emerging Industry Development Strategy and Its Implications for Korea*

By WONSEOK CHOI*

China's emerging industries have a great need for development in terms of technological innovation and national development and play a leading role in the long-term development of the society as a whole. The emerging industries announced last year by China's National Bureau of Statistics include eight major industries: energy-efficient and environmental technologies, next-generation information technology (IT), biotechnology, high-end equipment manufacturing, new energy, new materials, new energy vehicles, and digital technology. These industries are not only technology-intensive and consume a low level of physical resources, they also have high growth potential and thus affect the development of a wide range of other industries.

Emerging industries in China are growing faster than general manufacturing sectors. In the first half of 2019, the value-added of strategic emerging industries grew by 7.7% over the same period last year, accounting for 18.6% of the manufacturing value-added. Among these industries, the electronics and telecommunication equipment manufacturing industry grew by 11.6%, and the aerospace industry recorded 10.5% growth. In the case of commodities, the areas of 3D printing, smartwatches, service machines, eco-friendly cars, and solar batteries showed impressive growth rates in production, increasing by 271.4%, 162.9%, 86.5%, 34.6%, and 20.1%, respectively.

There is a fair case that the rapid growth of these emerging industries can be attributed to the huge domestic market in China and strong support from the Chinese government. The Chinese government has established long-term goals at the national level to foster emerging industries and is implementing national strategies to achieve them.

First, through participation in the international technology standardization process, China is aiming to enhance its competitiveness. In 2017, the Chinese-German Standardization Cooperation Committee announced reform measures for the standardization of industries such as smart manufacturing (Industry 4.0), electric vehicles, and intelligent connected vehicles. In September of that year, China, the United States, the EU, and Japan organized a working group for electric vehicle safety (EVS) to promote international standards for electric vehicles and battery safety. These efforts aim to reduce risk and increase market share through a strategy of industrial standardization through international cooperation.

Second, China is jointly conducting R&D by providing an infrastructure and development environment favorable to overseas companies. Through such research and development, the nation hopes to rapidly narrow the technology gap with advanced countries. Currently, China's representative autonomous driving project is Baidu's Apollo project. As of July 2018, more than 110 overseas and Chinese companies, including Honda, Ford, Hyundai, Microsoft, and NVIDIA, are participating in the Apollo project. The project operates on an open cooperation system that

*This article appeared in KIEP Opinions on October 30, 2019.
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provides partners with an autonomous driving platform and continuously develops technologies using their autonomous driving data.

Third, the Chinese government is striving to maximize synergies among industries. According to a plan released by the State Council in 2017, it will employ artificial intelligence (AI) in the fields of intelligent manufacturing, intelligent medical care, smart cities, smart agriculture, and try to raise the market size of the AI industry to 400 billion yuan by 2025. Through the development of these related industries, the government is striving to apply its policies in all directions possible, for instance by constructing AI platforms, establishing AI-powered courts, and taking measures to protect the AI environment. The Chinese government seeks to utilize IT technology to compensate for the large development gap between regions, while improving technology and accumulating know-how through experiences in the domestic market.

Fourth, the government aims to enhance competitiveness through a strategy that reduces market intervention and creates sound market order. As excessive government subsidies distort the market and burden the government's finances, the government is trying to reduce the size of subsidies and establish market order in the industry. Representative industries are those in which local companies show relative competitiveness, such as electric vehicles and the solar industry. The government plans to grant one renewable energy supply certificate (REC) per 1MWh of electricity produced through eco-friendly energy and introduce an REC trading system through a government-operated platform.

In addition, the current subsidy policy for new energy vehicles will be terminated by 2020. Instead, the “double mileage policy” seeks to promote industry standardization and drive market competition. Cars produced by automobile manufacturers are given negative scores according to their average chemical energy consumption, while new energy vehicles are given positive scores. If the cumulative score is negative, the company will be fined. According to the regulations, the cumulative scoring system will apply from 2019 to companies producing more than 30,000 passenger cars a year. Each company will be required to accumulate a certain ratio of points for the new energy vehicles they produce, with this ratio set at 10% and 12% by 2019 and 2020, respectively.

However, despite these strategies aimed at promoting development in emerging industries, they still struggle with a general lack of basic competencies. Local companies show low willingness to participate in the standardization process, which in turn is hampered by the behavior of companies producing products of similar quality due to excessive price competition. Also, advanced production equipment is highly dependent on imports. For example, 80% of the production equipment for integrated circuit chips depends on imports, while about 70% of main production equipment for automobiles depends on imports.

In this sense, China's emerging industries are growing rapidly in terms of size, and there are areas where Korea can share in this growth through cooperation with China. As Korea is limited in the size of its domestic market, it will be important to participate in the standardization process ongoing at China, particularly in industries where China is likely to lead industrial development in the future. The reason behind Japan's joint decision with China to determine the high-speed charging standard for electric vehicles is to gain an advantage in entering the Chinese market in the future.

Overcapacity and inefficiency remain in the domestic market due to excessive subsidies supported by the government. For example, in 2017, 17% and 10% of the annual amount of electricity generated from hydro-power and wind energy were discarded without being used. This is due to the lack of efficient transmission infrastructure between provinces and the lack of large-capacity electrical storage equipment and technologies. By identifying these local market

demands and providing the equipment and technology necessary for Chinese companies, it will be possible to prepare a bridgehead into the Chinese market.

The domestic gap within China is proving difficult to narrow because of the severe technological gap between provinces and the unbalanced distribution of researchers who play a key role in technological development. For example, in 2016, there were an estimated 169 million researchers nationwide, of which 104 million were active in eastern China, while only 11 million were situated in the northeast. Considering the large differences in technology levels among provinces, a localization strategy should be established by collaborating with local companies that desperately need the skills and equipment of Korean companies.

As China continues to grow in terms of its technological development and industrial competitiveness, Korea will above all need to agilely respond to these changes. Such a response should begin with an understanding of China's industry and cooperation between the two countries. Since technological cooperation with foreign-invested companies is one of the main drivers of growth in China's emerging industries, it is important to continuously study China's development strategy and cooperation process with foreign countries by industry. Urgent efforts should be made to realize opportunities to further Korea’s technological development through cooperation in China's emerging industries.

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Vol.7, No.1

Monetary Policy

Data-Dependent Monetary Policy in an Evolving Economy*

By JEROME H. POWELL*

Thank you for this opportunity to speak at the 61st annual meeting of the National Association for Business Economics.

At the Fed, we like to say that monetary policy is data dependent. We say this to emphasize that policy is never on a preset course and will change as appropriate in response to incoming information. But that does not capture the breadth and depth of what data-dependent decisionmaking means to us. From its beginnings more than a century ago, the Federal Reserve has gone to great lengths to collect and rigorously analyze the best information to make sound decisions for the public we serve.

The topic of this meeting, "Trucks and Terabytes: Integrating the 'New' and 'Old' Economies," captures the essence of a major challenge for data-dependent policymaking. We must sort out in real time, as best we can, what the profound changes underway in the economy mean for issues such as the functioning of labor markets, the pace of productivity growth, and the forces driving inflation.

Of course, issues like these have always been with us. Indeed, 100 years ago, some of the first Fed policymakers recognized the need for more timely information on the rapidly evolving state of industry and decided to create and publish production indexes for the United States. Today I will pay tribute to the 100 years of dedicated—and often behind the scenes—work of those tracking change in the industrial landscape.

I will then turn to three challenges our dynamic economy is posing for policy at present: First, what would the consequences of a sharp rise in the price of oil be for the U.S. economy? This question, which never seems far from relevance, is again drawing our attention after recent events in the Persian Gulf. While the question is familiar, technological advances in the energy sector are rapidly changing our assessment of the answer.

Second, with terabytes of data increasingly competing with truckloads of goods in economic importance, what are the best ways to measure output and productivity? Put more provocatively, might the recent productivity slowdown be an artifact of antiquated measurement?

Third, how tight is the labor market? Given our mandate of maximum employment and price stability, this question is at the very core of our work. But answering it in real time in a dynamic economy as jobs are gained in one area but lost in others is remarkably challenging. In August, the Bureau of Labor Statistics (BLS) announced that job gains over the year through March were likely a half-million lower than previously reported. I will discuss how we are using big data to

*This speech was given at "Trucks and Terabytes: Integrating the 'Old' and 'New' Economies" 61st Annual Meeting of the National Association for Business Economics on October 8, 2019.

*Jerome H. Powell, Chair of the Board of Governors of the Federal Reserve System

improve our grasp of the job market in the face of such revisions.

These three quite varied questions highlight the broad range of issues that currently come under the simple heading "data dependent." After exploring them, I will comment briefly on recent developments in money markets and on monetary policy.

A Century of Industrial Production

Our story of data dependence in the face of change begins when the Fed opened for business in 1914. World War I was breaking out in Europe, and over the next four years the war would fuel profound growth and transformation in the U.S. economy.[1] But you could not have seen this change in the gross national product data; the Department of Commerce did not publish those until 1942. The Census Bureau had been running a census of manufactures since 1905, but that came only every five years—an eternity in the rapidly changing economy. In need of more timely information, the Fed began creating and publishing a series of industrial output reports that soon evolved into industrial production indexes.[2] The indexes initially comprised 22 basic commodities, chosen in part because they covered the major industrial groups, but also for the practical reason that data were available with less than a one-month lag. The Fed's efforts were among the earliest in creating timely measures of aggregate production. Over the century of its existence, our industrial production team has remained at the frontier of economic measurement, using the most advanced techniques to monitor U.S. industry and nimbly track changes in production.

What Are the Consequences of an Oil Price Spike?

Let's turn now to the first question of the consequences of an oil price spike. Figure 1 shows U.S. oil production since 1920. After rising fairly steadily through the early 1970s, production began a long period of gradual decline. By 2005, production was at about the same level as it had been 50 years earlier. Since then, remarkable advances in the technology for finding and extracting oil have led to a rapid increase in production to levels higher than ever before.[3] In 2018, the United States became the world's largest oil producer.[4] Oil exports have surged, imports have fallen (figure 2), and the U.S. Energy Information Administration projects that this month, for the first time in many decades, the United States will be a net exporter of oil.[5]

[1] Hugh Rockoff (2004) analyzes the change that accompanied a 44-month expansion starting in 1914.

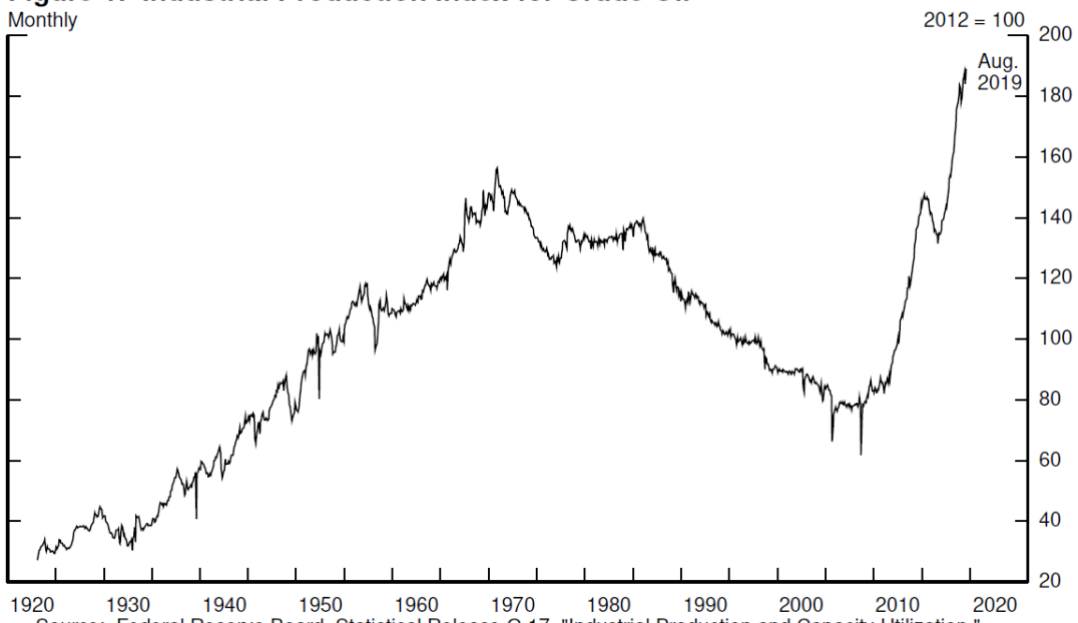
[2] For more information on the history of industrial production reporting at the Board, see "Celebrating 100 Years of the Industrial Production Index" at https://www.federalreserve.gov/releases/g17/100_years_of_ip_data.htm.

[3] Decker, Flaaen, and Tito (2016) explore reasons for the resilience of production, even in light of declines in oil prices.

[4] Department of Energy (2018).

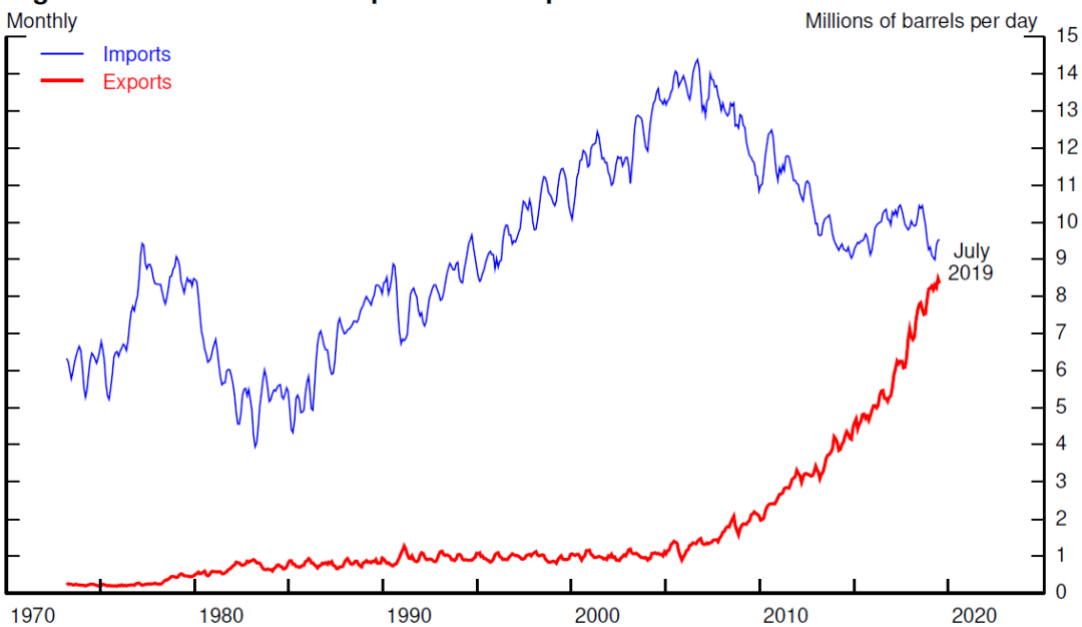
[5] The Energy Information Administration's Short-Term Energy Outlook (STEO; available at https://www.eia.gov/outlooks/steo), released on September 10, 2019, shows that the United States will become a net exporter of crude oil and liquid fuels by October 2019. A new STEO will be published today.

Figure 1. Industrial Production Index for Crude Oil



Source: Federal Reserve Board, Statistical Release G.17, "Industrial Production and Capacity Utilization."

Figure 2. Volume of Oil Imports and Exports



Note: Imports and exports are shown as a 3-month moving average and consist of crude oil and liquid fuels.
Source: U.S. Energy Information Administration.

As monetary policymakers, we closely monitor developments in oil markets because disruptions in these markets have played a role in several U.S. recessions and in the Great Inflation of the 1960s and 1970s. Traditionally, we assessed that a sharp rise in the price of oil would have a strong negative effect on consumers and businesses and, hence, on the U.S. economy. Today a higher oil price would still cause dislocations and hardship for many, but with

exports and imports nearly balanced, the higher price paid by consumers is roughly offset by higher earnings of workers and firms in the U.S. oil industry. Moreover, because it is now easier to ramp up oil production, a sustained price rise can quickly boost output, providing a shock absorber in the face of supply disruptions. Thus, setting aside the effects of geopolitical uncertainty that may accompany higher oil prices, we now judge that a price spike would likely have nearly offsetting effects on U.S. gross domestic product (GDP).

How Should We Measure Output and Productivity?

Let's now turn to the second question of how to best measure output and productivity. While there are some subtleties in measuring oil output, we know how to count barrels of oil. Measuring the overall level of goods and services produced in the economy is fundamentally messier, because it requires adding apples and oranges—and automobiles and myriad other goods and services. The hard-working statisticians creating the official statistics regularly adapt the data sources and methods so that, insofar as possible, the measured data provide accurate indicators of the state of the economy. Periods of rapid change present particular challenges, and it can take time for the measurement system to adapt to fully and accurately reflect the changes in the economy.

The advance of technology has long presented measurement challenges. In 1987, Nobel Prize–winning economist Robert Solow quipped that "you can see the computer age everywhere but in the productivity statistics."[6] In the second half of the 1990s, this measurement puzzle was at the heart of monetary policymaking.[7] Chairman Alan Greenspan famously argued that the United States was experiencing the dawn of a new economy, and that potential and actual output were likely understated in official statistics. Where others saw capacity constraints and incipient inflation, Greenspan saw a productivity boom that would leave room for very low unemployment without inflation pressures. In light of the uncertainty it faced, the Federal Open Market Committee (FOMC) judged that the appropriate risk management approach called for refraining from interest rate increases unless and until there were clearer signs of rising inflation. Under this policy, unemployment fell near record lows without rising inflation, and later revisions to GDP measurement showed appreciably faster productivity growth.[8]

This episode illustrates a key challenge to making data-dependent policy in real time: Good decisions require good data, but the data in hand are seldom as good as we would like. Sound decisionmaking therefore requires the application of good judgment and a healthy dose of risk management.

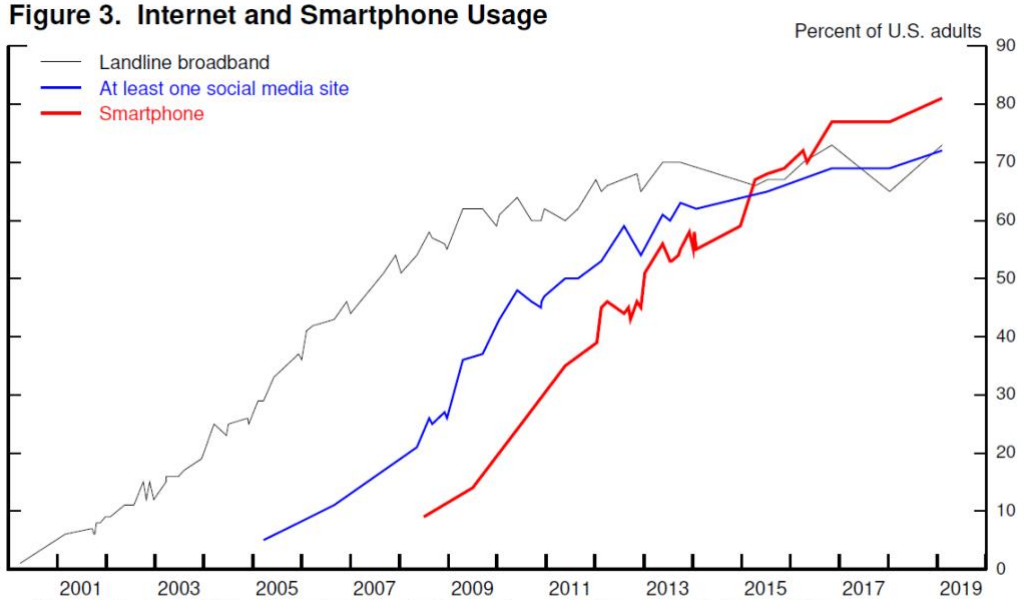
Productivity is again presenting a puzzle. Official statistics currently show productivity growth slowing significantly in recent years, with the growth in output per hour worked falling from more than 3 percent a year from 1995 to 2003 to less than half that pace since then.[9] Analysts are actively debating three alternative explanations for this apparent slowdown: First, the slowdown may be real and may persist indefinitely as productivity growth returns to more normal levels after a brief golden age.[10] Second, the slowdown may instead be a pause of the sort that often accompanies fundamental technological change, so that productivity gains from recent technology advances will appear over time as society adjusts.[11] Third, the slowdown may be overstated, perhaps greatly, because of measurement issues akin to those at work in the

[6] Solow (1987).
[7] I discuss and document this episode more fully in Powell (2018).
[8] Revision and the role of high tech is described in Seskin (1999) and Jorgenson, Ho, and Stiroh (2008).
[9] Between 1995 and 2003, business-sector output per hour increased at an annual rate of 3.4 percent, and it has risen only 1.4 percent since then. Fernald (2015) suggests 2003 as a break point for the beginning of the productivity slowdown.
[10] See Gordon (2017) and Fernald (2018).
[11] Brynjolfsson, Rock, and Syverson (2018).

1990s.[12] At this point, we cannot know which of these views may gain widespread acceptance, and monetary policy will play no significant role in how this puzzle is resolved. As in the late 1990s, however, we are carefully assessing the implications of possibly mis-measured productivity gains. Moreover, productivity growth seems to have moved up over the past year after a long period at very low levels; we do not know whether that welcome trend will be sustained.

Recent research suggests that current official statistics may understate productivity growth by missing a significant part of the growing value we derive from fast internet connections and smartphones. These technologies, which were just emerging 15 years ago, are now ubiquitous (figure 3). We can now be constantly connected to the accumulated knowledge of humankind and receive near instantaneous updates on the lives of friends far and wide. And, adding to the measurement challenge, many of these services are free, which is to say, not explicitly priced. How should we value the luxury of never needing to ask for directions? Or the peace and tranquility afforded by speedy resolution of those contentious arguments over the trivia of the moment?

Figure 3. Internet and Smartphone Usage



Note: Data are available at irregular intervals. The most recent values are for February 2019.
Source: Pew Research Center on Internet and Technology, extended by Byrne and Corrado (2019).

Researchers have tried to answer these questions in various ways.[13] For example, Fed researchers have recently proposed a novel approach to measuring the value of services consumers derive from cellphones and other devices based on the volume of data flowing over those connections.[14] Taking their accounting at face value, GDP growth would have been about 1/2 percentage point higher since 2007, which is an appreciable change and would be very good news. Growth over the previous couple of decades would also have been about 1/4 percentage point higher as well, implying that measurement issues of this sort likely account for only part of the productivity slowdown in current statistics. Research in this area is at an early stage, but this

[12] Hatzius and others (2016).
[13] In the case of Facebook, Brynjolfsson, Collis, and Eggers (2019) found that the median user required compensation of $48 to live without that social media platform for a month.
[14] Byrne and Corrado (2019).

example illustrates the depth of analysis supporting our data-dependent decisionmaking.

How Tight Is the Labor Market?

Let me now turn from the measurement issues raised by the information age to an issue that has long been at the center of monetary policymaking: How tight is the labor market? Answering this question is central to our outlook for both of our dual-mandate goals of maximum employment and price stability. While this topic is always front and center in our thinking, I am raising it today to illustrate how we are using big data to inform policymaking.

Until recently, the official data showed job gains over the year through March 2019 of about 210,000 a month, which is far higher than necessary to absorb new entrants into the labor force and thus hold the unemployment rate constant. In August, the BLS publicly previewed the benchmark data revision coming in February 2020, and the news was that job gains over this period were more like 170,000 per month—a meaningfully lower number that itself remains subject to revision. The pace of job gains is hard to pin down in real time largely because of the dynamism of our economy: Many new businesses open and others close every month, creating some jobs and ending others, and definitive data on this turnover arrive with a substantial lag. Thus, initial data are, in part, sophisticated guesses based on what is known as the birth–death model of firms.

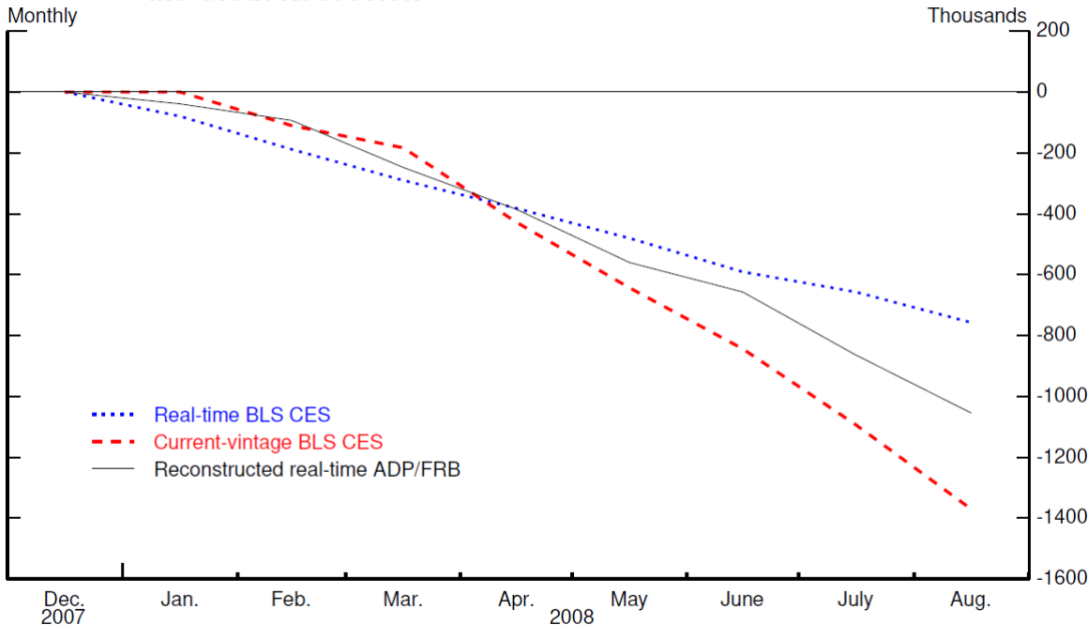
Several years ago, we began a collaboration with the payroll processing firm ADP to construct a measure of payroll employment from their data set, which covers about 20 percent of the nation's private workforce and is available to us with a roughly one-week delay.[15] As described in a recent research paper, we constructed a measure that provides an independent read on payroll employment that complements the official statistics.[16] While experience is still limited with the new measure, we find promising evidence that it can refine our real-time picture of job gains. For example, in the first eight months of 2008, as the Great Recession was getting underway, the official monthly employment data showed total job losses of about 750,000 (figure 4). A later benchmark revision told a much bleaker story, with declines of about 1.5 million. Our new measure, had it been available in 2008, would have been much closer to the revised data, alerting us that the job situation might be considerably worse than the official data suggested.[17]

[15] This share is comparable to that covered in the sample used by the BLS, but the BLS sample is designed to be representative, while the ADP sample is simply their customer base.

[16] Cajner and others (2019).

[17] Any example about the details of data deserves detailed comment. Our ADP-based estimate showed job losses of about 1 million over this period, considerably more than the real-time BLS data but well short of the post-benchmark value. This episode motivated the BLS to revise their procedures in ways that will reduce the revisions in similar episodes in the future. See BLS (2019) for a technical note last updated in August and BLS (2010).

Figure 4. Cumulative Real-Time Employment Losses at the Start of the Great Recession



Note: Cumulative private payroll employment losses. Real-time series indicate the data vintage available as of September 2009.
Source: For real time and current vintage, Bureau of Labor Statistics (BLS), Current Employment Statistics (CES); for reconstructed real time, ADP and Federal Reserve Board (FRB) staff calculations.

We believe that the new measure may help us better understand job market conditions in real time. The preview of the BLS benchmark revision leaves average job gains over the year through March solidly above the pace required to accommodate growth in the workforce over that time, but where we had seen a booming job market, we now see more-moderate growth. The benchmark revision will not directly affect data for job gains since March, but experience with past revisions suggests that some part of the benchmark will likely carry forward. Thus, the currently reported job gains of 157,000 per month on average over the past three months may well be revised somewhat lower. Based on a range of data and analysis, including our new measure, we now judge that, even allowing for such a revision, job gains remain above the level required to provide jobs for new entrants to the jobs market over time. Of course, the pace of job gains is only one of many job market issues that figure into our assessment of how the economy is performing relative to our maximum-employment mandate and our assessment of any inflationary pressures arising in the job market.

What Does Data Dependence Mean at Present?

In summary, data dependence is, and always has been, at the heart of policymaking at the Federal Reserve. We are always seeking out new and better sources of information and refining our analysis of that information to keep us abreast of conditions as our economy constantly reinvents itself. Before wrapping up, I will discuss recent developments in money markets and the current stance of monetary policy.

Our influence on the financial conditions that affect employment and inflation is indirect. The Federal Reserve sets two overnight interest rates: the interest rate paid on banks' reserve balances and the rate on our reverse repurchase agreements. We use these two administered rates to keep a market-determined rate, the federal funds rate, within a target range set by the FOMC. We rely on financial markets to transmit these rates through a variety of channels to the rates

paid by households and businesses—and to financial conditions more broadly.

In mid-September, an important channel in the transmission process—wholesale funding markets—exhibited unexpectedly intense volatility. Payments to meet corporate tax obligations and to purchase Treasury securities triggered notable liquidity pressures in money markets. Overnight interest rates spiked, and the effective federal funds rate briefly moved above the FOMC's target range. To counter these pressures, we began conducting temporary open market operations. These operations have kept the federal funds rate in the target range and alleviated money market strains more generally.

While a range of factors may have contributed to these developments, it is clear that without a sufficient quantity of reserves in the banking system, even routine increases in funding pressures can lead to outsized movements in money market interest rates. This volatility can impede the effective implementation of monetary policy, and we are addressing it. Indeed, my colleagues and I will soon announce measures to add to the supply of reserves over time. Consistent with a decision we made in January, our goal is to provide an ample supply of reserves to ensure that control of the federal funds rate and other short-term interest rates is exercised primarily by setting our administered rates and not through frequent market interventions. Of course, we will not hesitate to conduct temporary operations if needed to foster trading in the federal funds market at rates within the target range.

Reserve balances are one among several items on the liability side of the Federal Reserve's balance sheet, and demand for these liabilities—notably, currency in circulation—grows over time. Hence, increasing the supply of reserves or even maintaining a given level over time requires us to increase the size of our balance sheet. As we indicated in our March statement on balance sheet normalization, at some point, we will begin increasing our securities holdings to maintain an appropriate level of reserves.[18] That time is now upon us.

I want to emphasize that growth of our balance sheet for reserve management purposes should in no way be confused with the large-scale asset purchase programs that we deployed after the financial crisis. Neither the recent technical issues nor the purchases of Treasury bills we are contemplating to resolve them should materially affect the stance of monetary policy, to which I now turn.

Our goal in monetary policy is to promote maximum employment and stable prices, which we interpret as inflation running closely around our symmetric 2 percent objective. At present, the jobs and inflation pictures are favorable. Many indicators show a historically strong labor market, with solid job gains, the unemployment rate at half-century lows, and rising prime-age labor force participation. Wages are rising, especially for those with lower-paying jobs. Inflation is somewhat below our symmetric 2 percent objective but has been gradually firming over the past few months. FOMC participants continue to see a sustained expansion of economic activity, strong labor market conditions, and inflation near our symmetric 2 percent objective as most likely. Many outside forecasters agree.

But there are risks to this favorable outlook, principally from global developments. Growth around much of the world has weakened over the past year and a half, and uncertainties around trade, Brexit, and other issues pose risks to the outlook. As those factors have evolved, my colleagues and I have shifted our views about appropriate monetary policy toward a lower path for the federal funds rate and have lowered its target range by 50 basis points. We believe that our policy actions are providing support for the outlook. Looking ahead, policy is not on a preset course. The next FOMC meeting is several weeks away, and we will be carefully monitoring

[18] See the Balance Sheet Normalization Principles and Plans, which are available on the Board's website at https://www.federalreserve.gov/newsevents/pressreleases/monetary20190320c.htm.

incoming information. We will be data dependent, assessing the outlook and risks to the outlook on a meeting-by-meeting basis. Taking all that into account, we will act as appropriate to support continued growth, a strong job market, and inflation moving back to our symmetric 2 percent objective.

References

Brynjolfsson, Erik, Avinash Collis, and Felix Eggers (2019). "Using Massive Online Choice Experiments to Measure Changes in Well-Being," Proceedings of the National Academy of Sciences, vol. 116 (April), pp. 7250–55.

Brynjolfsson, Erik, Daniel Rock, and Chad Syverson (2018). The Productivity J-Curve: How Intangibles Complement General Purpose Technologies. NBER Working Paper Series 25148. Cambridge, Mass.: National Bureau of Economic Research, October.

Bureau of Labor Statistics (2010). "Benchmark Article: BLS Establishment Estimates Revised to Incorporate March 2009 Benchmarks (PDF)," February 23.

——— (2019). "Introduction of Quarterly Birth/Death Model Updates in the Establishment Survey," Current Employment Statistics, August 28.

Byrne, David M., and Carol Corrado (2019). "Accounting for Innovations in Consumer Digital Services: IT Still Matters (PDF)," Finance and Economics Discussion Series 2019-049. Washington: Board of Governors of the Federal Reserve System, June.

Cajner, Tomaz, Leland D. Crane, Ryan A. Decker, Adrian Hamins-Puertolas, and Christopher Kurz (2019). "Improving the Accuracy of Economic Measurement with Multiple Data Sources: The Case of Payroll Employment Data (PDF)," Finance and Economics Discussion Series 2019-065. Washington: Board of Governors of the Federal Reserve System, September.

Decker, Ryan, Aaron Flaaen, and Maria Tito (2016). "Unraveling the Oil Conundrum: Productivity Improvements and Cost Declines in the U.S. Shale Oil Industry," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, March 22.

Fernald, John G. (2015). "Productivity and Potential Output before, during, and after the Great Recession," in Jonathan A. Parker and Michael Woodford, eds., NBER Macroeconomics Annual 2014, vol. 29. Chicago: University of Chicago Press, pp. 1–51.

——— (2018). "Is Slow Productivity and Output Growth in Advanced Economies the New Normal?" International Productivity Monitor, no. 35 (Fall), pp. 138–48.

Gordon, Robert J. (2017). The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War. Princeton, N.J.: Princeton University Press.

Hatzius, Jan, Zach Pandl, Alec Phillips, David Mericle, Elad Pashtan, Daan Struyven, Karen Reichgott, and Avisha Thakkar (2016). "Productivity Paradox v2.0 Revisited," U.S. Economics Analyst, Goldman Sachs Economics Research, September 2.

Jorgenson, Dale W., Mun S. Ho, and Kevin J. Stiroh (2008). "A Retrospective Look at the U.S. Productivity Growth Resurgence," Journal of Economic Perspectives, vol. 22 (Winter), pp. 3–24.

Powell, Jerome H. (2018). "Monetary Policy in a Changing Economy," speech delivered at "Changing Market Structure and Implications for Monetary Policy," a symposium sponsored by the Federal Reserve Bank of Kansas City, held in Jackson Hole, Wyo., August 23–25.

Rockoff, Hugh (2004). "Until It's Over, Over There: The U.S. Economy in World War I," NBER Working Paper Series 10580. Cambridge, Mass.: National Bureau of Economic Research, June.

Seskin, Eugene P. (1999). "Improved Estimates of the National Income and Product Accounts for 1959–98: Results of the Comprehensive Revision," Survey of Current Business, vol. 79 (December), pp. 15–43.

Solow, Robert M. (1987). "We'd Better Watch Out," New York Times Book Review, July 12.
U.S. Department of Energy (2018). "U.S. Becomes World's Largest Crude Oil Producer and Department of Energy Authorizes Short Term Natural Gas Exports," press release, September 13.
U.S. Environmental Protection Agency (2016). Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States, final report. Washington: EPA, December, available at http://cfpub.epa.gov/ncea/hfstudy/recordisplay.cfm?deid=332990.

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Monetary Policy, Price Stability, and Equilibrium Bond Yields: Success and Consequences*

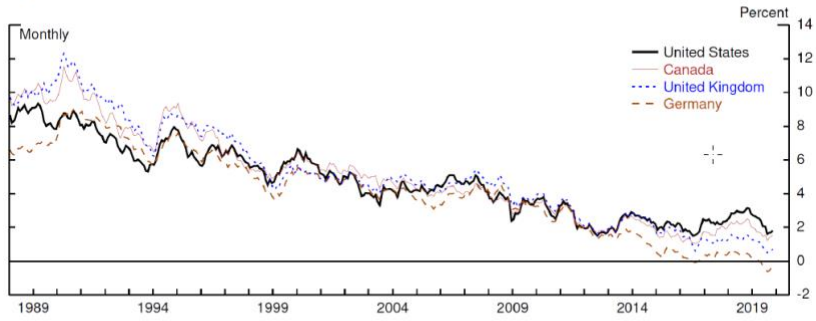
By RICHARD H. CLARIDA*

Good morning. I am honored and delighted to participate in this second annual conference on global risk, uncertainty, and volatility, cosponsored by the Federal Reserve Board, the Bank for International Settlements, and the Swiss National Bank.[1] I would like especially to thank the Swiss National Bank for hosting this event. This conference is part of continuing work across all of our institutions and the academic community to better quantify and assess the implications of risk and uncertainty. I am pleased that this year the focus of the conference is on two of my long-standing professional interests—financial markets and monetary policy. And my remarks today will not stray far from those interests. In particular, I would like to address an issue that has been much in focus—the decline in long-term interest rates—highlighting the role of monetary policy in contributing to that decline and the implications of that decline for the conduct of monetary policy.

The Decline in Long-Term Interest Rates and the Role of Monetary Policy

One of the most remarkable and fundamental changes in the global financial landscape over the past three decades has been the steady and significant decline in global sovereign bond yields. From the late 1980s, when 10-year nominal Treasury yields in the United States and sovereign rates in many other major advanced economies were around 10 percent, global bond yields in the advanced economies have trended lower to levels below 2 percent today (figure 1, "Bond Yields").

Figure 1: Bond Yields



Note: 10-year generic government bond yields.
Source: Bloomberg Finance LP.

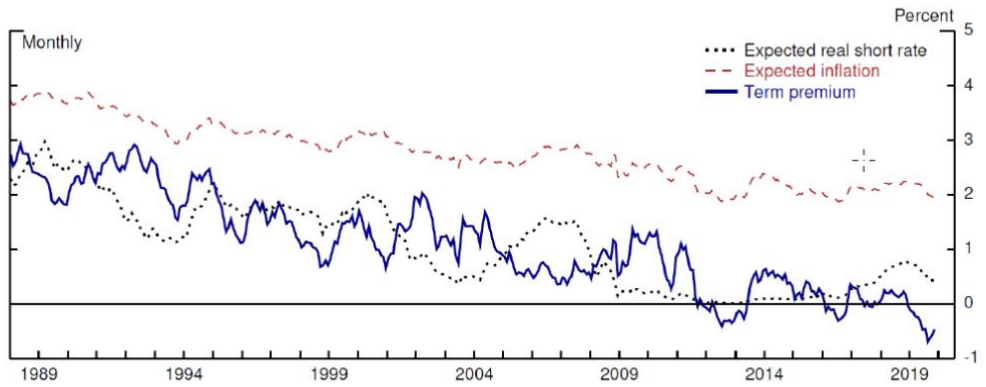
*This speech was given at the High-Level Conference on Global Risk, Uncertainty, and Volatility on November 12, 2019.

* Richard H. Clarida, Vice Chair of the Board of Governors of the Federal Reserve System

[1] The views expressed are my own and not necessarily those of the Federal Reserve Board or the Federal Open Market Committee. I would like to thank Vickie Chang, Stephanie Curcuru, Caitlin Dutta, Eric Engstrom, Don Kim, Jack McCoy, Andrew Meldrum, Katia Peneva, Marius Rodriguez, Beth Anne Wilson, and Emre Yoldas for their assistance in preparing this speech.

To understand and interpret this decline, it is useful to think of the yield on a nominal 10-year bond as the sum of two components: investors' expectation over the next 10 years of the average level of short-term interest rates plus a term premium. The term premium is the additional compensation—relative to investing in and rolling over short-maturity bills—that bondholders require for assuming the risk of holding a long-duration asset with greater exposure to interest rate and inflation volatility. Importantly, according to economic theory the equilibrium term premium can be negative. In this case, which is relevant today in the United States and some other countries, the exposure to interest rate and inflation volatility embedded in a long-maturity bond is more than offset by the potential value of the bond in hedging other risks, such as equity risk.[2] The expectation of the average level of future short-term interest rates can, in turn, be decomposed into the expectation of average future real interest rates and the expectation of average future inflation rates. Performing this standard decomposition reveals that the decline in long-term rates reflects declines in all three components: expected real rates, expected inflation, and the term premium (figure 2, "Yield Decomposition"). I will now discuss each of these components in turn.

Figure 2: Yield Decomposition



Note: Decomposition of the 10-year zero-coupon U.S. Treasury yield based on the model presented in Kim, Walsh, and Wei (2019).

Source: Federal Reserve Bank of New York; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters; Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Financial Forecasts; Board staff calculations.

With respect to expected real short-term interest rates, one reason investors expect lower future short-term interest rates is that neutral interest rates appear to have declined worldwide and are expected to remain low. This concept of a neutral level for short-term real interest rates is referred to in the academic literature as r* and corresponds to the rate consistent with a level of aggregate demand equal to and growing in pace with aggregate supply at an unchanged rate of inflation. Longer-run secular trends in r* largely, or even entirely, reflect fundamental "real" factors that are outside the control of a central bank. Policymakers and academics alike, including myself, have spent considerable time exploring the reasons for and ramifications of the

[2] Term premium estimates have been negative in the euro area and Japan for several years. See Cohen, Hördahl, and Xia (2018) and International Monetary Fund (2018).

decline in r* across countries.[3] For example, many have pointed to slowing population growth and a moderation in the pace of technological change as consistent with a lower level of r*.[4] Changes in risk tolerance and regulations have led to an increase in savings and in the demand for safe assets, pushing down yields on sovereign bonds.[5] Importantly, economic theory suggests and empirical research confirms that there is a significant common global component embedded in individual country r*s (figure 3, "Estimates of r*").[6] This common factor driving individual country r*s not only reflects the influence of common global shocks affecting all economies in a similar way (for example, a slowdown in global productivity and the demographics associated with aging), but also results from international capital flows that respond to and, over time, tend to narrow divergences in rates of return offered across different countries. Other things being equal, a decline in the common factor driving individual country r*s that is evident in the data would be expected to produce a comparable common decline in global bond yields.

Figure 3: Estimates of r*

Note: The foreign r* shown in the chart captures the comovement of r*in Canada, the euro area, and the United Kingdom with the U.S. r*. Specifically, the foreign r* is a linear combination of the r*s for Canada, the euro area, and the United Kingdom. The weights are equal to (minus) the cointegrating vector coefficient for each country as reported in Holston, Laubach, and Williams (2017) from a vector-error-correction model fitted to r*s in the United States, Canada, the euro area, and the United Kingdom.
Source: Holston, Laubach, and Williams (2017); Clarida (2019); Board staff calculations.

In addition to the decline in r* around the world, lower long-term bond yields also reflect the influence of the initial downshift and ultimate anchoring of inflation expectations in many countries after the mid-1990s. Unlike the decline in r*, which primarily reflects fundamental "real" factors that are outside the control of a central bank, the decline and ultimate anchoring of inflation and inflation expectations in both major and many emerging economies were the direct consequence of the widespread adoption and commitment to transparent, flexible inflation-targeting monetary policy strategies. For example, in the United States, after the collapse of Bretton Woods, inflation spiraled upward, hitting double-digit rates in the 1970s and

[3] See, for instance, Fischer (2016a, 2016b, 2017) and Clarida (2019).
[4] Most papers—such as Carvalho, Ferrero, and Nechio (2016); Gagnon, Johannsen, and Lopez-Salido (2016); and Eggertsson, Mehrotra, and Robbins (2017)—estimate that demographics can explain between 1 and 2 percentage points of the decline in r*.
[5] See Williams (2016, 2017); Caballero, Farhi, and Gourinchas (2017); Glick (2019); Chen, Karabarbounis, and Neiman (2017); and Dao and Maggi (2018) for a discussion of the potential drivers for the increase in the supply of savings and increased demand for safe assets. Other factors cited for lower real rates include low productivity growth (Rachel and Summers, 2019) and secular stagnation due to insufficient aggregate demand (Summers, 2015).
[6] See Holston, Laubach, and Williams (2017); Clarida (2019); and Jorda and others (2019).

early 1980s. But by the mid-1980s, the back of inflation had been broken (thank you, Paul Volcker), and total personal consumption expenditure (PCE) inflation averaged less than 4 percent from 1985 to 1990. Following the 1990–91 recession, inflation fell further, and, by the mid-1990s, the conditions for price stability in the United States had been achieved (thank you, Alan Greenspan). From the mid-1990s until the Great Recession, U.S. PCE inflation averaged about 2 percent. And, of course, this step-down in inflation has been global, with the other major advanced economies experiencing a similar shift down (table 1, "Average Inflation Rates"). Many major emerging market economies as well have seen a remarkable and very welcome decline in average inflation rates as a result of adopting and delivering on credible inflation-targeting polices. To the extent that the step-down in inflation is expected to persist, which appears to be the case, long-term yields have reflected this decline one-for-one.

Table 1: Average Inflation

Region	1970–1994	1995–2018
United States*	5.2	1.8
Memo: US core inflation	*5.1*	*1.7*
Other advanced economies**	6.7	1.4
Emerging market economies***	32.7	6.6

*For the United States, inflation is the annualized quarterly percent change in the price index for personal consumption expenditures (PCE). Core inflation is the annualized quarterly percent change in the price index for PCE less food and energy.

**Staff estimate. Begins in the third quarter of 1970. Based on a weighted average of Australia, Canada, the euro area, Japan, Sweden, Switzerland, and the United Kingdom. For the euro area, inflation is the annualized quarterly percent change in the harmonized index of consumer prices, extended back to 1970 using Euro Area Business Cycle Network data. For all other countries, inflation is the annualized quarterly percent change in the consumer price index (CPI). Countries' weights are based on real GDP at chained purchasing power parity.

***Staff estimate. Begins in the third quarter of 1971. Based on a weighted average of Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Saudi Arabia, Singapore, Taiwan, Thailand, Venezuela, and Vietnam. The data for Venezuela end in 2005. Countries' weights are based on real GDP at chained purchasing power parity.

Source: Board staff calculations; Haver Analytics; Robert C. Feenstra, Robert Inklaar, and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table," *American Economic Review*, 105 (October), pp. 3150–82, available for download at www.ggdc.net/pwt.

However, not only has the average level of inflation fallen, but inflation has also become more stable. After considerable volatility in the 1970s and 1980s, over the past few decades, inflation—especially core inflation, which excludes volatile food and energy prices—has, with rare exceptions, moved only within a relatively narrow range in many countries despite significant swings in the prices of oil and other commodities, recessions, the Global Financial Crisis, and unprecedented monetary policy actions. Reflecting this, inflation volatility, as measured by the standard deviation in quarterly inflation rates, has declined. (See table 2, "Standard Deviation of Annualized Quarterly Headline Inflation Rates.")

Table 2: Standard Deviation of Annualized Quarterly Inflation Rates

Region	1970–1994	1995–2018
United States*	2.8	1.5
Memo: US core inflation	*2.2*	*.5*
Other advanced economies**	3.8	1.0
Emerging market economies***	25.1	4.8

*For the United States, inflation is the annualized quarterly percent change in the price index for personal consumption expenditures (PCE). Core inflation is the annualized quarterly percent change in the price index for PCE less food and energy.

**Staff estimate. Begins in the third quarter of 1970. Based on a weighted average of Australia, Canada, the euro area, Japan, Sweden, Switzerland, and the United Kingdom. For the euro area, inflation is the annualized quarterly percent change in the harmonized index of consumer prices, extended back to 1970 using Euro Area Business Cycle Network data. For all other countries, inflation is the annualized quarterly percent change in the consumer price index (CPI). Countries' weights are based on real GDP at chained purchasing power parity.

***Staff estimate. Begins in the third quarter of 1971. Based on a weighted average of Argentina, Brazil, Chile, China, Colombia, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Mexico, Philippines, Russia, Saudi Arabia, Singapore, Taiwan, Thailand, Venezuela, and Vietnam. The data for Venezuela end in 2005. Countries' weights are based on real GDP at chained purchasing power parity.

Source: Board staff calculations; Haver Analytics; Robert C. Feenstra, Robert Inklaar, and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table," *American Economic Review*, 105 (October), pp. 3150–82, available for download at www.ggdc.net/pwt.

What has been behind this global decline in inflation volatility? I would argue, as have many others, that monetary policy played a key role in reducing not only the average rate of inflation, but also the volatility of inflation.[7] Inflation-targeting monetary policy can plausibly influence the variance of inflation through several channels. For example, in a textbook DSGE (dynamic stochastic general equilibrium) model (Clarida, Galí, and Gertler (CGG), 1999) featuring a central bank that implements policy via a Taylor-type rule, the equilibrium variance of inflation will be lower the more aggressively the central bank leans against exogenous shocks that push inflation away from target. So even if the variance of inflation shocks is constant, the variance of inflation itself will be an endogenous function of monetary policy. Another related channel through which monetary policy can influence the variance of inflation is by changing the equilibrium persistence of inflation deviations from target. In the textbook CGG model (1999), augmented with a hybrid Phillips curve that features an inertial backward-looking component, the equilibrium persistence of inflation is an endogenous function of the monetary policy rule such that the more aggressively the central bank leans against exogenous shocks that push inflation away from target, the less persistent are inflation deviations from target in equilibrium. In the simple case in which equilibrium inflation is a first-order autoregressive process (as it is in the CGG (1999) model under optimal policy), the equilibrium unconditional variance of inflation is monotonic in inflation persistence for any given constant variance of inflation shocks. Of course, non-monetary factors may also have contributed to a lower variance of inflation. For example, the variance of underlying exogenous shocks to aggregate supply and demand may have fortuitously and coincidentally fallen in tandem with the adoption of inflation targeting in many countries.

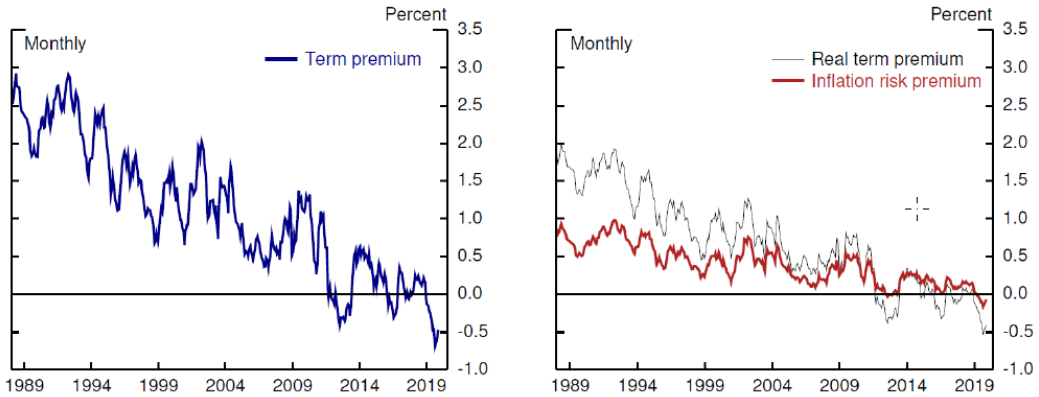
I will now turn to a third factor behind the decline in global bond yields, the decline in term premiums that is estimated to have occurred in many countries over the past 20 years. Most

[7]This view has also long been shared by fellow monetary policymakers. See, for example, Bernanke (2007b) and Powell (2018).

studies find that term premiums have fallen substantially in major economies over the past 20 years, and that in the United States term premiums may have been negative for some time. Decomposing the factors that drive equilibrium term premiums is an active area of academic research, and I will not attempt to summarize or synthesize this vast literature.[8] But I would like to emphasize what seems to me to be three contributors to the decline in the term premium in the United States and perhaps in other countries as well.[9]

First, the decline in inflation volatility has almost certainly been important in driving the term premium on nominal bonds lower. The real ex-post payoff from holding a nominal bond to maturity is directly exposed to price-level risk, and thus, all else being equal, a decline in inflation volatility makes the real purchasing power of the bond's payoff less risky. Through this channel, the decline in inflation volatility should be reflected in a smaller inflation risk premium in nominal bond yields, which is exactly what is estimated in the Kim, Walsh, and Wei (2019) yield curve model (figure 4, "Term Premium Decomposition"). Indeed, this yield curve model attributes around 100 basis points of the decline in the U.S. 10-year nominal term premium since the early 1990s to a decline in the inflation risk premium.

Figure 4: Term Premium Decomposition



Note: Decomposition of the 10-year zero-coupon U.S. Treasury yield based on the model presented in Kim, Walsh, and Wei (2019).

Source: Federal Reserve Bank of New York; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters; Wolters Kluwer Legal and Regulatory Solutions U.S., Blue Chip Financial Forecasts; Board staff calculations.

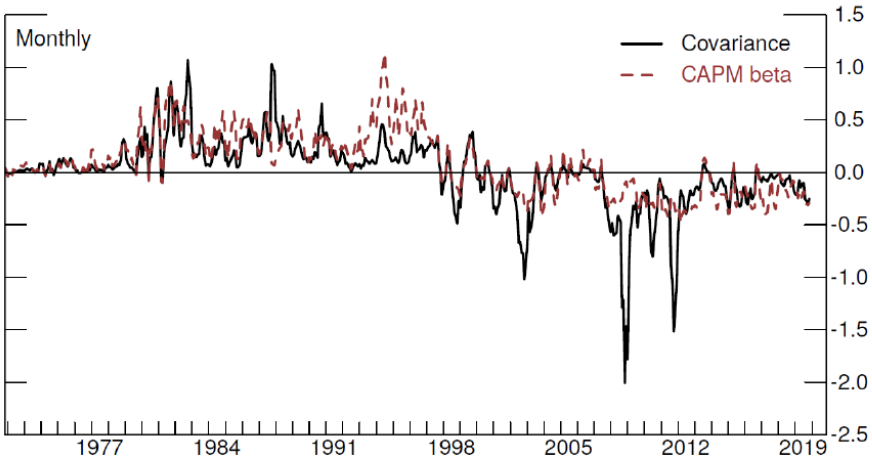
A second likely contributor to the decline in the U.S. term premium over the past decade is the Federal Reserve's substantial purchases of long-duration Treasury securities and mortgage-backed securities in three large-scale asset purchase (LSAP) programs and one maturity extension program between late 2008 and late 2014. These purchases, which were concentrated at the longer end of the U.S. yield curve, took duration out of the market and thus lowered the equilibrium yield required by investors to hold the reduced supply of long-duration assets instead of holding and rolling over short-maturity Treasury bills. Estimates of the cumulative effect of these purchases on the U.S. term premium span a wide range, with some

[8] Gürkaynak and Wright (2012) provide a survey.

[9] For estimates of term premiums in other countries, see Cohen, Hördahl, and Xia (2018), and International Monetary Fund (2018).

estimates above 100 basis points.[10] Moreover, the global market for sovereign bonds and currency-hedged duration is tightly integrated, and it seems likely that asset purchase programs in other major economies, such as Japan, the euro area, and the United Kingdom, have contributed as well to reducing the term premium in Treasury securities (and, of course, LSAP programs in the United States likely contributed to lower term premiums abroad).

Figure 5: Bond-Stock Covariance in the United States



Note: 10-year Treasury returns are constructed from zero-coupon yields. The covariance and Capital Asset Pricing Model (CAPM) beta are estimated from a rolling window of 3 months of daily data.

Source: Bloomberg Finance LP; Federal Reserve Bank of New York; Board staff calculations.

A third contributor to a lower U.S. term premium is much less widely appreciated than lower inflation volatility and LSAPs. This reflects the value that bonds have provided over the past 20 years as a hedge against equity risk. As documented by Campbell, Sunderam, and Viceira (CSV) (2017) and Campbell, Pflueger, and Viceira (CPV) (forthcoming), the empirical correlation between U.S. bond and stock returns changed sign in the late 1990s from positive to negative (figure 5, "Bond–Stock Covariance in the United States"). In the 1970s and 1980s, the sign of the correlation was positive, which implies that bond and stock returns tended to rise and fall together. In this period, bonds provided a diversification benefit when added to an equity portfolio (the bond return beta to stocks averaged 0.2) but not a hedge against equity risk. Since the late 1990s, the empirical correlation between bond and stock returns has typically been negative (the bond return beta to stocks has averaged negative 0.2). This means that since the late 1990s, bond returns tend to be high and positive when stock returns are low and negative so that nominal bonds have been a valuable outright hedge against equity risk. As such, we would expect the equilibrium yield on bonds to be lower than otherwise, as investors should bid up their price to reflect their value as a hedge against equity risk (relative to their value when the bond beta to stocks was positive). According to CSV, the hedging value of nominal bonds with a negative beta to stocks could substantially lower the equilibrium term premium on bonds. Quoting from their paper (page 265),

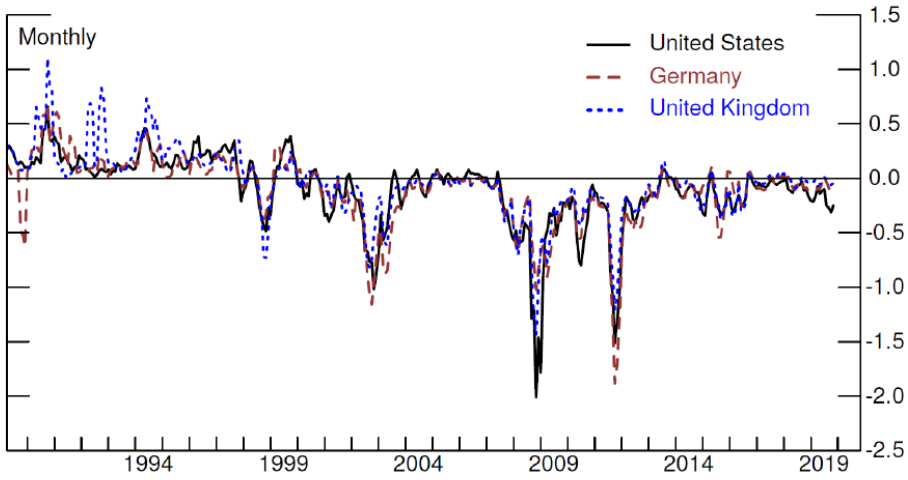
[10] For recent reviews, see Kuttner (2018) and Gagnon (2016). Hamilton and Wu (2012) and Li and Wei (2013), among others, study the effects of the Fed's asset purchases in a term structure model setting.

"Thus from peak to trough, the realized beta of Treasury bonds has declined by about 0.6 and has changed sign. According to the CAPM [capital asset pricing model], this would imply that term premia on 10-year zero-coupon Treasuries should have declined by 60 percent of the equity premium."[11]

As a concrete example, consider the (ex-post) hedging value of bonds for equity risk in the Global Financial Crisis. In 2008, the total return on the S&P 500 index was around minus 37 percent, while the total return of the on-the-run 30-year Treasury bond was about 38 percent!

There is likely no single explanation for the change in sign of the correlation between equilibrium bond and stock returns in the United States and in other major countries (figure 6, "Bond–Stock Covariances in Advanced Economies").[12] One recent paper that does rigorously model the changing value of bonds for hedging equity risk is by CPV. This paper develops and estimates a habit persistence consumption asset pricing model in which the sign of the equilibrium covariance between equity and bond returns depends on the reduced-form correlation between inflation and the output gap, the correlation between the federal funds rate and the output gap, as well as the equilibrium persistence of inflation. CPV document in U.S. data, for a sample spanning 1979:Q3 to 2011:Q4, that (1) the correlation between inflation and the output gap changed sign from negative to positive; that (2) the correlation between the federal funds rate and the output gap changed sign, also from negative to positive; and that (3) the evidence of the sign change becomes statistically significant beginning in the late 1990s. CPV also document that the transitory component of inflation becomes much less persistent after the estimated break in their sample.

Figure 6: Bond-Stock Covariances in Advanced Economies



Note: 10-year bond returns are constructed from zero-coupon yields for United States and generic bond yields for other advanced economies. Covariances are estimated from a rolling window of 3 months of daily data.

Source: Bloomberg Finance LP; Federal Reserve Bank of New York; Board staff calculations.

[11] To elaborate a bit, this estimate of the implied decline in term premium may be on the larger side of estimates, because the term premium represents an expected average bond risk premium over the life of the bond and because the CAPM beta is expected to shrink as the bond's remaining time-to-maturity shrinks.

[12] See, for instance, d'Addona and Kind (2006); Bekaert, Engstrom, and Grenadier (2010); Eraker (2008); and Bansal and Shaliastovich (2013).

The CPV paper is agnostic as to why the reduced-form correlation between inflation and the output gap and that between the federal funds rate and the output gap both change sign in their sample, but the authors do demonstrate that in their asset pricing model, these reduced-form sign changes are sufficient to generate the sign change in the correlation between equity and bond returns that we observe in the data.

I, myself, believe that the change in the U.S. monetary policy regime that began in 1979 under Paul Volcker and that was extended by Alan Greenspan in the 1990s very likely contributed to the change in the sign of the correlation between inflation and the output gap as well as the change in sign of the correlation between the federal funds rate and the output gap that we observe in the data (Clarida, Galí, and Gertler, 2000). These are the sorts of patterns that a simple model of optimal monetary policy would produce when starting from an initial condition in which inflation is well above the (implicit) target, as was the case in 1979. High initial inflation triggers a policy response for the central bank to push up the real policy rate well above inflation in order to push output below potential, which, via the Phillips curve, will, over time, lower inflation toward the target. If this policy succeeds ex post, inflation expectations become anchored at the new lower level of inflation, and policy can, then, respond to demand shocks by adjusting real rates pro-cyclically, the opposite of what is required when initial inflation is too high and inflation expectations are not anchored.[13] Inflation will also be pro-cyclical with well-anchored inflation expectations if demand shocks dominate and inflation expectations remain anchored.

Implications for Monetary Policy: The Federal Reserve's Framework Review

By lowering expected inflation, by anchoring expected inflation at a low level, by contributing to a reduction in the volatility of inflation—and thus a reduction in the inflation risk premium—and by contributing to creating a hedging value of long-duration sovereign bonds, inflation-targeting monetary policy has lowered equilibrium bond yields relative to equilibrium short rates substantially compared with the experience of the 1970s and early 1980s. But, as I noted earlier, during the past decade equilibrium short rates have themselves also fallen substantially. These two phenomena, taken together, have resulted in sovereign bond yields that are substantially lower than the pre-crisis experience and thus substantially closer to the effective lower bound for the policy rate than they were before the crisis. But what does this mean for monetary policy? At its most basic level, the answer to this question could depend on how far the nominal policy rate is from the effective lower bound (ELB) and the extent to which the term premium on long-duration bonds can become even more negative than it is at present (at least in the United States).[14] While I do not have a precise answer to this question, I will confess that I think it highly unlikely in the next downturn, whenever it is, that 10-year U.S. Treasury yields will fall by the roughly 390 basis points that we observed between June 2007 and July 2016 (the bottom in Treasury yields in this cycle) or even decline by the roughly 360 basis points that we observed between January 2000 and June 2003.

The reality of low neutral rates and equilibrium bond yields has motivated us at the Federal Reserve to take a hard look this year at our monetary policy strategy, tools, and communication practices. While we believe our existing framework, in place since 2012, has served us well, we believe now is a good time to step back and assess whether, and in what possible ways, we can refine our strategy, tools, and communication practices to achieve and maintain our goals as

[13] Hoek, Kamin, and Yoldas (2019) show that monetary policy actions that are interpreted as responses to rising inflation have more adverse spillovers to emerging markets than actions motivated by growth shocks.

[14] For assessments of the risks that U.S. monetary policy will be constrained by the ELB and its implications for economic activity and inflation,see Kiley and Roberts (2017), Erceg and others (2018), Swanson (2018), and Chung and others (2019).

consistently and robustly as possible in the world we live in today.[15] As I have noted before, the review of our current framework is wide ranging, and we are not prejudging where it will take us, but events of the past decade highlight three broad questions that we will seek to answer with our review.

The first question is, "Can the Federal Reserve best meet its statutory objectives with its existing monetary policy strategy, or should it consider strategies that aim to reverse past misses of the inflation objective?" Central banks are generally believed to have effective tools for preventing persistent inflation overshoots. But persistent inflation shortfalls, such as those associated with the ELB, carry the risk that longer-term inflation expectations become anchored below the stated inflation goal.[16] At our September Federal Open Market Committee (FOMC) meeting, we discussed options for mitigating ELB risks, including "makeup" strategies in which policymakers would promise to make up for past inflation shortfalls with a sustained accommodative stance of policy intended to generate higher future inflation.[17] Such strategies provide accommodation at the ELB by keeping the policy rate low for an extended period. Makeup strategies may also help anchor inflation expectations more firmly at 2 percent than would a policy strategy that does not compensate for past inflation misses. But the benefits of makeup strategies depend importantly on the private sector's understanding of them as well as the belief that future policymakers will follow through on promises to keep policy accommodative. An advantage of our current framework over makeup approaches is that it has provided the Committee with the flexibility to assess a broad range of factors and information in choosing its policy actions, and these actions can vary depending on economic circumstances in order to best achieve our dual-mandate goals.

We are also considering whether our existing monetary policy tools are adequate to achieve and maintain maximum employment and price stability, or whether our toolkit should be expanded and, if so, how. Because the U.S. economy required additional support after the ELB was reached in 2008, the FOMC deployed two additional tools beyond changes to the target for the federal funds rate: balance sheet policies and forward guidance about the likely path of the federal funds rate.[18]The review is examining the efficacy of these existing tools, as well as additional tools for easing policy when the ELB is binding, in light of the more recent experiences of other economies.

Finally, we are focusing on how the FOMC can improve the communication of its policy framework and actions. Our communication practices have evolved considerably since 1994, when the Federal Reserve released the first statement after an FOMC meeting.[19] As part of the review, we are assessing the Committee's current and past communications and additional forms of communication that could be helpful.

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[15]Fuhrer and others (2018) explore the desirability of comprehensive reviews of the monetary policy framework. They argue that such reviews may help the Fed more effectively identify and implement needed changes to its framework.

[16]These risks could be exacerbated if households and businesses expect monetary policy to be insufficiently accommodative because of proximity to the ELB. For related discussions, see Reifschneider and Williams (2000); Adam and Billi (2007); Nakov (2008); and Hills, Nakata, and Schmidt (2016).

[17]See Board of Governors (2019b).

[18]As an illustration of the shortfall in policy support created by a binding ELB during the Global Financial Crisis, the simple policy rules considered in a January 2017 speech by then-Chair Janet Yellen prescribed setting the federal funds rate between negative 1-1/2 and negative 9 percent; see Yellen (2017). In addition to using these two additional monetary policy tools, the Federal Reserve implemented a number of other measures to stabilize the financial system, increase household and business confidence, and more generally support the economic recovery. These supplementary measures included the setting up of several credit facilities and the introduction of stress tests for systemically important financial institutions.

[19]Over the past decade or so, the FOMC has enhanced its communication both to promote public understanding of its policy goals, strategy, and actions and to foster democratic accountability. These enhancements include the Statement on Longer-Run Goals and Monetary Policy Strategy; post-meeting press conferences; various statements about the principles and strategy guiding the Committee's normalization of monetary policy; and quarterly summaries of individual FOMC participants' economic projections, assessments about the appropriate path of the federal funds rate, and judgments of the uncertainty and balance of risks around their projections. Starting in 1979, the Federal Reserve published a summary of individual economic projections from various Board members, FOMC members, or FOMC participants in the semiannual Monetary Policy Report. With the introduction of the Summary of Economic Projections (SEP) in 2007, the FOMC increased the frequency of the releases of policymaker projections, expanded the set of economic variables included, and extended the forecast horizon. Because the SEP includes individual contributions of projections and assessments from all FOMC participants, it captures a broader range of views than those of FOMC members. For a discussion and data, see Bernanke (2007a) and Romer (2010).

In terms of process, we have heard from a broad range of interested individuals and groups in 14 Fed Listens events this year. At our July 2019 FOMC meeting, the Committee began to assess what we have learned from these events and to receive briefings from System staff on topics relevant to the review.[20] But we still have much to discuss at upcoming meetings. We will share our findings with the public when we have completed our review, likely during the first half of 2020.

Concluding Remarks

The economy is constantly evolving, bringing with it new opportunities and challenges. One of these challenges is how best to conduct monetary policy in the new world of low equilibrium interest rates. It makes sense for us to remain open minded as we assess current practices and consider ideas that could potentially enhance our ability to deliver on the goals the Congress has assigned us. For this reason, my colleagues and I do not want to preempt or to predict our ultimate findings. What I can say is that any refinements or more material changes to our framework that we might make will be aimed solely at enhancing our ability to achieve and sustain our dual-mandate objectives in the world we live in today.

Stepping back, earlier today, speakers at this conference discussed the challenges of making monetary policy in an uncertain and risky environment. In my remarks, I have laid out an important example of the interaction of the macroeconomy, monetary policy, and the market response to risk. The papers you are about to discuss throughout the next two days present cutting-edge research on the effect and measurement of risk and uncertainty and volatility, with a special focus on monetary policy and market behavior. As someone on the front lines, I look forward to learning from your insights and encourage your rich discussion over the next few days and your continued work on how to make my job easier! Thank you, and good luck!

References

Adam, Klaus, and Roberto M. Billi (2007). "Discretionary Monetary Policy and the Zero Lower Bound on Nominal Interest Rates," Journal of Monetary Economics, vol. 54 (April), pp. 728–52.

Bansal, Ravi, and Ivan Shaliastovich (2013). "A Long-Run Risks Explanation of Predictability Puzzles in Bond and Currency Markets," Review of Financial Studies, vol. 26 (January), pp. 1–33.

Bekaert, Geert, Eric Engstrom, and Steven R. Grenadier (2010). "Stock and Bond Returns with Moody Investors," Journal of Empirical Finance, vol. 17 (December), pp. 867–94.

Bernanke, Ben S. (2007a). "Federal Reserve Communications," speech delivered at the Cato Institute 25th Annual Monetary Conference, Washington, November 14.

——— (2007b). "Inflation Expectations and Inflation Forecasting," speech delivered at the Monetary Economics Workshop of the National Bureau of Economic Research Summer Institute, Cambridge, Mass., July 10.

Board of Governors of the Federal Reserve System (2019a). "Minutes of the Federal Open Market Committee, July 30–31, 2019," press release, August 21.

——— (2019b). "Minutes of the Federal Open Market Committee, September 17–18, 2019," press release, October 9.

Caballero, Ricardo J., Emmanuel Farhi, and Pierre-Olivier Gourinchas (2017). "The Safe Assets Shortage Conundrum," Journal of Economic Perspectives, vol. 31 (Summer), pp. 29–46.

Campbell, John Y., Carolin Pflueger, and Luis M. Viceira (forthcoming). "Macroeconomic Drivers of Bond and Equity Risks," Journal of Political Economy.

[20]See Board of Governors (2019a).

Campbell, John Y., Adi Sunderam, and Luis M. Viceira (2017). "Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds," Critical Finance Review, vol. 6 (September), pp. 263–301.

Carvalho, Carlos, Andrea Ferrero, and Fernanda Nechio (2016). "Demographics and Real Interest Rates: Inspecting the Mechanism," European Economic Review, vol. 88 (September), pp. 208–26.

Chen, Peter, Loukas Karabarbounis, and Brent Neiman (2017). "The Global Rise of Corporate Saving," NBER Working Paper Series 23133. Cambridge, Mass.: National Bureau of Economic Research, February (revised March 2017).

Chung, Hess, Etienne Gagnon, Taisuke Nakata, Matthias Paustian, Bernd Schlusche, James Trevino, Diego Vilán, and Wei Zheng (2019). "Monetary Policy Options at the Effective Lower Bound: Assessing the Federal Reserve's Current Policy Toolkit" (PDF), Finance and Economics Discussion Series 2019-003. Washington: Board of Governors of the Federal Reserve System, January.

Clarida, Richard (2019). "The Global Factor in Neutral Policy Rates: Some Implications for Exchange Rates, Monetary Policy, and Policy Coordination" (PDF), International Finance Discussion Papers 1244. Washington: Board of Governors of the Federal Reserve System, April.

Clarida, Richard, Jordi Galí, and Mark Gertler (1999). "The Science of Monetary Policy: A New Keynesian Perspective," Journal of Economic Literature, vol. 37 (December), pp. 1661–1707.

——— (2000). "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," Quarterly Journal of Economics, vol. 115 (February), pp 147–80.

Cohen, Benjamin H., Peter Hördahl, and Dora Xia (2018). "Term Premia: Models and Some Stylized Facts" (PDF) , BIS Quarterly Review. Basel, Switzerland: Bank for International Settlements, September 23, pp. 79–91.

d'Addona, Stefano, and Axel H. Kind (2006). "International Stock-Bond Correlations in a Simple Affine Asset Pricing Model," Journal of Banking and Finance, vol. 30 (October), pp. 2747–65.

Dao, Mai Chi, and Chiara Maggi (2018). "The Rise in Corporate Saving and Cash Holding in Advanced Economies: Aggregate and Firm Level Trends," IMF Working Papers WP/18/262. Washington: International Monetary Fund, December, available at https://www.imf.org/en/Publications/WP/Issues/2018/12/07/The-Rise-in-Corporate-Saving-and-Cash-Holding-in-Advanced-Economies-Aggregate-and-Firm-Level-46369.

Eggertsson, Gauti B., Neil R. Mehrotra, and Jacob A. Robbins (2017). "A Model of Secular Stagnation: Theory and Quantitative Evaluation," NBER Working Paper Series 23093. Cambridge, Mass.: National Bureau of Economic Research, January (revised February 2017).

Eraker, Bjørn (2008). "Affine General Equilibrium Models," Management Science, vol. 54 (December), pp. 2068–80.

Erceg, Christopher, James Hebden, Michael Kiley, David López-Salido, and Robert Tetlow (2018). "Some Implications of Uncertainty and Misperception for Monetary Policy" (PDF), Finance and Economics Discussion Series 2018-059. Washington: Board of Governors of the Federal Reserve System, August.

Fischer, Stanley (2016a). "Low Interest Rates," speech delivered at the 40th Annual Central Banking Seminar, sponsored by the Federal Reserve Bank of New York, New York, October 5.

——— (2016b). "Why Are Interest Rates So Low? Causes and Implications," speech delivered at the Economic Club of New York, New York, October 17.

——— (2017). "The Low Level of Global Real Interest Rates," speech delivered at the

Conference to Celebrate Arminio Fraga's 60 Years, Casa das Garças, Rio de Janeiro, Brazil, July 31.

Fuhrer, Jeffrey, Giovanni Olivei, Eric Rosengren, and Geoffrey Tootell (2018). "Should the Fed Regularly Evaluate Its Monetary Policy Framework?" (PDF) Brookings Papers on Economic Activity, Fall, pp. 443–517.

Gagnon, Etienne, Benjamin K. Johannsen, and David Lopez-Salido (2016). "Understanding the New Normal: The Role of Demographics" (PDF) Finance and Economics Discussion Series 2016-080. Washington: Board of Governors of the Federal Reserve System, October

Gagnon, Joseph E. (2016). "Quantitative Easing: An Underappreciated Success" (PDF), Policy Brief PB16-4. Washington: Peterson Institute for International Economics, April.

Glick, Reuven (2019). "R* and the Global Economy" (PDF) , Working Paper Series 2019-18. San Francisco: Federal Reserve Bank of San Francisco, August.

Gürkaynak, Refet S., and Jonathan H. Wright (2012). "Macroeconomics and the Term Structure," Journal of Economic Literature, vol. 50 (June), pp. 331–67.

Hamilton, James D., and Jing Cynthia Wu (2012). "The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment," Journal of Money, Credit and Banking, vol. 44 (1, February), pp. 3–46.

Hills, Timothy S., Taisuke Nakata, and Sebastian Schmidt (2016). "The Risky Steady State and the Interest Rate Lower Bound" (PDF), Finance and Economics Discussion Series 2016-009. Washington: Board of Governors of the Federal Reserve System, January.

Hoek, Jasper J., Steven B. Kamin, and Emre Yoldas (2019). "When Is Bad News Good News? U.S. Monetary Policy, Macroeconomic News, and Financial Conditions in Emerging Markets," unpublished working paper, Board of Governors of the Federal Reserve System, Division of International Finance, September.

Holston, Kathryn, Thomas Laubach, and John C. Williams (2017). "Measuring the Natural Rate of Interest: International Trends and Determinants," Journal of International Economics, vol. 108, (1, May), pp. S59–75.

International Monetary Fund (2018). Global Financial Stability Report: A Bumpy Road Ahead (PDF). Washington: IMF, April.

Jorda, Oscar, Katharina Knoll, Dmitry Kuvshinov, Moritz Schularick, and Alan M. Taylor (2019). "The Rate of Return on Everything, 1870–2015," Quarterly Journal of Economics, vol. 134 (August), pp. 1225–98.

Kiley, Michael T., and John M. Roberts (2017). "Monetary Policy in a Low Interest Rate World" (PDF), Brookings Papers on Economic Activity, Spring, pp. 317–96

Kim, Don, Cait Walsh, and Min Wei (2019). "Tips from TIPS: Update and Discussions" (PDF), FEDS Notes. Washington: Board of Governors of the Federal Reserve System, May 21.

Kuttner, Kenneth N. (2018). "Outside the Box: Unconventional Monetary Policy in the Great Recession and Beyond," Journal of Economic Perspectives, vol. 32 (Fall), pp. 121–46.

Li, Canlin, and Min Wei (2013). "Term Structure Modeling with Supply Factors and the Federal Reserve's Large-Scale Asset Purchase Programs," International Journal of Central Banking, vol. 9 (March), pp. 3–39.

Nakov, Anton (2008). "Optimal and Simple Monetary Policy Rules with Zero Floor on the Nominal Interest Rate," International Journal of Central Banking, vol. 4 (June), pp. 73–127.

Powell, Jerome H. (2018). "Monetary Policy and Risk Management at a Time of Low Inflation and Low Unemployment," speech delivered at the 60th Annual Meeting of the National Association for Business Economics, Boston, October 2.

Rachel, Łukasz, and Lawrence H. Summers (2019). "On Falling Neutral Real Rates, Fiscal Policy, and the Risk of Secular Stagnation" (PDF), paper presented at the Brookings Papers on

Economic Activity Conference, Spring, held at the Brookings Institution, Washington, March 7–8.

Reifschneider, David L., and John C. Williams (2000). "Three Lessons for Monetary Policy in a Low-Inflation Era," Journal of Money, Credit and Banking, vol. 32 (November), pp. 936–66.

Romer, David (2010). "A New Data Set on Monetary Policy: The Economic Forecasts of Individual Members of the FOMC," Journal of Money, Credit and Banking, vol. 42 (August), pp. 951–57.

Summers, Lawrence H. (2015). "Have We Entered an Age of Secular Stagnation? IMF Fourteenth Annual Research Conference in Honor of Stanley Fischer, Washington, D.C.," IMF Economic Review, vol. 63 (1), pp. 277–280.

Swanson, Eric T. (2018). "The Federal Reserve Is Not Very Constrained by the Lower Bound on Nominal Interest Rates," NBER Working Paper Series 25123. Cambridge, Mass.: National Bureau of Economic Research, October.

Williams, John C. (2016). "Monetary Policy in a Low R-star World" (PDF), FRBSF Economic Letter 2016-23. San Francisco: Federal Reserve Bank of San Francisco, August.

——— (2017). "Three Questions on R-star" (PDF), FRBSF Economic Letter 2017-05. San Francisco: Federal Reserve Bank of San Francisco, February.

Yellen, Janet (2017). "The Economic Outlook and the Conduct of Monetary Policy," speech delivered at the Stanford Institute for Economic Policy Research, Stanford, Calif., January 19.

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What the Future Holds-Benefits and Limitations of Forward Guidance⋆

By JENS WEIDMANN*

Introduction

Ladies and gentlemen,

More than 200 years ago, French scientist Pierre-Simon Laplace proposed that the universe was essentially deterministic and, hence, predictable. Some being – later called a demon – with sufficient information and calculating power would be able to know all the states of the universe: past, present and future.[1]

In today's financial markets, Laplace's demon could easily earn a fortune. But despite all the progress in computing, it has never come into existence. Still, some people may dream of its possibility. Brazilian author Paulo Coelho once quipped that everything was possible: "from angels to demons to economists to politicians".[2]

Financial market participants are no demons: they carefully monitor every word uttered by central bankers, because failing to anticipate the central bank's next move could be costly.

For a long time, central bankers were reluctant to provide hints on their expected future course of action or communicate openly. A good example is former Fed Chair, Alan Greenspan, who once told Congress: "If I seem unduly clear to you, you must have misunderstood what I said".[3]And according to Otmar Issing, central banking was "presented as an esoteric art".[4]

Over time, monetary policy has clearly become more of a science and less of an art.[5]Economists have formulated reaction functions, which are supposed to summarise how central banks respond to economic conditions. Often, relatively simple rules such as a common Taylor rule are considered. Of course, monetary policymaking is much more complex than that. But just for the sake of argument, I would ask you to think of such a standard rule when it comes to the reaction function.

Central banks have also increased transparency and extended communication in order to enhance their accountability to the public and make monetary policy more effective. In the wake of the financial crisis, as policy rates approached zero, more and more central banks switched from dipped beam to full beam: using forward guidance, they began to shed light on their reaction function.

By indicating that they would withdraw the monetary policy stimuli later than the public expected at the time, central banks attempted to further reduce longer-term interest rates when policy rates had already reached low levels.[6]In this context, I would like to distinguish two approaches to forward guidance:

⋆This speech was given at the European Banking Congress on November 22, 2019.

* Jens Weidmann, President of the Deutsche Bundesbank and Chair of the Board of Directors of the Bank for International Settlements

1Laplace, P.-S. (1814). Essai philosophique sur les probabilités, Mme. Ve. Courcier.

2Coelho, P. in an interview by The Guardian, 19 March 2009.

3Greenspan, A. in a testimony to Congress in 1987, according to Federal Reserve Bank of San Francisco, What steps has the Federal Reserve taken to improve transparency?, September 2006.

4Issing, O. (2014). Forward Guidance: A New Challenge for Central Banks, Goethe University, SAFE White Paper, No 16.

5Mishkin, F.S. (2007). Will Monetary Policy become more of a Science?, Prepared for the Deutsche Bundesbank conference "Monetary Policy Over Fifty Years", held in Frankfurt am Main, Germany, 21 September, 2007.

6Campbell, J., Fisher, J., Justiniano, A. and Melosi, L. (2016). Forward Guidance and Macroeconomic Outcomes since the Financial Crisis, NBER Macroeconomics Annual 31 (2016), pp. 283-357; Charbonneau, K.B. and Rennison, L. (2015). Forward Guidance at the Effective Lower Bound: International Experience, Bank of Canada Discussion Papers.

First, the central bank can clarify its reaction function if there is a misperception or uncertainty about it among the public due to imperfect information.

And second, the central bank could communicate that it intends to deviate from previous behaviour in the future.

However, just as in the case of any other policy tool, the public may face the problem of disentangling information regarding the central bank's policy from information on the state of the economy. In times of considerable uncertainty, observers could – falsely – interpret an unexpected expansionary policy move as a signal that the central bank deems aggregate demand to be weaker than they had anticipated. By dampening inflation expectations, the surprise could have an unintended adverse effect on the economy temporarily.[7] Therefore, monetary policy decisions need to be communicated very carefully and clearly.

What is more, the lines between the two types of forward guidance I have laid out may be less clear-cut in economic reality. However, to keep it simple, I will squarely attribute the communication provided by the Eurosystem and many other central banks to forward guidance of the first type.[8]

Today, I would like to reflect on the experience we have made in the last few years, but I will also discuss possible pros and cons of the second, more daring type of forward guidance. I will close with some remarks on monetary policy in the euro area.

Clarifying the reaction function

In recent years, the Eurosystem's forward guidance evolved and, at times, communicated the Governing Council's expectations on both the lift-off of policy rates and the duration of asset purchases.

With the introduction of the Asset Purchase Programme (APP) in 2015, guidance was given along two dimensions by providing a timeframe and outlining the necessary progress of inflation towards our policy aim. The calendar-based component was easy to communicate and understand. And the state-contingent element acted like an automatic adjustment mechanism to economic news. If incoming data indicated a delay in the firming of inflation towards our policy aim, it implied continuation of net asset purchases beyond the calendar- based component.

Later, the forward guidance on policy rates was linked to the duration of the Eurosystem's net asset purchases. A prolongation of these purchases shifted the timing of the first rate hike further into the future. This connection was well-understood and worked accordingly. Indeed, Bundesbank research shows that rate forward guidance linked to the APP contributed to the observed decline in longer-term interest rates to a significant extent.[9]In other words, part of the expansionary effect of the purchase programme was due to the management of expectations about interest rates in the more distant future.[10]

Last year, the Governing Council announced the end of APP net purchases after December 2018 and decided to link the two elements of forward guidance directly to policy rates. This reformulated guidance succeeded in anchoring expectations about future short-term rates despite the end of net purchases and, therefore, contributed to keeping longer-term interest rates low.

More generally, by using rate forward guidance, central banks can do what they also do when employing asset purchases, namely to influence long-term rates and stimulate the economy when conventional policy is constrained.

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[7]Falck, L., Hoffmann, M. and Hürtgen, P. (2019). Disagreement about Inflation Expectations and Monetary Policy Transmission, Journal of Monetary Economics, forthcoming.

[8]Deutsche Bundesbank (2013). Forward guidance – an indication of monetary policy stance in the future, Monthly Report, August 2013.

[9]Geiger, F. and Schupp, F. (2018). With a little help from my friends: Survey-based derivation of euro area short rate expectations at the effective lower bound, Deutsche Bundesbank, Discussion Papers 27/2018.

[10]Deutsche Bundesbank (2016). The macroeconomic impact of quantitative easing in the euro area, Monthly Report, June 2016.

Besides shaping expectations, asset purchases can work through other channels, such as portfolio rebalancing, as well. But they also entail different risks and possible side effects, all the more so in a monetary union with fiscally autonomous member states. In this particular set-up, government bond purchases involve the fundamental risk of mutualising sovereign liability risks through the central banks' balance sheets, blurring the lines between fiscal and monetary policy.

Given its effectiveness, forward guidance could be a preferred policy tool near the lower bound of interest rates. Indeed, the reformulation of forward guidance introduced in September maintained the focus on policy rates.

Lower for longer

At the effective lower bound, theory, at least, suggests that the central bank could do more if it switches to the second type of forward guidance. By committing to hold interest rates lower for longer than implied by the monetary policy rule, the central bank pledges to let inflation overshoot its target in the future. In this way, it could provide an additional stimulus to the economy via inflation expectations. If people expect future inflation to be temporarily higher than anticipated so far, real interest rates will decline even when nominal rates remain unchanged. This, in turn, will induce them to consume and invest more in the here and now.

But why have central banks so far shied away from using forward guidance in this manner?

One important reason may be the problem of time inconsistency.[11]Let's say that a father wants to make sure his son studies up on his Latin vocabulary. It makes sense, then, to announce that he will quiz his son next Thursday evening. But when Thursday arrives and Arsenal takes on Eintracht Frankfurt, there is every reason for the father to cancel the test, since he has already made his son study. His optimal choices are time-inconsistent. And his son is not outsmarted so easily. He will call his father's bluff, as he knows the Europa League schedule just as well as his father does.

Similarly, a one-off promise of "lower for longer" holds the allure of a monetary stimulus now, at the cost of higher inflation in the future. But when the time comes to make good on the promise, the benefits have already been reaped, and only the cost of higher inflation remains. At this point, policymakers have an incentive to renege on their promise as well.

But such an approach still raises further problems. In the case of the euro area, it should be kept in mind that, according to our existing strategy, the Governing Council defines price stability as a year-on-year increase in the HICP for the euro area of below 2% and aims to maintain inflation rates below, but close to 2% over the medium term. Thus, intentionally higher inflation rates would not be consistent with this strategy and may pose a communication challenge and a credibility risk.

Moreover, for "lower for longer" to work as intended, inflation expectations of firms and households need to respond accordingly: short-term expectations have to adapt to the central bank's guidance without de-anchoring long-term expectations from the inflation target. This is certainly no mean feat. A study on various advanced economies suggests that expectations of households and firms do not respond much to announcements on monetary policy in an environment of low inflation. The researchers refer to this as a "veil of inattention".[12]Central banks would need to pierce it by adjusting and intensifying their communication in order to use inflation expectations as a more active policy tool.

Furthermore, after a long period of low interest rates, holding interest rates lower for even longer would aggravate the risks and side effects of a very expansionary monetary policy.

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[11]Kydland, F.E. and Prescott E.C. (1977). Rules Rather than Discretion: The Inconsistency of Optimal Plans, Journal of Political Economy, Vol. 85, No 3, pp. 473-492.

[12]Coibion, O., Gorodnichenko, Y., Kumar, S. and Pedemonte, M. (2018). Inflation expectations as a policy tool?, NBER Working Paper 24788.

For example, the longer the period of negative rates persists, the more likely it is to place a burden on banks that primarily generate their income from traditional deposit-taking and lending operations. This is what we observe in the euro area. In this context, the relief which the new tiering system will provide to banks is likely to be perceptible, but modest. It is the indirect effects of negative interest rates and, for banks engaged in maturity transformation, also the flat yield curve that matter more.

Of course, safeguarding the profitability of banks is not a task of the Eurosystem. However, the pressure on bank profitability arising from negative interest rates could eventually cause banks to cut back on lending despite additional expansionary monetary policy measures, thereby impairing the transmission of monetary policy.

Beyond its impact on bank profitability, a prolonged period of low interest rates may also induce investors in search of yield to take on undue risks that could sow the seeds of financial imbalances. Eventually, this could undercut the central bank's ability to maintain price stability.

Clearly, the first line of defence against financial imbalances should be macroprudential policy. But this policy approach is still in its infancy, and our knowledge about the effects and transmission channels is incomplete. Given this uncertainty, macroprudential policy may be prone to an inaction bias – that is to say, the inclination to act too tentatively and

thus too late, or not at all.[13] Hence, we should not be over-confident about the role macroprudential policy can play in addressing systemic risks. Monetary policy cannot be complacent if its policy stance raises long-term risks to price stability through the build-up of financial imbalances.

Achieving price stability in the euro area

As Luis de Guindos said on Monday, we are aware that the expansionary stance of monetary policy in the euro area comes with side effects, and that the side effects are increasing.[14] And I keep on making this point for quite some time now.

At the same time, price pressures in the euro area remain subdued. Therefore, monetary policy accommodation is still warranted.

At least, financial market expectations of considerable further policy rate cuts have receded in recent weeks and months. Among other positive news, the German economy did not slip into a technical recession, and first tentative signs emerged that the downturn in its export-oriented industry could level off.

Moreover, wage pressures in the euro area point in the right direction. In the second quarter of 2019, hourly wages went up by 2½% year-on-year, and the total wage sum increased by almost 4%.

True, a recent Bundesbank study finds that the cyclical impact of wages on prices in Germany has become weaker since the 1970s. In recent years, however, the pass-through has remained roughly stable and intact.[15] Our economists estimate that a 1% rise in wage costs in Germany increases consumer prices by around 0.3%. But the analysis also shows that the transmission can take several years. With that in mind, the slow strengthening of inflation shouldn't really come as a surprise to us.

An ECB study suggests that this is also the case for other major euro area economies.[16] In a low inflation setting, the transmission could even take longer than under normal circumstances.

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[13] Buch, C. M., Vogel, E. and Weigert, B. (2018). Evaluating macroprudential policies, European Systemic Risk Board, Working Paper, No 76.

[14] Reuters (2019). EZB-Vize – Nebenwirkungen der ultralockeren Geldpolitik nehmen zu. https://de.reuters.com/article/ezb-de-guindos-idDEKBN1XS168, 18 November 2019.

[15] Deutsche Bundesbank (2019). The impact of wages on prices in Germany: results of selected empirical analyses, Monthly Report, September 2019.

[16] Bobeica, E., Ciccarelli, M. and Vansteenkiste, I. (2019), The link between labor cost and price inflation in the euro area, ECB Working Paper Series No 2235.

The Governing Council has deliberately geared its policy aim towards the medium term without further specification. This allows us to take lags into account, such as the pass- through from wages to prices. Our strategy also gives us the leeway not to respond to every slight revision in the inflation outlook mechanistically or even with full force, as long as the overall trajectory is still intact and the relevant inflation expectations remain anchored.

But it is also true that near the effective lower bound of interest rates, fiscal policy is less at risk of crowding out private demand. Under current conditions, this makes it a potentially powerful instrument if economic developments were to take a marked turn for the worse – which, just to be clear, is not what is generally expected.

Conclusion

Ladies and gentlemen,

Dennis Gabor, the British physicist who invented holography and won the Nobel Prize in 1971, noted that the future cannot be predicted, but it can be created.[17]

It is worth investigating which monetary policy approaches allow the Eurosystem to respond vigorously in an economic downturn. But these policies have to be evaluated carefully in light of both potential benefits and costs. In my short remarks today, I have only been able to highlight a few issues on forward guidance.

I fully agree with Christine Lagarde. The monetary policy strategy should always evolve in a way that best serves our mandate.[18]Since our strategy has been in place since 2003, it may be worth collecting lessons from the financial crisis and the more recent past at the appropriate time.

In my view, this should include, among other things, the question how to handle long-term risks to price stability arising from financial imbalances.

As Claudio Borio once warned us, economic lessons "are learnt, forgotten, re-learnt and forgotten again".[19]

Laplace's demon would know better. Thank you for your attention.

[17]Gabor, D. (1963). Inventing the Future, Secker & Warburg.

[18]European Parliament (2019). Draft report on the Council recommendation on the appointment of the President of the European Central Bank, Committee on Economic and Monetary Affairs, 29 August 2019.

[19]Borio, C. (2012). The financial cycle and macroeconomics: What have we learnt? BIS Working Paper, No. 395.

IMI International Monetary Review

Global Economy

Decelerating Growth Calls for Accelerating Action⋆

By KRISTALINA GEORGIEVA*

Introduction

Thank you, Tom, for that generous introduction. It is an honor to be with all of you to deliver my first speech as Managing Director of the IMF.

I am pleased to continue the tradition of my wonderful predecessor, Christine Lagarde, and discuss the outlook and priorities ahead of our Annual Meetings.

As many of you know, Christine was a member of the French national synchronized swimming team. So I want to honor her legacy today and borrow the word **synchronized** for my speech.

When I took over as Managing Director, I thought about what the Ministers and Governors might ask the IMF next week. I conferred with David Lipton who has so ably led the Fund in this interim period. And I spoke to many of my new colleagues.

One question stood out to all of us:

What can we all do to help fix the fractures in the global economy and encourage stronger growth?

I want to begin with that this morning.

Thankfully, I don't have to do it alone. I have the support of this great institution, its skilled Executive Board, and its world-class staff.

So let's get to it.

The Outlook

Two years ago, the global economy was in a synchronized upswing. Measured by GDP, nearly 75 percent of the world was accelerating.

Today, even more of the world economy is moving in synch but, unfortunately, this time growth is decelerating.

In 2019, we expect slower growth in nearly 90 percent of the world.[1]

The global economy is now in a synchronized slowdown.

This widespread deceleration means that growth this year will fall to its lowest rate since the beginning of the decade.

Next week we will release our *World Economic Outlook* which will show downward revisions for 2019 and 2020.

The headline numbers reflect a complex situation.

Despite this overall deceleration, close to 40 emerging market and developing economies are

⋆This speech was given at IMF 2019 Annual Meetings on October 8, 2019.

*Kristalina Georgieva, IMF Managing Director

[1]As measured by real GDP (at PPP rates)

forecast to have real GDP growth rates above 5 percent — including 19 in sub-Saharan Africa.

In the United States and Germany, unemployment is at historic lows. Yet across advanced economies, including in the U.S., Japan, and especially the euro area, there is a softening of economic activity.

In some of the largest emerging market economies, such as India and Brazil, the slowdown is even more pronounced this year.

In China, growth is gradually coming down from the rapid pace it saw for many years.

The precarious outlook presents challenges for countries already facing difficulties — including some of the Fund's program countries.

So why the slowdown in 2019? There are a range of issues and one common theme: Fractures.

I will start with trade. We have spoken in the past about the dangers of trade disputes. Now, we see that they are actually taking a toll.

Global trade growth has come to a near standstill.

In part because of the trade tensions, worldwide manufacturing activity and investment have weakened substantially. There is a serious risk that services and consumption could soon be affected.

And the fractures are spreading.

Disputes now extend between multiple countries and into other critical issues. Currencies are once again in the spotlight. Because of our interconnected economies, many more countries will soon feel the impact.

Uncertainty — driven by trade, but also by Brexit, and geopolitical tensions — is holding back economic potential.

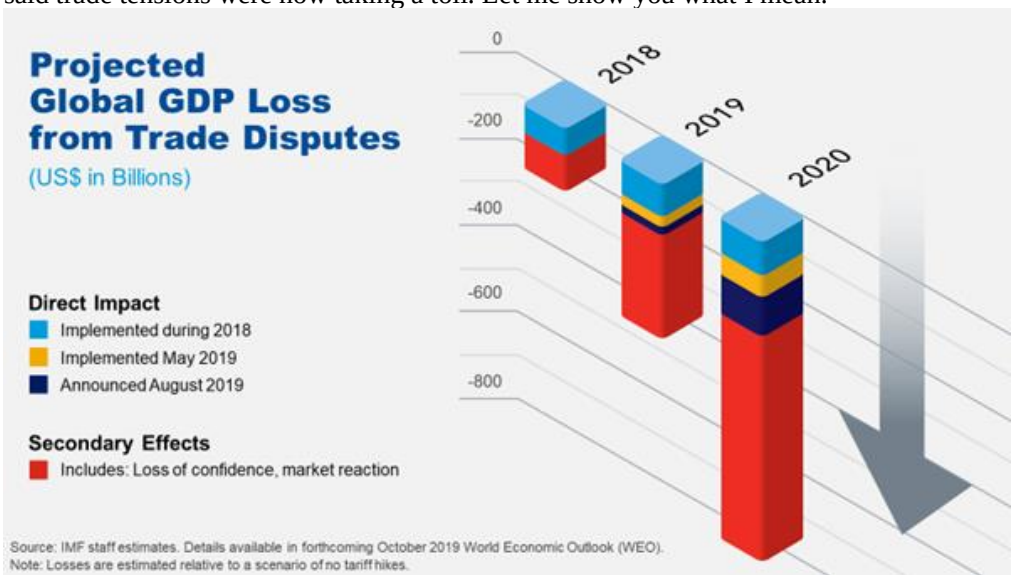
Even if growth picks-up in 2020, the current rifts could lead to changes that last a generation — broken supply chains, siloed trade sectors, a "digital Berlin Wall" that forces countries to choose between technology systems.

Our goal should be to fix these fractures. Our world is intertwined. So our responses must be coordinated.

I believe we can do it. How? Start by unleashing the growth generating capacity of trade.

Unleash Trade Potential

I said trade tensions were now taking a toll. Let me show you what I mean.



This graphic is part of the updated analysis on tariffs we will release next week. It shows the projected global GDP loss from the escalating trade conflict between the US and China.

The blue, yellow, and purple blocks show the direct costs on businesses and consumers from the three rounds of implemented and announced tariffs.

Now, look at the red blocks. This is what happens when the expected secondary effects are added in — including the loss of confidence and market reactions.

The results are clear. Everyone loses in a trade war. For the global economy, the cumulative effect of trade conflicts could mean a loss of around $700 billion by 2020, or about 0.8 percent of GDP. As a reference, this is approximately the size of Switzerland's entire economy.

So we need to work together, now, and find a lasting solution on trade.

This requires difficult decisions and political will. But it is worth it.

We need real change.

Countries need to address legitimate concerns related to their trade practices. That means dealing with subsidies, as well as intellectual property rights and technology transfers.

We also need a more modern global trading system, particularly to unlock the full potential of services and e-commerce.

And every country must do more to help communities harmed by the dislocations associated with technology and trade.

The key is to improve the system, not abandon it.

Access to new markets is essential to raise living standards. It is part of the answer to our question on addressing fractures. But what about the other part? Encouraging higher growth and creating more opportunity?

When it comes to improving people's lives, the hard work starts at home. I learned this lesson first-hand growing up behind the Iron Curtain. I saw the high costs of bad policies. And I also saw how a shift to good policies, with international support, can help put a country and its people back on the path to prosperity.

So, let me focus on the domestic policy priorities we believe are critical to accelerate growth and build more resilient economies. And then I want to turn to how a renewed commitment to international cooperation — and synchronized policy action — can help us more fully address our fractures.

Policy Priorities to Secure Stronger and More Resilient Growth

1. Use Monetary Policy Wisely & Enhance Financial Stability

Let's begin with monetary policy and financial stability. Central banks around the world are striving to fulfill their mandates under difficult circumstances. Their independence is the foundation of sound monetary policy.

How can they best fulfill their mandates? They should communicate their plans clearly, remain data dependent, and where appropriate keep interest rates low. Especially since inflation is still subdued in many countries and overall growth is weakening.

However, interest rates are already very low or even negative in many advanced economies. So in those places, there may be limited space to do more with conventional tools.

Prolonged low rates also come with negative side effects and unintended consequences. Think of pension funds and life insurance companies that are taking on more risky investments to meet their return objectives. In our surveillance, we see such an increase of risk taking by investors broadly around the globe.

All of this creates financial vulnerabilities. In some countries, firms are using low rates and building up debt to fund mergers and acquisitions instead of investing.

Our new analysis shows that if a major downturn occurs, corporate debt at risk of default

would rise to $19 trillion, or nearly 40 percent of the total debt in eight major economies.[2]This is above the levels seen during the financial crisis.

Low interest rates are also prompting investors to search for higher yields in emerging markets. This leaves many smaller economies exposed to a sudden reversal of capital flows.

So we need macroprudential tools. And we can use new approaches to better manage debt, reduce financial booms and busts, and contain volatility.

But we should state one thing very clearly. Monetary and financial policies cannot do the job alone. *Fiscal policy must play a central role*.

I have heard the quip that the IMF stands for "It's Mostly Fiscal." Let me be true to form and focus on fiscal policy next.

2. Deploy Fiscal Tools to Meet Current Challenges

Now is the time for countries with room in their budgets to deploy — or get ready to deploy — fiscal firepower. In fact, low interest rates may give some policymakers additional money to spend.

In places such as Germany, the Netherlands, and South Korea, an increase in spending — especially in infrastructure and R&D — will help boost demand and growth potential.

That advice will not work everywhere. Globally, public debt is near record levels. So in countries with a high debt-to-GDP ratio, fiscal restraint continues to be warranted.

Countries will, of course, tailor policies that work for them. But in every country, reducing debts and deficits should always be done in a way that protects education, health, and jobs.

And every country needs to wrestle with the question of where, in a rapidly changing world, new sources of growth will come from. I believe focusing on fundamentals can help.

One way to create more fiscal space is through domestic revenue mobilization. Reducing corruption and utilizing digital tools in tax collection can unlock resources and fuel new investments in people. It can also help countries reach the 2030 Sustainable Development Goals.

3. Implement Structural Reforms for Future Growth

As countries decide which policies make the most sense for this moment, we all need to keep an eye on the horizon.

Potential job losses from automation and shifting demographics require countries to reform the structure of their economies.

If we do not act, many countries will be stuck in mediocre growth.

New IMF research — focused specifically on emerging markets and developing economies — shows how structural reforms can raise productivity and generate enormous economic gains .

These changes are the key to achieving higher growth over the medium and long-term.

The right reforms in the right sequence could double the speed at which emerging markets and developing economies reach the living standards of the advanced economies.[3]

We also know that when countries undertake reforms at the same time there can be a positive spillover effect.

Which policies work best? Let me give you some examples.[4]

- In Chile, childcare programs lifted female labor force participation and helped the economy. Proving, by the way, that empowering women is an economic gamechanger.
- In Ghana, anti-corruption legislation created more transparency and accountability.

[2]Forthcoming Global Financial Stability Report, Chapter 1. October 2019. Countries: China, France, Germany, Italy, Japan, Spain, the United Kingdom, and the United States.

[3]Forthcoming World Economic Outlook Chapter 3. "Reigniting Growth in Emerging Market and Low-Income Economies: What Role for Structural Reforms?" October 2019. Based on projected growth rates over a 5-6 year time frame.

[4]Id. Some examples from World Economic Outlook Chapter 3. Review between 2000-2014.

- In Jamaica, which is completing an IMF-supported program, cutting red tape made it easier to start a new business.

These types of reforms help people find new opportunities, reduce excessive inequality, and enable countries to prepare for shocks.

Here I would like to acknowledge that today the Fund will host a conference in honor of one of our young researchers — Giang Ho — who studied many of these issues and sadly passed away last year.

To borrow a proverb from her home country of Vietnam: *"The time to jump is before your feet get wet."*

This is true. If we wait until the next crisis, it will be too late.

We need to act now.

We also need to act together.

4. Embrace International Cooperation

Here is what I see. While the need for international cooperation is going up, the will to engage is going down. Trade is a case in point. And yet, we need to work together. From safely adapting to fintech, to fully implementing the financial regulatory reform agenda, to fighting money laundering and the financing of terrorism.

And we need to work together to address climate change.

Climate Change

It is a crisis where no one is immune and everyone has a responsibility to act.

One of our priorities at the IMF is to assist countries as they reduce carbon emissions and become more climate resilient.

At the current average carbon price of $2 per ton, most people and most companies have little financial incentive to make this transition. Limiting global warming to a safe level requires a significantly higher carbon price.

Some countries have embraced a straightforward strategy — taxing carbon.

Here is a good example: when Sweden introduced a carbon tax in 1991, low- and middle-income households received higher transfers and tax cuts to help offset higher energy costs. That policy shift has been instrumental in reducing Sweden's carbon emissions by 25 percent since 1995, while its economy has grown by over 75 percent.

New research in our upcoming Fiscal Monitor confirms that carbon taxes can be one of the most powerful and efficient tools. But the key here is to change tax systems, not simply add a new tax.[5]

Additional revenues could be used to cut taxes elsewhere and fund assistance to millions of affected households. These new resources could also support investments in the clean energy infrastructure that will help the planet heal.

Dealing with climate change requires not only mitigating damage, but also adapting for the future. Adaptation is about many things, but it is mostly about pricing risk and providing incentives for investment, including in new technologies.

IMF analysis from the *Global Financial Stability Report* shows progress is being made in the private financial sector. So-called green bonds are now on the rise in Europe and parts of Asia.[6] This is a very good development, but it is not nearly enough.

The price of inaction is high. We recognize each country faces unique challenges and

[5]Forthcoming Fiscal Monitor. "How to Mitigate Climate Change". October 2019.
[6]Forthcoming Global Financial Stability Report, Chapter 5. October 2019.

constraints. But we can — and we must — cooperate on this challenge now and work together in a way that generates renewed confidence in multilateralism.

I have often said that making the case for cooperation to a more skeptical world requires delivering real results in people's lives .

It also means reminding everyone of the power of partnership in times of crisis. This brings me to my conclusion, and a thought about our uncertain future.

Conclusion

If the global economy slows more sharply than expected, a coordinated fiscal response may be needed.

Let me be clear. We are not there. But when it comes to preparing for the possibility of a coordinated response we should remember the advice of Shakespeare:

"Better three hours too soon, than a minute too late."[7]

Our research shows that changes in spending are more effective and have a multiplier effect when countries act together.

Or, put another way — if the synchronized slowdown worsens , we may need a synchronized policy response.

We have seen how effective this approach can be in the recent past. Think about 2009 and the G20 commitment to a joint stimulus.

It is an important reminder of how countries can protect their own citizens, while leveraging international cooperation for mutual benefit.

Let me conclude where I began — with the image of synchronized swimming.

The world economy is still growing, it is just growing too slowly. To reverse this trend, and meet the aspirations of people, we cannot afford to be complacent. We must act.

Next week, as our 189-member countries gather together in Washington, I urge them to come prepared to find solutions.

I am confident that if we cooperate — mindful of each other's challenges and interests — we can deliver a better future for all.

Thank you very much.

[7]William Shakespeare. The Merry Wives of Windsor. Act II, Scene II.

IMI International Monetary Review

Scepticism on Second Plaza Accord*

By MARK SOBEL*

In recent weeks, market participants have repeatedly asked me whether there could be a second Plaza accord, now or if the dollar strengthened considerably.

While one should 'never say never', count me as a sceptic.

In the early 1980s, Paul Volcker's Federal Reserve overhauled US monetary policy to wring high inflation out of the US economy. President Ronald Reagan's administration pursued an expansionary fiscal policy. Unsurprisingly, interest rates soared, the economy went into recession and the dollar surged. Though the policy mix was then altered, the dollar reached high levels in early 1985. Protectionist screams emerged, particularly in the midwest, then labelled the 'Rust Belt'.

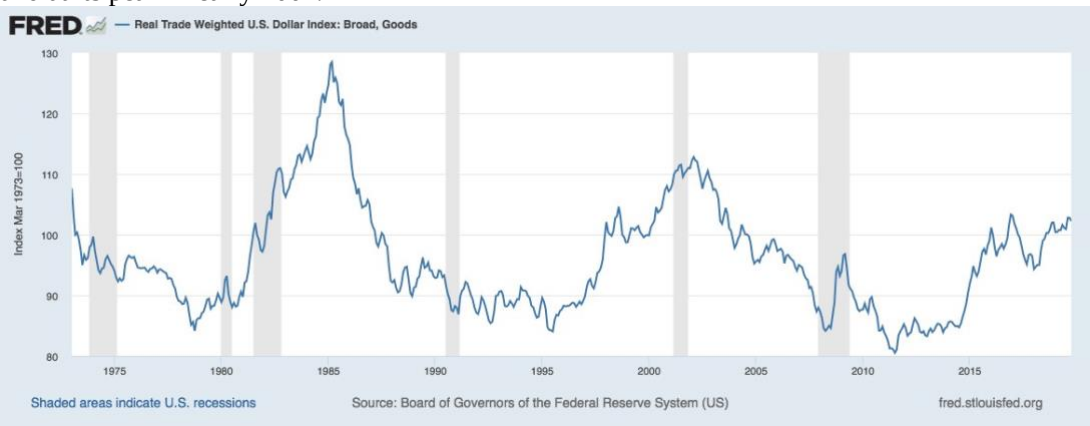
Treasury Secretary James Baker and his team led the G5 (France, Germany, US, UK and Japan) in agreeing on a currency pact in September 1985, the so-called Plaza accord.

The G5 argued that improving economic fundamentals had not been reflected in exchange markets and that 'further orderly appreciation of the main non-dollar currencies against the dollar is desirable'. To this end, the G5 countries undertook policy commitments, and in the case of the US to reduce fiscal deficits.

Some see Plaza as a heyday of international economic policy coordination. In my view, Plaza placed undue blame on the exchange rate and helped push an already weakening dollar down, including through intervention. But the US did not deliver on its fiscal commitments.

The global context has altered considerably since 1985.

While President Donald Trump protests dollar strength, it is far less robust now than in 1985 and at its peak in early 2002.



As a pact between G5 finance ministries and central banks, Plaza predated the advent of the European Central Bank and China's rise. Any deal now would require a different, less cohesive set of actors. While the US remains the world's largest economy (using market exchange rates), its hegemonic role has lessened. Washington led the effort on Plaza, but these days it is uncertain if it would or could lead, let alone if others would follow the US.

*This article appeared in OMFIFCommentary on November 11, 2019.

* Mark Sobel, US Chairman of OMFIF

Since the 1985 accord, thinking on policy coordination has changed. Except in extreme times, the best contribution countries could make to sound global economic functioning was to keep their own houses in order. Intervention, especially if sterilised, had little impact. Monetary policy should achieve domestically driven mandates, including price stability, and not target exchange rates or current account positions. Fiscal fine-tuning was difficult given administrative lags, and often the need to pursue consolidation. This thinking hindered Plaza-type co-operation.

The Plaza accord urged countries to resist protectionism, just as the 2008 G20 Washington summit communiqué urged countries to refrain from protectionist measures.

That position was oft-repeated in G20 communiqués, but then dropped during the Trump administration. The US president's trade wars have helped foster a risk-off market environment, which boosts the dollar. The end to trade wars would probably lead to dollar depreciation, but there is no consensus yet on Washington's willingness to do so.

Brussels and Japan have evinced little concern about disorderly exchange markets or exchange rate misalignments. They would probably not agree with Trump that their exchange rates are substantially undervalued, and they view the dollar's strength as understandable in light of relative US economic outperformance and the president's trade threats.

Critically, it is unclear what could constitute a package of fundamental economic commitments to produce orderly non-dollar appreciation. The elements might conceivably be there, but the will or ability to follow through is questionable. Markets are not disorderly. The US, European Central Bank and Japan practice free floating for all intents and purposes, and there would be little appetite for intervention.

In principle, US fiscal consolidation could reduce the country's current account deficit and lessen the need for foreign capital inflows. However, the executive and legislative branches have shown little capacity or desire to run responsible budgetary policies.

Fiscal expansion in Germany and the New Hanseatic League, a grouping of eight fiscally conservative EU governments, could boost demand and take some burden off of monetary policy. But despite the beginnings of shifting German rhetoric, the country seemingly remains committed to its zero deficit 'schwarze Null' policy and debt brake.

With anaemic growth, and inflation consistently below target, euro area monetary policy normalisation seems unlikely to occur any time soon.

While China has some fiscal space, monetary policy will probably remain accommodative in the face of a highly leveraged and slowing economy. China has an interest in renminbi stability, especially given the potential for capital outflow, but it does not wish to reduce its reserves below $3tn.

Cohesion is lacking among the major players as they pursue domestic priorities. The US and China may seek to establish a truce, but there is little trust between the two and geopolitical competition is here to stay. Rising European nationalism and populism stymie efforts to advance the Union.

The 2008 financial crisis proved that in dire straits, countries can coordinate. But the sense of cohesion needed for a 'Plaza 2' is sorely lacking.

IMI International Monetary Review

Signs Point to Global Recession*

By DESMOND LACHMAN*

The 2008 financial crisis furnished markets with a painful lesson in 'Minsky moments', when asset prices collapse following a prolonged period of reckless speculative activity.

US economist Hyman Minsky never tired of warning that extended bull markets always end in epic collapses. The prolonged period of exuberance that financial markets are now experiencing would surely make him shudder.

A decade of ultra-easy monetary policy conducted by the world's major central banks has fuelled this dangerous bull market. To cite one example, US equity prices have increased more than threefold since their nadir in March 2009, and the US equity bull market is in its 11th year.

Financial market exuberance has begotten years of reckless lending. The risky US leveraged loan market has increased to more than $1.3tn. The size of the global leveraged loan market is around two-and-a-half times the size of the US subprime market in 2008. In 2017, oft-troubled Argentina was able to issue a 100-year bond. Today, European high-yield borrowers can place their debt at negative interest rates. Italy, dysfunctional and heavily-indebted as its government may be, can borrow at a lower interest rate than the US. Greece, which is slowly emerging from years of hardship, is able to borrow at negative rates.

Despite the clearest signals of gross global credit misallocation and the serious mispricing of credit risk, markets and policy-makers seem remarkably sanguine. The possibility of a violent repricing of risky assets, which could lead to large strains in the financial markets, is apparently far from their minds.

Their complacency is surprising, particularly in the light of early warning signs. In August, Argentina fell into a technical default on its bond obligations. In China, domestic corporate bonds are defaulting at an increasing rate following a year of record defaults in 2018. For WeWork, the much-vaunted US shared-workspace company, its equity bubble burst spectacularly in October.

Many factors point towards a global recession. According to the International Monetary Fund, whereas 75% of all countries were experiencing economic upswings in 2018, today 90% are suffering from slowdowns. Much of this can be attributed to the multiple fronts on which US President Donald Trump is fighting his trade war.

With the world economy already slowing, one might have expected markets to price in at least some possibility that the continuing quagmire in Hong Kong might precipitate an escalation of the US-China trade war. Markets seem to be ignoring, too, some probability of a hard Brexit, an oil price shock resulting from US-Iran tensions, or the possibility that Democratic candidate Elizabeth Warren – who has called regularly on congress and regulators to mitigate the threat of a downturn – might win next year's US presidential election.

People frequently quote Minsky's warnings about extended bull markets. But the economist also taught, just as importantly, that markets have short memories and habitually delude themselves into believing that 'this time will be different'. Judging by today's market exuberance in the face of mounting economic and political risks, it seems Minsky is soon likely to be proved correct again on both counts.

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*This article appeared in OMFIFCommentary on December 4, 2019.

* Desmond Lachman, resident fellow at the American Enterprise Institute. He was formerly a deputy director in the International Monetary Fund's Policy Development and Review Department and the chief emerging market economic strategist at Salomon Smith Barney.

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Development of Asia's Capital Markets: Roles and Challenges*

By MASAYOSHI AMAMIYA*

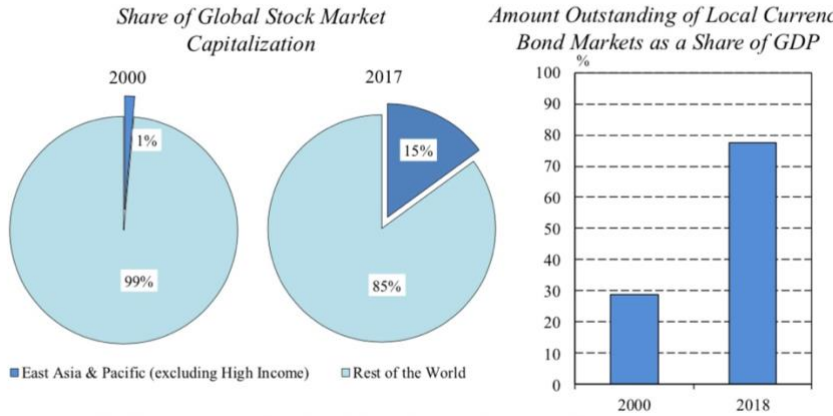
Introduction

Good morning everyone. It is my great pleasure to be here at the Asia Securities Industry and Financial Markets Association (ASIFMA) annual conference 2019. I am honored to address this distinguished audience comprised of representatives from the securities and asset management industries, institutional investors, policy makers, and regulators in Asia and other important regions.

Asia's capital markets have experienced remarkable growth since the Asian financial crisis in the late 1990s. Asia's share of global stock market capitalization[1] soared from 1 percent in 2000 to 15 percent in 2017. Notably, the amount outstanding in local currency bond markets in Asia as a share of GDP[2] in 2018 increased to more than double that in 2000 (Chart 1). Obviously, the rapid expansion of Asian economies has driven the growth of the capital markets in the region. At the same time, the collective efforts of market participants, policy makers, and regulators both at national and regional levels have contributed to market liberalization and enhancement of market infrastructures in Asia.

Chart 1

Asia's Capital Markets



Notes: 1. In the left-hand chart, "East Asia & Pacific (excluding High Income)" covers the "East Asia & Pacific" (a country and region grouping employed in the World Bank's World Development Indicators) excluding high-income countries and regions (Australia, Hong Kong, Japan, South Korea, New Zealand, and Singapore).
2. In the right-hand chart, the figures are based on the aggregated amount outstanding of local currency bond markets in China, Hong Kong, India, South Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.
Sources: Asian Bond Online; World Bank, "World Development Indicators."

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*This speech was given at the ASIFMA Annual Conference 2019 on October 10, 2019.

* Masayoshi Amamiya, Deputy Governor of the Bank of Japan

[1] Based on figures for "East Asia & Pacific" (a country and region grouping employed in the World Bank's World Development Indicators) excluding high-income countries and regions (Australia, Hong Kong, Japan, South Korea, New Zealand, and Singapore).

[2] Based on the aggregated amount outstanding in local currency bond markets in China, Hong Kong, India, South Korea, Malaysia, the Philippines, Singapore, Thailand, and Vietnam.

Typical examples of such regional cooperation include the Asian Bond Markets Initiative (ABMI), launched by the ASEAN+3, as well as the Asian Bond Fund (ABF) initiative[3] of the Executives' Meeting of East Asia-Pacific Central Banks (EMEAP), which is a group of 11 central banks and monetary authorities in the region. Financial industry associations, such as the ASIFMA, have also played a vital role by facilitating dialogue between market participants, promoting regional coordination, and providing necessary recommendations from a market perspective. Activities by those market participants and relevant authorities have been indispensable for the development of Asia's capital markets. I would like to recognize and praise all of those who have committed to these efforts.

Looking to the future, Asia needs to further accelerate and deepen the development of its financial markets more than ever before. This is because the existence of more developed capital markets both domestically and regionally will play a much more crucial role for the long-term stable economic growth of the region.

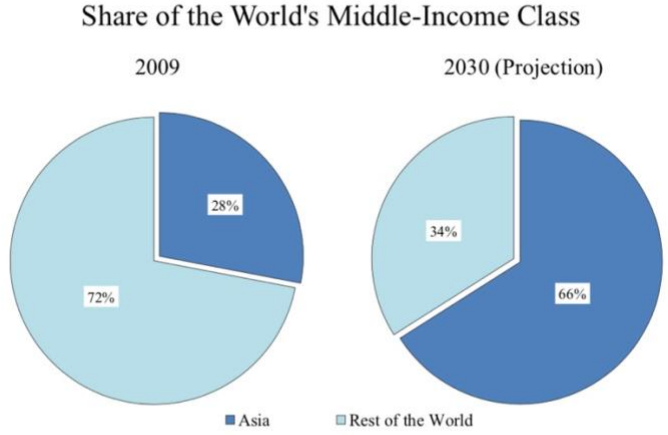
Today, I would like to discuss the economic implications of the conference theme, "developing Asia's capital markets," from several perspectives. Then, I will briefly touch on interest rate benchmark reform, as a specific example of the challenges we are facing as we endeavor to further develop market infrastructures.

Economic Significance of Further Developments in Asia's Capital Markets

Financing Economic Growth through the Growing Middle-Income Class

Let me begin with the importance of relying on the growing middle-income class to finance economic growth. The middle-income class in Asia has been growing to a remarkable extent. The Organisation for Economic Co-operation and Development (OECD) forecasts[4] that the middle-income population in Asia will constitute 66 percent of the world's share in 2030, more than doubling that in 2009 (Chart 2).

Chart 2



Note: The share of the number of people with daily per capita income of between 10 and 100 U.S. dollars in terms of purchasing power parity.
Source: Kharas, H. (2010), "The Emerging Middle Class in Developing Countries," *OECD Development Centre Working Paper*, No. 285.

[3] The Asian Bond Fund (ABF), established in 2003, is an index bond fund with a two-phase framework, namely, "ABF1," which invested in U.S. dollar bonds, and "ABF2," which invests in local currency bonds and is open to private sector investors. In 2016, because the EMEAP determined that ABF1 had achieved its original purpose, its proceeds were reinvested in ABF2. In July 2018, some selected bonds held within ABF2 were made available for lending to support the development of local currency securities lending markets and to enhance the functioning of regional money markets.

[4] Kharas, H. (2010), "The Emerging Middle Class in Developing Countries," OECD Development Centre Working Paper, No. 285.

The rise of Asia's middle-income class will be accompanied by growth and diversification of the financial needs of that class. Both domestic and regional markets in Asia must satisfy those evolving demands by providing various financial services, including investment trusts, pension funds, and insurance.

By doing so, Asia will receive benefits such as inflows of money from the middle-income class into infrastructure projects, which require a significant amount of funding. In other words, meeting the financial demands of the growing middle-income class will contribute to utilization of Asian savings for Asian investments.

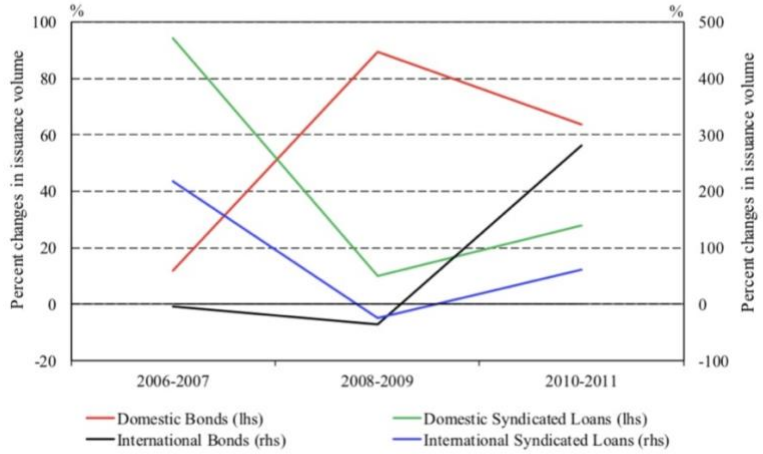
Strengthening Financial Stability with More Liquid Domestic Capital Markets

Now, I would like to proceed to a perspective of financial stability. Since the Asian financial crisis, many countries in the region have made wide-ranging efforts, including a reduction in the non-performing loans held by banks, in order to enhance their resilience against capital flow dynamics.

However, the presence of domestic bond markets in the Asian financial system is still limited, compared with that of banking sectors. In order to further strengthen financial stability in Asia, it is important to diversify funding sources for firms by developing domestic bond markets.[5] Recent empirical studies[6] point out that domestic bond markets in East Asia provided an alternative source of funding for firms in the region when the liquidity of international debt markets vanished during the global financial crisis from 2008 to 2009. East Asia saw greater domestic bond issuance during the crisis, in contrast with lower international bond issuance and a reduction in the amount of syndicated loan origination (Chart 3). This result tells us how important it is to develop domestic bond markets to make the Asian financial system more robust.

Chart 3

Issuance Activity in East Asia during the Global Financial Crisis



Note: Percent changes in aggregated total issuance volume of domestic and international bonds, and domestic and international syndicated loans in each sub-period. The figures are calculated by referencing Abraham, F., J. J. Cortina, and S. L. Schmukler (2019), "The Rise of Domestic Capital Markets for Corporate Financing: Lessons from East Asia," *World Bank Group Policy Research Working Paper*, No. 8844. The top and bottom 10 percentile of the sample has been excluded in the aggregation of data for each sub-period.
Source: Dealogic.

[5]For example, see Bank for International Settlements (2016), "A Spare Tire for Capital Markets: Fostering Corporate Bond Markets in Asia," BIS papers, No. 85, which focuses on the importance of domestic bond markets among capital markets in times of crisis.

[6]Abraham, F., J. J. Cortina, and S. L. Schmukler (2019), "The Rise of Domestic Capital Markets for Corporate Financing: Lessons from East Asia," World Bank Group Policy Research Working Paper, No. 8844.

Enhancing the Effectiveness of Monetary Policy

Lastly, I will touch on the effectiveness of monetary policy. For the conduct of monetary policy, central banks buy and sell financial instruments from capital markets, and they also receive financial instruments as collateral for the provision of liquidity. So, the degree of market functioning and liquidity concerning those financial instruments is a critical element that impacts the effectiveness of monetary policy.

In this regard, repos are financial instruments that are frequently used in the conduct of monetary policy, because repos carry a low credit risk and they are suitable for inventory and liquidity management by market makers. In Asia, market participants have preferred to use FX swaps and uncollateralized funding because of their accessibility and operational convenience, and the role of repo markets has been relatively limited overall. However, the situation is now changing. The EMEAP market survey[7] suggests ongoing efforts to enhance the functioning and liquidity of money markets such as repos. These efforts are being driven by various initiatives, such as the promotion of non-bank participation and the enhancement of industry standards. Accelerating these efforts would lead to greater effectiveness of monetary policy in Asia.

Interest Rate Benchmark Reform

Before closing, I will comment on interest rate benchmark reform. It would be beneficial to share some key points of interest related to this issue, as there are active discussions in various markets throughout the world.

In the wake of the LIBOR manipulation scandal, more reliable and robust interest rate benchmarks have been pursued. In addition, LIBOR will most likely be permanently discontinued after the end of 2021 judging from the announcement by the U.K. Financial Conduct Authority in July 2017 that the survival of LIBOR cannot be guaranteed.

LIBOR is the most widely-used benchmark in the global financial system and its discontinuation would have a significant impact on Asian markets. For example, the transition from U.S. dollar LIBOR to an alternative risk-free rate would be necessary in cases where the U.S. dollar is funded via cross-currency swaps. Accordingly, the other leg of the swap could also be affected.

We should also bear in mind that the discontinuation would affect a wide range of market participants in Asia.The latest EMEAP report[8] on a survey among member central banks on this issue stresses the importance of raising awareness of the potential discontinuation of LIBOR among institutional investors and non-financial corporates in particular.

In Japan, initiatives to prepare for the possible discontinuation of Japanese yen LIBOR have been taken by the Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks. The Bank of Japan serves as Secretariat on the committee, which is composed of a wide range of parties including financial institutions, institutional investors, and non-financial corporates. The committee has also expanded its deliberations into a public consultation and a wide range of outreach activities, such as holding a forum for non-financial corporates and industry associations (Chart 4). As a result, market awareness has been gradually growing and proactive initiatives towards interest rate benchmark reform, such as LIBOR exposure mapping, have been launched.

[7]For details, see EMEAP Working Group on Financial Markets (2018), "EMEAP Money Markets: Survey Report."
[8]For details, see EMEAP Working Group on Financial Markets (2019), "Study on the Implications of Financial Benchmark Reforms."

Chart 4

Interest Rate Benchmark Reform

- Raising awareness is the key to success.
- In Japan, the Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks held the *Interest Rate Benchmark Reform Forum* on August 1, 2019.
  http://www.boj.or.jp/en/announcements/release_2019/rel190830f.htm/

Participated widely by:
- Financial Institutions
- Non-financial Corporates (e.g., TOYOTA)
- Institutional Investors (e.g., Insurance Companies)
- Relevant Industrial Groups

Photo: Shoichi Nose

The permanent discontinuation of LIBOR would be one of the most significant events in global financial history, and the deadline is unavoidable. It is therefore important for us all to work together for our common interest -- a smooth transition to alternative reference rates. We should bring together our cross-sectorial wisdom and experience towards establishing more reliable and robust interest rate benchmarks, and make interest rate benchmark reform one of the great successes in global financial history.

Concluding Remarks

This conference covers so many important topics related to financial developments in Asia. I hope that lively discussions and exchanges of viewpoints over the coming two days will further contribute to the development of Asia's capital markets.

Thank you very much for your attention.

IMI International Monetary Review

U. S.

Trade Wars Facts and Fallacies*

By STEVE H. HANKE*

U.S. President Donald Trump, alongside many others, has a straightforward view on international trade, particularly the U.S. external balance. They believe an external deficit is a malady caused by foreigners who manipulate exchange rates, impose tariff and non-tariff barriers, steal intellectual property, and engage in unfair trade practices. The president and his followers feel the U.S. is victimized by foreigners, as reflected in the country's negative external balance.

This mercantilist view of international trade and external accounts is wrongheaded. The negative external balance in the U.S. is not a "problem," nor is it caused by foreigners engaging in nefarious activities. The U.S.'s negative external balance, which the country has registered every year since 1975, is "made in the USA"—a result of its savings deficiency.

To view the external balance correctly, the focus should be on the domestic economy. The external balance is homegrown; it is produced by the relationship between domestic savings and domestic investment. Foreigners only come into the picture 'through the backdoor'. Countries running external balance deficits must finance them by borrowing from countries running external balance surpluses.

It is the gap between a country's savings (read: income, minus consumption) and domestic investment that drives and determines its external balance. This fact can easily be seen by studying the savings-investment identity:

$$CA = S_{private} - I_{private} + S_{public} - I_{public},$$

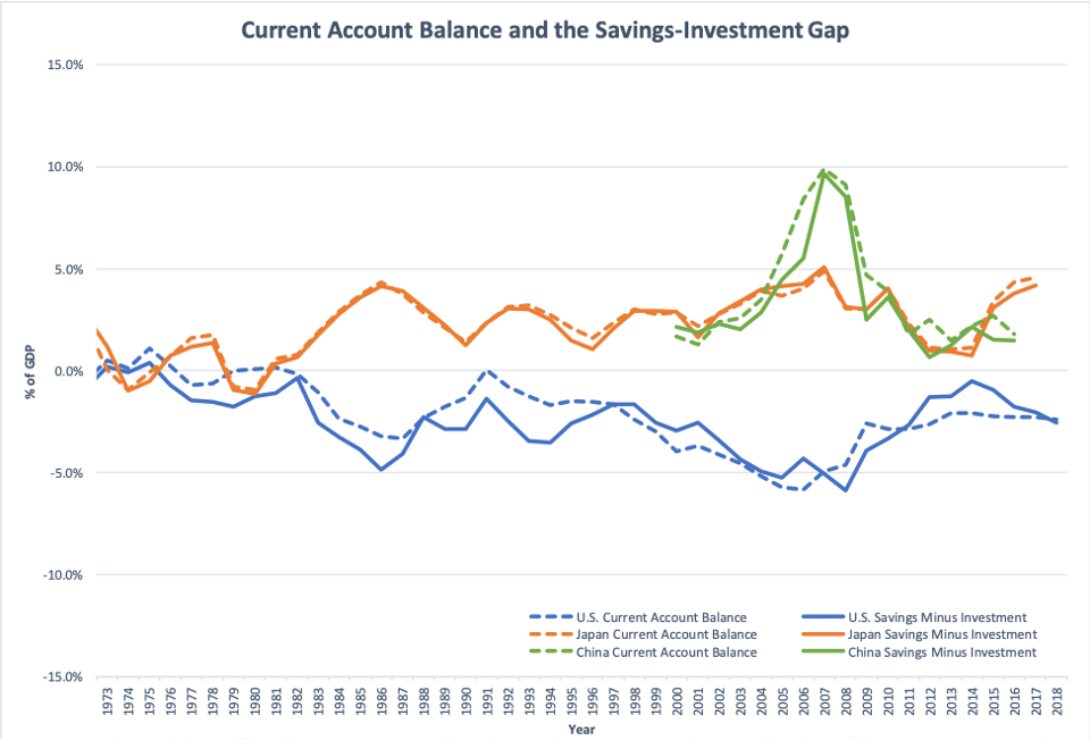
where CA is the current account balance, $S_{private}$ is private savings, $I_{private}$ is private domestic investment spending, S_{public} is government savings, and I_{public} is government domestic investment spending. In this form, $S_{private} - I_{private}$ is the savings-investment gap for the private sector and $S_{private} - I_{public}$ is the savings-investment gap for the government sector. For a full derivation of the identity in this form, see "The Strange and Futile World of Trade Wars" by Steve H. Hanke and Edward Li in the Fall 2019 issue of the Journal of *Applied Corporate Finance*.

First, the national savings-investment gap determines the current account balance. Both the public and private sector contribute to the current account balance through their respective savings-investment gaps. The counterpart of the current account balance is the sum of the private savings-investment gap and public savings-investment gap (read: the public sector balance).

The U.S. external deficit, therefore, mirrors what is happening in the U.S. domestic economy. This holds true for any country, even those with significant external surpluses. The chart below, which comports with the savings-investment identity, makes this clear. The U.S. displays a savings deficiency and a negative current account balance that reflects its negative savings-investment gap. Japan and China display savings surpluses, and both run current account surpluses that mirror their positive savings-investment gaps.

*This article appeared on *Forbes.com* on October 15, 2019.

*Steve H. Hanke, Member of IMI International Advisory Board; Professor of Applied Economics at The Johns Hopkins University



Source: Cabinet Office of Japan - Economic and Social Research Institute, National Bureau of Statistics of China, U.S. Department of Commerce - Bureau of Economic Analysis.

The table below shows again that U.S. data support the important savings-investment identity. The cumulative current account deficit the U.S. has racked up since 1973 is $11.488 trillion, and the amount by which total savings has fallen short of investment is $11.417 trillion. But, that is not the end of the story. Disaggregated U.S. data are available that allow us to calculate both the private and government contributions to the U.S. current account deficit. As shown in the table, the U.S. private sector generates a savings surplus—that is to say, private savings exceed private domestic investment—so it actually reduces (makes a negative contribution to) the current account deficit. The government stands in sharp contrast to the private sector, with the government accounting for a cumulative savings deficiency—that is to say, government domestic investment exceeds government savings, resulting in fiscal deficits—that is almost twice the size of the private sector surplus. Clearly, then, the U.S. current account deficit is driven by the government's (federal, plus state and local) fiscal deficits. Without the large cumulative private sector surplus, the cumulative U.S. current account deficit since 1973 would be almost twice as large as the one that's been recorded.

U.S. Savings and Investment (in billion USD)

Period	Current Account Balance	Total Savings Minus Investment	Private Savings Minus Investment	Government Savings Minus Investment
1973-1979	1.8	-118.4	514.1	-632.5
1980-1989	-777.9	-1,174.7	1,227.4	-2,402.2
1990-1999	-1,216.6	-1,816.9	1,305.4	-3,122.3
2000-2009	-5,710.4	-5,477.9	1,298.1	-6,776.0
2010-2018	-3,784.5	-2,829.4	8,457.3	-11,286.8
1973-2018	**-11,487.6**	**-11,417.4**	**12,802.3**	**-24,219.7**

Source: U.S. Department of Commerce - Bureau of Economic Analysis.

The straightforward implication of this analysis is that President Trump can bully countries he identifies as unfair traders and can impose all the restrictions on trading partners that his heart desires, but it won't change the current account balance. The U.S. current account deficit is

solely a function of the savings deficiency in the U.S., in which the government's fiscal deficit is the proverbial elephant in the room. And how is the current account deficit financed?

Well, it turns out that foreigners who generate savings surpluses and current account surpluses finance the U.S. current account deficits. It is clear, therefore, that current account balances represent nothing more than a measure of the international trade in savings.

What's more, the Trump administration's fiscal policies, which promise ever-widening fiscal deficits, will throw a monkey-wrench into President Trump's trade policy works. Indeed, if his fiscal deficits are not offset by an increase in private savings relative to private investment, increases in the federal budget deficit will translate into larger current account deficits. So, the U.S. current account deficit will not only continue to be made in the good old U.S.A., but it will be greatly enlarged by President Trump himself—the professed archenemy of external imbalances.

The good news, however, is that the U.S. has been able to finance its current account deficit with relative ease. Indeed, foreigners are more than willing to park their savings in U.S.-dollar-denominated assets. This is a tribute to the dollar's role as the world's reserve currency, America's creditworthiness, and the effectiveness of U.S. corporate governance.

The level of economic illiteracy that surrounds the strange world of international trade policy is stunning. Now we have irrefutable arguments and evidence to explain why a country's external balance is determined domestically, not by foreigners. As the history of trade policy shows, it's difficult to change false beliefs with facts. But, now we have even more damning evidence to refute the false beliefs than ever before.

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"Helicopter Money" Recession Solution*

By DESMOND LACHMAN*

Many are asking whether, with high US budget deficits, already low interest rates and a bloated Federal Reserve balance sheet, US policy-makers would have sufficient ammunition to fight the next recession.

Instead, they should be asking how economic policy-makers might best deploy the instruments at their disposal to fight the next recession in a manner that might avoid the mistakes made in responding to the 2008 financial crisis.

The first mistake was that, while there was a large fiscal policy response, it was poorly designed. Rather than seeking to construct an effective package of tax cuts and public spending increases, then-President Barack Obama's administration chose to leave the budget response's design largely to Congress. As should have been expected, the fiscal response was overloaded with smaller, local projects that might have been pleasing to constituents, but did little to stimulate the economy.

The more serious policy mistake was placing too much of the burden for avoiding a deflationary downturn on the Federal Reserve. Interest rates soon reached their zero lower bound and Congress was reluctant to introduce another fiscal stimulus. As a result, the central bank felt it had little choice but to make unorthodox resort to three rounds of massive government bond and mortgage-backed security purchases. The Fed did so to drive down long-term interest rates and encourage investors to take on more risk.

Its efforts succeeded in preventing a deflationary downward economic spiral. Over the past decade, the US has experienced its longest, albeit slowest, economic recovery on record. Meanwhile, unemployment declined steadily to its lowest level in the past 50 years, without jeopardising the Fed's inflation target.

The Fed's success in promoting an economic recovery came at considerable cost. By suppressing interest rates received by savers and creating conditions for a decade-long stock market boom, the central bank contributed to the heightening of US income and wealth inequality, which has poisoned the national political landscape.

The Fed's bond buying, together with that of the world's other major central banks, contributed to the substantial misallocation of capital and mispricing of credit risk around the world. Anyone doubting this need only look at the explosive increase in the US leveraged loan market or at the fact that European high yield borrowers and a country as highly indebted as Greece can borrow at negative interest rates. By having seriously distorted credit markets and increasing debt levels, the Fed has set the global economy up for a worse-than-normal recession.

With ultra-low government borrowing costs, governments can tolerate higher budget deficits and public debt levels. The Fed has the power to expand substantially its balance sheet by extending the menu of assets it might buy with a view to producing yet another bout of asset price inflation in general and a stock market boom in particular.

In countering to the next recession, the main policy challenge will be how to do so in a manner that does not repeat the mistakes of responding to the 2008 financial crisis. The key

*This article appeared in OMFIF Commentary on November 20, 2019.

*Desmond Lachman, resident fellow at the American Enterprise Institute. He was formerly a deputy director in the International Monetary Fund's Policy Development and Review Department and the chief emerging market economic strategist at Salomon Smith Barney.

questions policy-makers should be asking themselves is how to respond without exacerbating income and wealth inequality and without setting us up for the next major economic bust.

One way forward could be some variant of US economist Milton Friedman's 'helicopter money' idea. By financing government handouts on generous terms to those citizens most likely to spend that money, the Fed could help to address the country's inequality problem. This would also help to promote an economic recovery without distorting the capital market and without unduly increasing debt levels.

Hopefully, in responding to the next economic recession, serious thought will be given to the helicopter money idea. If not, we should brace ourselves for yet another Fed produced boom-bust cycle.

January 2020
Vol.7, No.1

Claustrophobia on Fed Balance Sheet*

By PIERRE ORTLIEB*

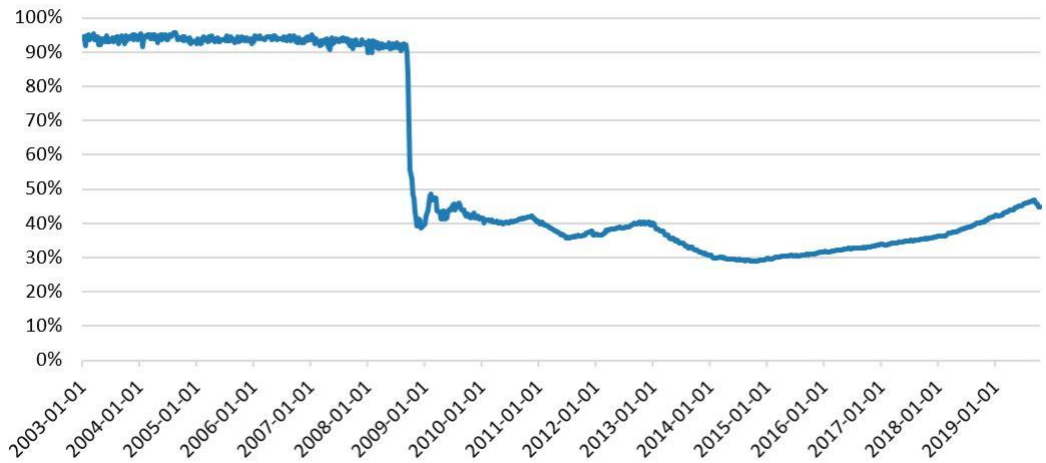
The US Federal Reserve's key challenge for the next six months, alongside trade tensions, is managing its liabilities.

Since the 2008 financial crisis, the size of the Fed's asset holdings has grown around fivefold, reaching almost $4.5tn in 2014 from less than $900bn in early 2008. It has since declined to below $4tn, but growth is set to resume with the Fed's announced permanent open market operations.

In the halcyon days of the 'great moderation' of the 1990s and early 2000s, the Fed's assets matched its liabilities almost entirely by currency in circulation (Figure 1).

Figure 1: As the balance sheet grows, other liabilites grow in importance

Currency in circulation as a share of the Federal Reserve's balance sheet, %



Source: Federal Reserve Economc Data, OMFIF analysis

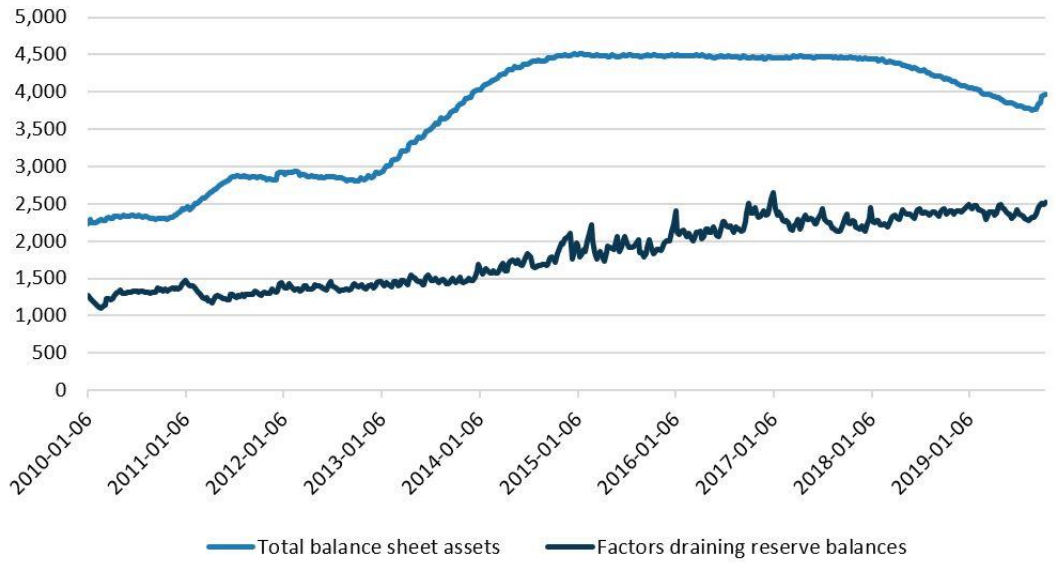
Yet for central banks, the enduring legacy of the crisis is that they are now a bulwark in money markets, and have taken on a critical role in providing overnight liquidity to the financial system. Various new lending facilities – such as the reverse repurchase (RRP) facility – and liquidity management practices now take up space on the liability side of the balance sheet. Their recent growth has precipitated a decline in the reserve balances available in the financial system.

The statement following the Federal Open Market Committee's ad hoc 4 October meeting reads, 'The Federal Reserve will… ensure that the supply of reserves remains ample even during periods of sharp increases in non-reserve liabilities.' Subsequent meetings will have to address the turmoil coming from continued shifts in liability composition.

*This article appeared in OMFIF Commentary on October 30, 2019.
*Pierre Ortlieb, Economist at OMFIF

Figure 2: Non-reserve liabilities devouring balance sheet space

Total balance sheet assets, $bn, non-reserve factors draining reserve balances, $bn



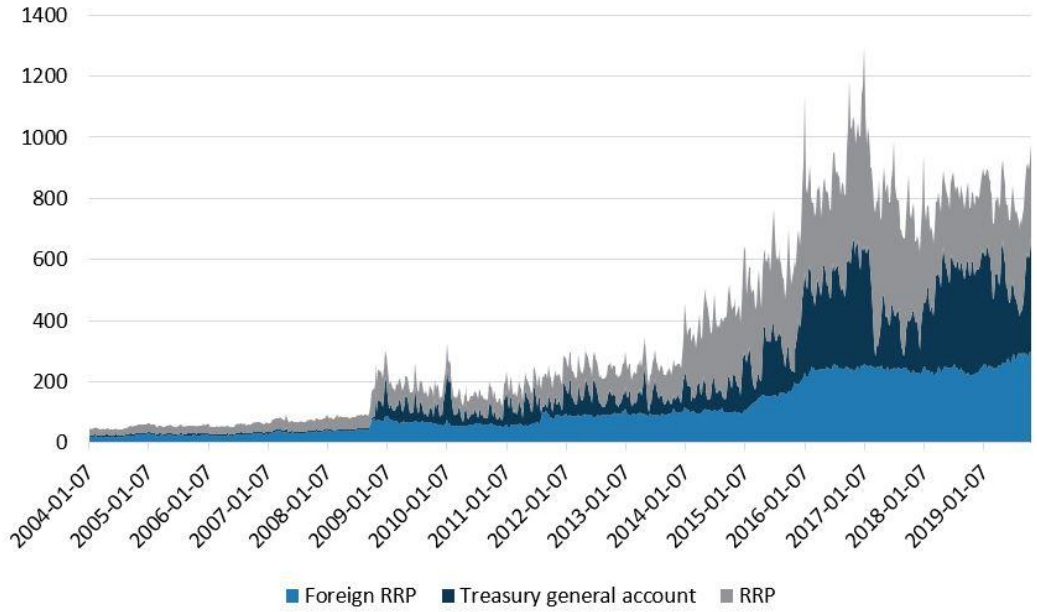
Source: FRED, OMFIF analysis

US fiscal authorities have been a key driver of tightening pressures this year. In September, the Treasury announced it would rebuild its cash buffer – a deposit account that it depleted during this summer's debt ceiling debacle – to more than $400bn, correspondingly 'sterilising' reserves on the Fed's balance sheet. A diminishing balance sheet and growing Treasury general account places pressure on available reserve balances.

Furthermore, two RRP facilities introduced by the Fed after the crisis – one for domestic institutions including primary dealers and money funds, and one for foreign official institutions – have changed the nature of financial intermediation in the US and complicated the Fed's liability mix. Their uncapped nature and the generally attractive rate offering have made them appealing to a new range of non-traditional counterparties, and uptake has been significant (Figure 3). For foreign institutions, the rising cost of hedging dollar assets has made the repo facility especially attractive, and it has become important to liquidity management as cash demand has risen.

Figure 3: Growth of Federal Reserve liquidity services

Reverse repurchase agreement, $bn, reverse repurchase agreements with foreign official counterparties, $bn, and Treasury general account, $bn



Source: FRED, OMFIF analysis

The broader shift in liability composition to overnight liquidity services from currency has squeezed the volume of reserve balances available for trading and settlement. This has acted in tandem with new regulations (particularly Basel III's liquidity coverage ratios and 'living will' rules), which have pressured the overall volume of dollar liquidity outstanding, especially when considering continued currency growth.

Most reserve balances are concentrated among a small number of systemically important banks, that – for the regulatory reasons identified earlier – are reluctant to lend these out. The four largest US banks – JPMorgan Chase, Bank of America, Citigroup and Wells Fargo – held $377bn in reserves as of the second quarter of this year. Financial intermediaries relying on reserves will feel increasingly claustrophobic in the context of the growing coterie of investors accessing the balance sheet for liquidity management.

The Fed's twin approach – repos interventions available since September, and permanent growth of the balance sheet at $80bn a month through 2020 – has calmed money markets. However, its ability to prevent a year-end spike in funding costs will be tested in December. Its medium-term impact may be limited by the dynamics between the foreign RRP facility and the Treasury bill market.

By purchasing outstanding bills, the Fed is reducing the available supply and suppressing yields on these securities, making it doubtful that money market funds or foreign central banks would acquire them as part of their liquidity management. As a result, both could increasingly turn to their respective RRP facilities to compensate, further reducing outstanding reserve

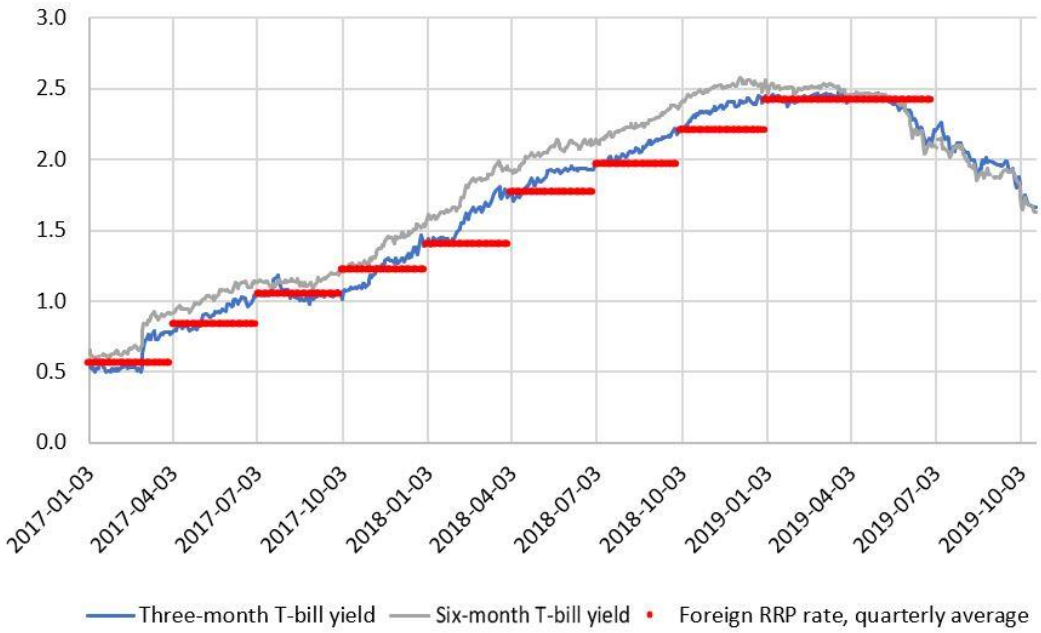
balances. A declining trade-weighted dollar could counteract this, but it is uncertain how these forces will unfold.

On the whole, permanent balance sheet growth is welcome, but should be complemented by other measures to reduce reliance on other liability-side facilities that have caused uncertainty in funding markets. The introduction of a standing repo facility – which would allow counterparties to trade Treasury securities freely for reserves on demand, reducing their immediate intraday liquidity needs – was discussed at the June and September FOMC meetings, but progress has been slow. This would reduce regulatory reliance on reserves themselves, thereby curbing uncertainty around the composition mix of the Fed's balance sheet.

Another area for improvement is in the structure of the foreign RRP facility. It is not based on market rates, but rather is priced by the New York Fed. As Credit Suisse's Zoltan Pozsar noted in 2015, the Fed once priced the facility to encourage foreign investors to move out of the bill market when these were in short supply. Now, it might want to do the opposite.

Figure 4: Tracking the strategy behind foreign RRP pricing*

Average RRP interest rate, %, three-month and six-month Treasury bill yields, %



Source: Federal Reserve, FRED, OMFIF analysis

Pricing the foreign RRP facility at less attractive rates to encourage foreign official investors to move into the bill market could ease significantly pressure on the Fed. Alternatively, allowing the price to fluctuate freely but capping the facility at a certain volume may have a similar effect; the facility was limited in size until 2015, when restrictions were lifted.

*The Fed releases average interest rates for the foreign RRP facility at the end of the first, second, and third quarters in its unaudited financial report. Rates are not reported for the fourth quarter; the ones indicated here are interpolated from the available data.

Stabilising the liability components of its balance sheet is a key task for the Fed in its next meeting. While the rate cut anticipated by markets will help relieve pressure and make dollar assets more accessible to foreign investors, the underlying structural issue of balance sheet uncertainty should not remain unaddressed.

IMI International Monetary Review

Digital Economy

The Colour of Money, Even for the Virtual Currencies*

By LIU JUN*

What are the major functions of money? The well-established and broadly-received ones include a medium of exchange, a store of value, a unit of account and a standard of deferred payment, while a comprehensive and precise summary would be that it plays the role of a universal equivalent.

Obviously, those defining characteristics are mainly for paper money, or fiat currency in other terms, which has evolved from physical goods, precious metals such as gold and silver to printed banknotes in paper, or in plastic in Australia's case.

Money is all about exchange and trade, first nationally then internationally, substantially supporting the dramatic development of cross-border trade and economic activities.

Accordingly, the monetary system has come a long way from the barter trade in the pre-industrial age, the gold-standard in the 1940s to the credit currency system adopted since the 1970s, facilitating trade flows and productivity elevation. Money, in its principal form of capital, is of great significance in creating the whole new edifice of capitalism and the market economy.

Capital sits in the top of the list of factors that contribute to the total productivity. However, nowadays capitalism is in doubt, globalism is in retreat, and money itself also seems to be in a synchronized resetting mode.

The first issue is the international monetary regime, i.e. which sovereign currency is the anchor of trade, investment and exchange reserve. The US dollar has been the undisputable pillar currency since the beginning of the US-centered world order, but it seems to have unwittingly entered into the playoff period, facing challenges from old contestants such as the Euro and the Japanese yen, as well as new competitors, Chinese Renminbi being the most salient and imminent one.

If functionality is the only variable, any convertible currency can be added into the international basket and obtain its proportionate share in line with the related economic shares. To the extreme, the super-sovereign currency, Special Drawing Right, created by the International Monetary Fund in 1969, might be the most ideal substitution for any sovereign currencies.

However, the reality is that in spite of the markedly high expectations on the Euro from its inception in 1999 and later on the RMB as China develops into the second-largest economy, neither has imposed real threats to the dollar, let alone the stateless currency forms. On the contrary, the dollar has gained more dominance in terms of its proportion in the international money flows.

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*This article appeared in DataEconomy on December 4, 2019.

*Liu Jun, Member of IMI Academic Committee; Vice President, China Investment Corporation

Money is nothing but a medium or vehicle, the value of which is fully determined by the trustworthiness and credibility endorsed by its home state with its comprehensive power. The US dollar seigniorage is surely derived from the statehood of the US, and its highest status is commensurate with the all-round supremacy of the USA.

Given the fact that European countries rally their support around the Euro in order to share the monetary hegemony as an alternative international currency, it is understandable that the US is bound to heavily leverage all means, even the security prowess through the NATO, to contain that European ambition. In the cases of both the SDR and the Euro, the nature of money and the monetary system comes to the surface, and national interests are the only theme.

The second issue is the digitalization of the traditional money form. The disruptive newcomers are mushrooming, and the most heated territory is peer-to-peer platforms, which initiate various virtual or cryptocurrencies such as Bitcoin, Litecoin and Ethereum etc.

The flag raised high by those new monies is the tech-driven decentralization of the current money issuance system, as well as the replacement of such system by other more trustworthy stateless virtual systems, for instance, the self-governing Bitcoin nation underpinned by blockchain technology.

The claimed digital monetary democracy might be clearly visualized through the frantic and somewhat anarchic price fluctuations of Bitcoin, but the conviction towards decentralization can never be achieved through the designing and constructing of the de facto virtual centres. The decentralization process is actually recentralized on certain specific technologies, if not one of Bigtech companies itself.

This techno-worship simply shifts the monetary authority from physical states to invisible organizations, whereas the center remains firmly intact. In addition, Facebook's Libra is, in fact, a stable coin fully backed by bank deposits and high-quality central bank treasuries, and China's Digital Currency Electronic Payment is essentially a mirror image of cash digitally.

They both take the middle ground to reflect the significance of the national-interests oriented authority. In respect of any digital currency forms, the interests of the real or virtual nations are intrinsically embedded.

To paraphrase the 1986 hit film, it is safe to conclude that the colour of money is national interests and the value of any forms of money can only be backed by the overall strength of the issuing states.

Even though the concept of nation or state may be built digitally or virtually, the true colour of money will never fade and the decentralized incumbents will be recentralized, maybe in a disruptive way. There is a pressing need for national and international regulations on virtual currencies and they will come soon.

IMI International Monetary Review

Digital SDR to Enhance Payment Systems*

By BEJOY DAS GUPTA AND MILES AU YEUNG*

Cross-border payments are growing rapidly, propelled by services trade, demand from foreign investment flows and workers' remittances, but remain costly, slow and opaque. Processes are complicated by the presence of multiple parties, regulatory approaches and capital requirements, as well as differences in technical and operational standards, legacy systems and infrastructure. Concentrated market structures and information asymmetries exacerbate costs.

Businesses and individuals are looking for faster, more convenient, transparent and inexpensive cross-border payment methods. While there have been innovations, they are often limited to the front-end user experience. The back-end clearing and settlement payment networks still go through the traditional value chain optimised for high-value, low-volume transactions involving banks.

There is a burgeoning need for technologies to improve back-end processes, lower compliance costs and transform payment means. Models involve bilateral connection between domestic e-money services, extending an e-money system to multiple countries, and creating a peer-to-peer payment network accessible in multiple countries.

One way to facilitate cross-border payments would be the use of a digital composite asset of stable value based on the special drawing right, the International Monetary Fund's composite currency unit. The development of this 'eSDR' has its genesis in a 2017 speech by Christine Lagarde, the IMF managing director and soon-to-be European Central Bank president, in which she said: 'The Fund will also have to be open to change, from bringing new parties to the table, to considering a role for a digital version of the SDR.'

The value of the eSDR is based on the SDR basket of currencies. It exists in the form of digital tokens and represents a claim on the freely usable currencies of transacting parties and can be exchanged for these currencies. The eSDR possesses banknotes' characteristics: it bears a monetary value; is protected by multiple security features; is uniquely identifiable and traceable; its supply is controlled by the participating authorities; its value are backed by the issuing authorities; and it is interoperable across payments systems.

Central banks could make use of the eSDR by issuing what would in effect be a universal central bank digital currency for cross-border transactions. As the value of the digital token would be determined by the IMF SDR's currency composition and weights, it would be a stable instrument with no additional volatility, trading or investment activity, nor danger of manipulation.

To illustrate, Southeast Asian central banks, which already hold SDRs in their reserves, could issue eSDRs for regional cross-border payments. Foreign exchange costs could be reduced through direct settlement between central banks, as payments would move from currency A to eSDRs to currency B. Transactions would be instantaneous, peer-to-peer, round-the-clock, with enhanced transparency and data-sharing. Problem posed by multiple intermediaries would be eliminated. All providers could use the central bank-backed digital tokens.

Over time, more central banks could join, and a multilateral institution, such as the IMF, take over management of the eSDR. Alternatively, the technology could be applied in different

*This article appeared in OMFIFCommentary on October 2, 2019.This article is based on a whitepaper covering cross-border payments and the eCurrency eSDR™.

*Bejoy Das Gupta is Chief Economist and Miles Au Yeung is Chief Markets Officer at eCurrency.

regions, with another currency basket as the reference point. However, private sector-issued eSDRs may hold more promise for faster implementation of a global solution for cheaper, quicker and more transparent cross-border payments.

An eSDR-based payment network would enable financial service providers to offer efficient, transparent and inexpensive cross-border payment services even for low-value and high-volume use cases. Settlement times and costs should fall substantially, and improved compliance should enhance financial integrity.

The inefficiencies of cross-border transactions must be addressed. The use of digital composite tokens should create a product that is a trusted and stable store of value as well as effective medium of exchange. In its ideal form, the eSDR will greatly benefit both private sector financial businesses and the authorities that supervise them.

IMI International Monetary Review

Central Bank Digital Currency and Innovative Payments*

By FRANCOIS VILLEROY DE GALHAU*

Ladies and Gentlemen,

One of the great things about the conferences organised by the ACPR is their sense of timing: they always come in the middle of heated debates. Today is no exception with the issue of the challenges faced by life insurance in a low interest rate environment. By way of introduction, let me agree with and sum up Bernard Delas's message of this morning: French insurers are resilient and thus have the capacity to make the necessary dual adaptation. First, the rates paid on life insurance policies need to be lowered this year from last year's average of 1.8%. Next, insurers must actively restructure and diversify their offering for savers, while at the same time paying very close attention to the quality of advice they offer. If, as a complement – and only as a complement – regulatory adjustments are needed to facilitate this change in life insurance, then we are ready to support them.

I would like to turn now to the topic for this afternoon which is dedicated to innovation. Allow me to both restrict and extend the scope of the subject: restrict it to the field of payments which has seen a proliferation of innovations over recent years. And extend it beyond the scope of the ACPR and the supervisory authority: I shall also speak as a central banker, and of a central bank digital currency (CBDC). Driven by new market entrants, the digital revolution has brought with it a wealth of advancements that we profit from every day: but it also raises major questions about bank intermediation, and even about our monetary sovereignty. I would like to propose today that we take a stark look at these questions (I), and that we answer them by reiterating the two main pillars of our strategy: safeguarding confidence and supporting innovation (II).

The advances and challenges associated with the proliferation of private initiatives in the payment industry

Let us first recall the main trends that currently characterise the European payments market. The increasing digitalisation of cashless payments – which is leading to a sharp fall in cash usage in certain countries, from Sweden to China – has been driven by the rise of non-bank players. There is no denying that, today, the "centre of gravity" for payments is shifting towards these new players, especially the BigTechs. This displacement poses a challenge for banks' economic model, but could also be a threat to European sovereignty insofar that the infrastructures, knowledge and technologies underlying it are largely owned by non-European corporations.

The emergence, in parallel, of a new generation of crypto-assets is amplifying this disruption. The first wave of speculative crypto-assets such as bitcoin – which are very volatile, with no real underlying economic basis and perhaps no real future – has been succeeded by a second generation of assets – stablecoins – based on the same promising blockchain technology, but now backed by mechanisms designed to stabilise their value. Thanks to network effects, these stablecoins could offer a concrete solution for cross-border payments which are still – undeniably – far too costly and slow. But – and this is the downside – these crypto-asset projects, which are global in reach, also generate considerable compliance, financial and political risks.

*This speech was given at the Autorité de controle prudentiel et de resolution (ACPR)on December 4, 2019.

*Francois Villeroy de Galhau, Governor of the Bank of France and Chairman of the ACPR

I'm thinking notably of money-laundering and terrorism, for which they could provide new channels of financing, and of the more systemic risks to financial stability.

Our response: Step up the pace on payment solutions and consider the possibility of a CBDC

Of course, as central bankers and supervisors, there is no question of us standing by and letting this change happen unchecked. We have to remain fully committed to our dual objective – safeguarding confidence/supporting innovation – which is written into the very DNA of our institution.

We are determined, first and foremost, to safeguard confidence – at the global level – through strong and coordinated action. Under France's presidency, the G7 reacted swiftly and strongly last June: alongside Bruno Le Maire, we entrusted BenoitCœuré with a mandate immediately after the announcement of the Libra project. Cœuré's report – compiled over four months and published in October – provides a full assessment of the risks posed by stablecoins from a microeconomic viewpoint, in terms of anti-money laundering and consumer protection, but also from a macroeconomic one, in terms of financial stability. Within the framework of the Financial Stability Board (FSB), we are now preparing a coordinated regulatory response to these challenges, due to be published by next summer.

I shall turn now to the second pillar of our response: supporting innovation to enhance our payment systems and meet the growing expectations of consumers. We first have to take advantage of the opportunities offered by the digital revolution to develop a genuine pan-European payment solution. As Steve Jobs said, "innovation is saying no to a thousand things". This observation sheds light on the challenge that European banks are about to face with the PEPS-I project (Pan European Payment Solution Initiative). I have every hope that they will be able to forces – and go beyond "national" practices – and rapidly propose a single, pan-European payment solution, thus avoiding market fragmentation and the dominance of non-European solutions. The Eurosystem will be ready to provide support as and when needed, in line with what we are doing to promote the use of TIPS (Target Instant Payment Settlement). As a market infrastructure capable of processing pan-European instant payments, TIPS could be used for the interbank settlement of transactions initiated via PEPS-I. This pan-European solution would be a major step forward that would help European banks withstand the challenges posed by the BigTechs.

There is also another important area where we need to make headway: reducing the cost and speeding up the execution of cross-border payments by identifying concrete and useful solutions. Our aim should notably be to harmonise the technical standards used for transfers of funds, and to enhance the interoperability of payment systems and solutions. Between now and the autumn, the FSB, under the aegis of the G20, will propose concrete measures to make cross-border, extra-European payments significantly cheaper and faster.

I shall turn now to a topic that is a major challenge for the future of the international monetary and financial system: the possible creation of a central bank digital currency (CBDC). The creation of a new form of currency by central banks goes beyond the challenges I have just mentioned: it is neither a precondition for nor a guarantee of more efficient payments. However, we as central banks must and want to take up this call for innovation at a time when private initiatives – especially payments between financial players – and technologies are accelerating, and public and political demand is increasing. Other countries have paved the way; it is now up to us to play our part, both ambitiously and methodically.

To this end, the Banque de France is to be reorganised. The current Direction de la surveillance des paiements et des infrastructures de marché (DSPM – Payments and Market

Infrastructures Oversight Directorate) will become the Direction des infrastructures, de l'innovation et des paiements (DIIP – Infrastructure, Innovation and Payments Directorate), and its scope will be extended to cover all payment innovations, infrastructures and central bank digital currency. Additional skills will be recruited to strengthen its expertise, and, with the help of our Lab, the DIIP will work with industry innovators from the private sector: we want to start running experiments rapidly and will launch a call for projects before the end of the first quarter of 2020. We are particularly keen to take part in experiments to integrate a "wholesale" CBDC into innovative procedures for exchanging and settling tokenised financial assets. Nathalie Aufauvre, Director General of Financial Stability and Operations, will coordinate the Banque de France's acceleration process. Our actions will naturally contribute to the work of the Eurosystem, which should make looking into the possibility of an "e-euro" one of its next focuses: Christine Lagarde referred to it on Monday in front of the European Parliament. Beyond this, we intend to take part in the work of the "innovation hub" recently created by the BIS.

On a substantive level, I would like to share with you some first thoughts – which are still open to discussion, of course – on three aspects: the objectives, externalities and possible modalities of a central bank digital currency.

1/ At this stage, I can see three different – but not mutually exclusive – objectives for digitalising central bank currency. The first relates to the desire, in countries such as Sweden where cash use is declining rapidly, to guarantee all citizens access to central bank money. A CBDC would help to preserve the trust in the financial system that stems in part from being able to exchange assets for legal tender. The second argument relates to the efficiency gains, reduced intermediation costs and resilience that would potentially result from the "tokenisation" of a central bank currency, especially in settlement and post-trade activities (which is also one of the objectives of JP Morgan's JPM Coin project). The third and final reason – and the most important one for political authorities, including in France and Europe – is that creating a CBDC would give us a powerful lever with which to assert our sovereignty in the face of private-sector initiatives such as Libra. This is also one of the concerns highlighted by the People's Bank of China with its Digital Currency Electronic Payment (DCEP) project.

In this context, what form should our CBDC take? Public expectations on this differ significantly from those of financial institutions. As a result, in the long term, two different uses of the CBDC could exist side by side: one for payments between financial sector players (a so-called "wholesale" currency) that uses blockchain technology and all its possibilities, notably smart contracts; and another for the general public (a so-called "retail" currency) that is simpler and better suited to retail transactions. In this respect, financial institutions are much more digitally mature than private individuals as they already access central bank currency digitally via the bank accounts they hold with the central bank. In addition, following on from the questions raised by the Governor of the Bank of England, Mark Carney, on the idea of creating an international digital currency in response to the dominance of the US dollar, I think there would be some advantage in moving rapidly to issue at least a wholesale CBDC, as we would be the first such issuer in the world and would thus reap the benefits of having a benchmark CBDC.

2/ The issuance of a CBDC can generate significant positive externalities by increasing the productivity of the financial sector and by extension the economy, and by shoring up confidence in the currency and in the financial system. But, in parallel, it is vital that we examine the potentially negative externalities that a CBDC could generate for liquidity, profitability and bank intermediation. In particular, we need to look very closely at the risks linked to large-scale and/or sudden conversions of bank deposits into central bank money.

3/ The third aspect is the modalities that could be used to circulate the CBDC, especially the "retail" version, about which we need to be particularly vigilant. I'm thinking about the issue of

its legal tender status – which is not indispensable but probable; the conditions under which it can be held – in the form of accounts rather than tokens; and last, whether non-residents will have access to it, which would certainly help to raise its international status. Moreover, thanks to their proven expertise in payment instruments, know-your customer requirements and transaction monitoring, financial intermediaries will be able to play a front-line surveillance role in the distribution of the CBDC. In parallel, we will also need to launch a reflection to define the conditions under which the CBDC could circulate anonymously "from person to person". Limits could be set for the size of anonymous transactions, such as those already applicable in France for e-money and cash payments.

Today, probably more than at any other time in our history, innovation has the potential to profoundly alter banking activities. It is no longer just about transforming our payment systems, it is our very currency that is at stake. The Banque de France fully intends to guide these developments, as it has done for more than two hundred years, and will adapt the way it operates to this change in paradigm. But in doing so it will also make sure that confidence, the cornerstone of innovation, is maintained on two levels. Confidence first and foremost in the currency: everyone will be free to use the payment instrument of their choice, and that still includes cash. Confidence, as well, in the ability of financial institutions to finance the economy. And the ACPR will continue and step up its efforts – notably through its FINTECH Innovation unit – to monitor all innovations that impact these methods of financing. Thank you for your attention.

IMI International Monetary Review

Working Paper

Introducing Digital Currencies to the Global Interbank Settlement System*

By HERBERT POENISCH*

Introduction and Outline

The global financial architecture, including the financial infrastructures was set up after WW2 and is still in place, with marginal improvements.

At the centre of the financial infrastructures are the national central banks and national banking systems. The central banks hold foreign assets, mostly denominated in USD and the commercial banks hold reserves at the central banks. The public hold claims on the central banks in the form of cash and claims on commercial banks in the form of deposits. Transactions within a national system are carried out through the payment and settlement infrastructure (such as CNAPS in China). Payments are made through banks and non-banks (VISA, Mastercard, Union Pay, Alipay, WeChat Pay). This includes an RTGS for large, time critical amounts and netting system for smaller amounts. The costs of settlements have declined drastically and the speed has increased to real time clearance. While digital technology has accelerated the payment process, no digital currencies are used at present[1].

The cross-border payments and settlement happens between central banks through their accounts at the Federal Reserve of New York and the Bank for International Settlements where all central banks hold accounts in key currencies. Countries accumulate reserves or lose them through this channel.

The global interbank market is one of the largest financial markets. However, cross-border payments among commercial banks are still carried out through intra bank transfers (within a bank) and the century old "correspondent banking model" for moving funds. China introduced its interbank payments system (CIPS) in 2015. Foreign exchange is obtained up front. In order to reduce the so called "Herstatt Risk"[2], commercial banks use the Continuous Linked Settlement System (CLS). Messaging is standardized through the SWIFT format. The present system is not only costly, time consuming, particularly if the commercial banks are not directly linked, but have to go through larger banks, members of RTGS and CLS. Furthermore, payments in USD are routed through the US clearing banks.

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*Herbert Poenisch, Member of IMI International Committee; Former Senior Economist of BIS

1The real time settlement systems of Ali Pay and Tencent introduced new technology but has to be prepaid in RMB through banks. The IMF calls this emoney: emoney is a means of payment and a store of value fully backed by fiat money, such as RMB

2Herstatt Risk arises from different time zones, when a partner bank can default.

According to the BIS foreign exchange survey[3], forex transactions in USD account for nearly 90% of all transactions[4], for current account purposes as well as financial account transactions, while this USD predominance has been unchanged for decades. This system is imbalanced as the global share of the US economy has declined, countries are excluded from this system due to US political decisions, subject to US surveillance and the whole system is subject to risks incurred by the major US banks as witnessed in the GFC ten years ago.

The new economic power, China has played along with this system so far but bumped into limits as it wants to expand the financial underpinning of its vast trading and investment network, first and foremost within the Belt and Road Initiative. The Chinese commercial banks are the largest commercial banks in the world, but they have to comply by a system designed and run by others.

It is therefore time to use the clout of Chinese banks and the advanced internet technology available to them to design a new cross-border interbank payment and settlement system. It can be based on digital currencies, either official ones, such as a Central Bank Digital Currency (CBDC), to be issued in RMB by the Peoples Bank of China (PBoC), or banks create a private digital currency, similar to the Utility Settlement Currency (USC), designed by 15 major western commercial banks[5].

This article will first address the limitations of the current global interbank clearing system, mainly through correspondent accounts and outline planned improvements. The only data available on the interbank market are the cross-border locational banking statistics collected by the Bank for International Settlements (BIS). An alternative to the present system will be suggested, which China could initiate and propagate. This would use Distributed Ledger Technology (DLT) and blockchain. Finally, two models will be suggested to digitalise the Chinese proposal, through use of official digital currency or private digital currency. The first would be a wholesale W-CBDC and the second one a private digital currency issued by banks, such as BRICS banks, for wholesale use only. Both can utilize the swap framework provided by the PBoC for 38 countries and regions with a total of over USD 500bn[6].

1. Present cross-border settlement for banks

The value of cross-border payments is expected to rise by 5.5% a year from USD 22tr in 2016 to USD 30tr in 2022 across retail and corporate payments[7]. Is the present cross-border payment and settlement system up to the task, is it suitable for digitalization? There are presently two major channels for cross-border settlement, either through intra bank fund transfers for major banks with affiliates in major financial centres or through correspondent accounts for the other banks, often through a number of banks.

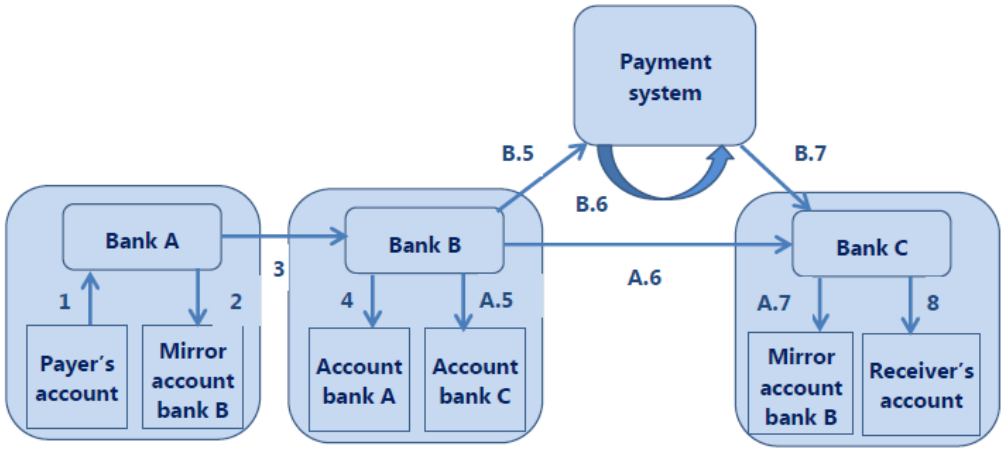
The intra bank fund transfer is possible when major banks are members of various RTGS systems in various currencies. For example, a Bank of China (BOC) affiliate anywhere in the world needs to send funds in USD to a US client. It transfers the funds in-house to the BOC in New York which is member of the US FedWire Clearing system. If the recipient bank is also member of Fedwire, the funds will be credited electronically without delay. In addition to the message confirming the transfer provided by SWIFT, the BOC will monitor the progress of payment at each stage, able to inform the clients.

[3]Latest in April 2019. See BIS (2019): Triennial Central Bank Survey, Global foreign exchange market turnover in 2019, September www.bis.org/statistics It is estimated that this survey captures 95% of market activity as most important centres are reporters.
[4]As currency pairs are recorded, this percentage is out of 200%
[5]FT (2019): Top banks push ahead with digital coins for 2020. In FT 2 June www.ft.com
[6]PBoC (2019): RMB Internationalisation Report, August www.pbc.gov.cn
[7]BOC, BOE, MAS (2018): Cross-border interbank payments and settlements. Emerging opportunities for digital transformation, November, p 6 www.bankofengland.com.uk

Routing payments through RGTS systems (bank B and C in figure 1 are members) has two advantages, first settlement takes place in central bank money, ie at zero risk. Secondly, it is a real-time system, thus excluding the build-up of credit risk during the settlement process. The communication standard is ISO 20022 and SWIFT uses MT messaging format.

Figure 1

Payments settled via correspondent banking



1. Debiting of payer's account with bank A
2. Crediting of bank B's mirror account with bank A, which is kept for accounting purposes
3. Payment message from bank A to bank B via telecommunication network
4. Debiting of bank A's account with bank B (loro account)

A. Use correspondent bank only

5. Crediting of bank C's account with bank B
6. Payment message from bank B to bank C via telecommunication network
7. Debiting of bank's B mirror account with bank C, which is kept for accounting purposes
8. Crediting of receiver's account with bank C

B. Involvement of payment system

5. Payment message from bank B to payment system
6. Settlement via payment system
7. Payment message from payment system to bank C
8. Crediting of receiver's account with bank C

Source: ECB, *Ninth survey on correspondent banking in euro*, 2015, adapted from Danmarks Nationalbank, *Payment systems in Denmark*, 2005.

If the originating bank is a lesser bank (such as bank A) or the receiving bank is not a member of the close to 10,000 member banks of Fedwire, there needs to be a chain of interbank transfers. These transfers are expensive, can take multiple days and lack transparency, regarding both time and costs.

This is primarily due to the complexity of the cross-border payment and settlement process, which includes the involvement of multiple entities in the execution of a cross-border transaction, the degree of regulation-for example anti-money laundering (AML), counter terrorist financing (CTF) and know your customer (KYC) requirements, as well as capital requirements-differences in technical and operational standards across jurisdictions, and the prevalence of legacy systems and infrastructure[8].

While operational resilience of an RTGS is assured, strategic resilience to facilitate innovation is not always inherent. For example, the RTGS infrastructure may not be able to incorporate the

[8]BOC, BOE, MAS, ibid, p6

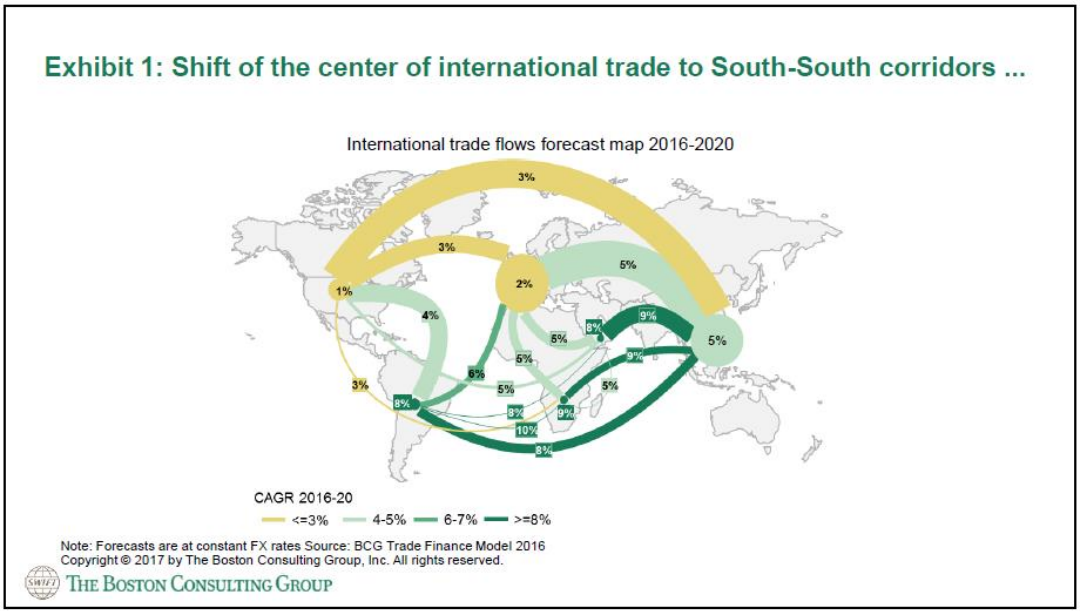
necessary processes of proofs required to interoperate with systems based on distributed ledger technology (DLT).

Differing technical requirements combined with varying regulatory standards across jurisdictions present a barrier to an institution that wants to have access to settlement accounts (RTGS) in different countries simultaneously, it adds cost and complexity to these operations. Consequently, only few banks have the scale required to maintain a global network of settlements in multiple jurisdictions. The recent history has shown a cutback in the number of correspondent relationships[9].

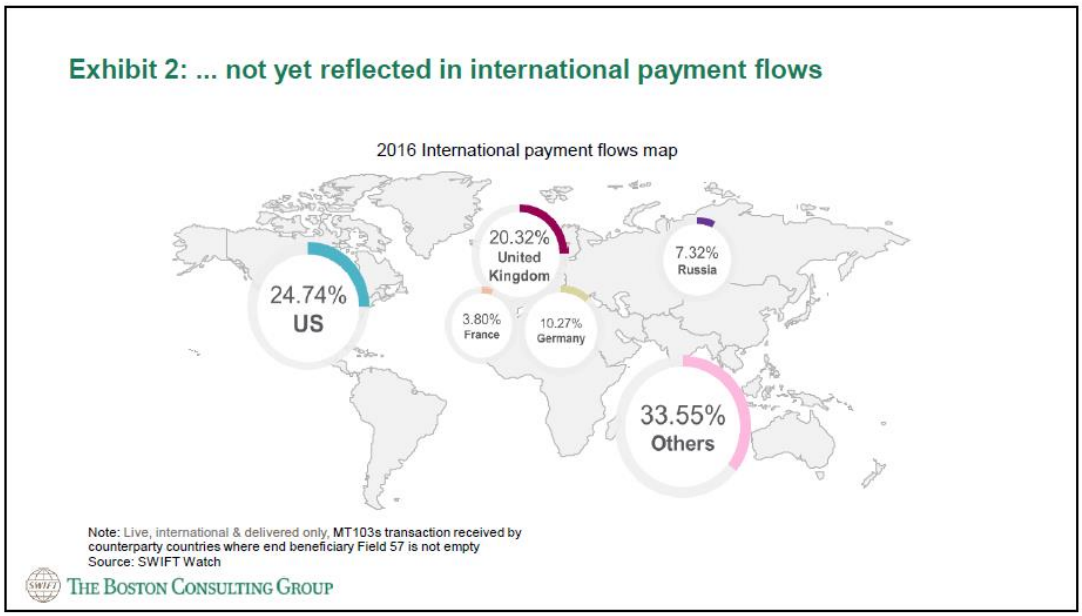
Correspondent banking relationships are being reduced especially for respondent banks that (i) do not generate sufficient volumes to recover compliance costs, (ii) are located in jurisdictions perceived to be too risky, (iii) where adequate risk assessment is not possible, (iv) offer products or services that are more difficult to manage[10]. This puts pressure on the commercial viability of the correspondent banking model.

It has been estimated, that the cost for a US bank to execute a cross-border payment via the correspondent banking network is in the range of USD 25 to USD 35, lately even USD 40, ie more than ten times the cost of an average domestic payment[11]. The breakdown is as follows: 34% are liquidity costs, treasury operations at 27%, foreign exchange costs at15%, compliance costs at 13%, payment operations at 9% and network management at 2%. The major concern is liquidity, which can be avoided by settlement in digital currencies.

There has been a disconnect between trade, which has increasing moved to south-south (exhibit 1) and payment which still pass through the northern financial centres (exhibit 2) in figure 2 below.



[9]Financial Stability Board (2019): FSB Action Plan to Assess and Address the Decline in Correspondent Banking, May p.1 www.fsb.org
[10]Committee on Payments and Market Infrastructures (2016): Correspondent banking, July, p11 www.bis.org/cpmi
[11]BOC, BOE, MAS, ibid, p 11



The present cross border clearing and settlement system is not only outdated but has major functional problems.

There are major challenges for end users, either individuals or businesses. There is a lack of transparency regarding payment status and costs, which makes it impossible to track cross-border payments and reach finality at a certain date. There are delays in payment processing as each bank across the payment value chain will individually undertake its own processes to meet regulatory requirements[12], such as sanctions screening, and assessment of collateral requirements as well as ensuring that the payment message format and content are correct[13].

There are time restrictions on cross-border payments to be processed round the clock as operating hours vary across multiple jurisdictions. Cross-border payments are subject to stipulated cut-off times; payment instructions received after the specified times are processed the next working day[14].

Several RTGS operators have proposed improvements to modernize and renew their payments infrastructure.

These proposals include interoperability with DLT platforms, broadening access to RTGS to allow non-banks to participate, adopting ISO 20022 messaging standard, extending operating hours, upgrading of CLS to include more currencies, called CLS NOW, greater transparency regarding payment speed and visibility, called SWFT gpi (global payments initiative) and harmonizing and standardizing the quality and types of data a firm can access regarding a client enhances KYC process for banks[15]. However, these initiatives have so far fallen short of the desired expectations in both intent and implementation, and uptake by the participating banks has been low.

[12]For details see CPMI (2016), ibid, p11.
[13]BOC, BOE, MAS, ibid, p14.
[14]BOC, BOE, MAS, ibid, p14.
[15]BOC, BOE, MAS, ibid p21.

The quoted report by the Bank of Canada (BOC), Bank of England (BOE) and Monetary Authority of Singapore (MAS) then goes on to list the capabilities that must be delivered by any future model for cross-border payments and settlement to solve the root causes.

In addition, there are China specific considerations which will be incorporated in the model proposed here. These are the political organisations, such as BRICS and the Belt and Road Initiative as well as new regional interbank associations such as based on the Shanghai Cooperation Organisation, ASEAN, Central and Eastern Europe, Africa, Arab countries etc. These are set up not only to facilitate interbank payments between China and major regional banks but also to support the internationalization of the RMB. Data on Chinese cross-border payments are not readily available (such as CIPS) and statistics collected by international bodies, such as the BIS[16] and SWIFT[17] show no increase in use of China's own alternatives (CIPS and RMB) to the present payments infrastructure.

This leads to the conclusion that presently, Chinese international active banks use the international financial infrastructure, such as existing RGTS, as well as the major currencies, such as USD, EUR, GBP, JPY, CAD to conduct their cross-border business.

The only RTGS covering a number of countries and regions are the Euro Target 2 system and the RMB RTGS including Hong Kong and Macao[18].

2. Data on cross-border interbank payments

Real time turnover data are collected by major banks but not published. The best source are the messages processed by SWIFT. On an average day, SWIFT dispatches messages covering 15 million transactions and a value of some USD 5tr. This includes major RGTS systems, such as FedWire. In comparison, the China Interbank payment system (CIPS) pales with yearly 3.42 million transactions at a value of some USD 6.5tr[19]. The difference is explained by technical factors and costs for through processing.

The only consistent data on cross-border intra bank and interbank transactions, outstanding volumes and quarterly changes have been collected by the BIS since the 1970s in the form of locational banking statistics (LBS)[20]. They are reported quarterly by banks in close to 50 major financial centres of the world, compiled by their central banks, reported to the BIS, where double counting is eliminated and seasonal adjustment is made.

The core are the cross-border claims and liabilities of banks in the reporting area on their clients, both banks and non-banks. The claims amounted to USD 30.5 tr compared with their domestic claims of USD 72tr (memo: USD 90tr Global GDP estimate 2019). The total liabilities amount to USD 27bn, compared with domestic liabilities of USD 72tr.

The table 1 below also shows that the interbank cross border business makes up 50% of all transactions and the intra bank (within a banking group) makes up 2/3 of interbank transactions (bank sector, of which intra bank)[21]. The bulk of these transactions are loans, mostly unsecured, they are denominated mostly in USD and EUR. The bulk of the trade is between advanced economies and between them and offshore centres. These data are a documentation of the international interbank market, part of which is used for routing retail payments either intra bank or via correspondent accounts.

[16]BIS (2019): Triennial Central Bank Survey. Global foreign exchange market turnover, ibid.
[17]SWIFT (2019): RMB Tracker. Monthly reporting and statistics on RMB progress towards becoming an international currency, August 2019 www.swift.com
[18]Committee on Payments and Market Infrastructure (CPMI) (2012): Red Book-China www.bis.org/cpmi
[19]The Peoples Bank of China (2019): RMB Internationalisation Report www.pbc.gov.cn
[20]Bank for International Settlements (2019): Locational Banking Statistics www.bis.org/statistics; China has been a reporter since the end of 2015.
[21]The origin of the large share of interbank business is the Basel 1 accord of 1988. BCBS (2019): History of the Basel Accord www.bis.org/bcbs/history

Table 1: Cross-border banking assets and liabilities, outstanding 1Q2019

Summary of locational statistics, by currency, instrument and residence and sector of

Amounts outstanding, in billions of US dollars

Sector of counterparty	All sectors		Bank sector			
			Total		Of which: Intragroup	
	Claims	Liabilities	Claims	Liabilities	Claims	Liabilities
Type of position	Q1 19	Q1 19	Q1 19	Q1 19	Q1 19	Q1 19
Cross-border positions	**30,472.7**	**27,222.1**	**15,388.0**	**14,668.6**	**9,621.1**	**8,530.8**
By residence of counterparty						
Developed countries	21,000.4	17,287.5	11,297.0	10,264.9	6,739.7	6,246.6
Of which: euro area	8,248.4	6,767.4	4,546.5	4,056.5	2,535.7	2,348.8
Offshore centres	4,935.1	4,485.6	1,961.4	2,137.4	1,357.2	1,394.8
Developing Africa and Middle East	808.8	981.8	320.8	561.6	133.2	92.8
Developing Asia and Pacific	2,080.5	1,658.3	1,146.5	1,093.6	494.2	436.6
Developing Europe	545.6	359.5	273.4	247.6	152.5	50.3
Developing Latin America and Caribbean	631.4	409.2	235.1	205.6	107.3	46.4
International organisations	251.0	282.3	39.2	54.0	0.1	0.1
Unallocated	220.0	1,757.9	114.4	103.9	636.9	263.1
By currency						
US dollar	14,665.3	13,428.5	7,235.6	7,527.4	4,818.7	4,497.7
Euro	8,951.8	8,156.4	4,872.4	4,271.6	2,518.6	2,340.7
Yen	1,850.0	891.1	685.4	566.9	421.8	330.3
Pound sterling	1,417.2	1,381.1	606.3	633.4	422.6	412.8
Swiss franc	406.3	343.2	265.6	192.7	148.5	67.5
Other currencies	1,226.7	1,663.6	638.1	899.0	368.4	584.4
Unallocated	1,955.6	1,358.3	1,084.5	577.7	922.5	297.3
By instrument						
Loans	20,678.1	21,258.2	12,121.6	13,180.5	7,891.4	7,259.2
Debt securities	6,636.2	3,665.1	1,694.1	506.5	123.7	31.7
Of which: short-term	.	682.3	.	147.6	.	10.1
Other instruments	2,958.5	2,124.3	1,376.3	968.5	719.7	447.8
Unallocated	199.8	174.5	195.9	13.1	553.8	799.5
Local positions in foreign currencies	**4,175.6**	**5,858.1**	**1,547.3**	**1,585.6**	**360.0**	**358.9**
Local positions in local currencies	**68,079.1**	**63,576.5**	**12,031.5**	**8,092.8**	**2,663.6**	**2,706.5**
Unallocated	**194.8**	**2,706.6**	**28.6**	**227.6**	**1.8**	**1.3**

[1] Data are incomplete. See Table A2 for a list of countries that report non-bank subsectors.

Source: BIS Locational Banking Statistics June 2019

Table 2: Cross border banking assets and liabilities, changes in 1Q2019

Summary of locational statistics, by currency, instrument and residence and sector o

Break- and exchange rate-adjusted changes, in billions of US dollars

Sector of counterparty	All sectors		Bank sector			
			Total		Of which: Intragroup	
	Claims	Liabilities	Claims	Liabilities	Claims	Liabilities
Type of position	Q1 19	Q1 19	Q1 19	Q1 19	Q1 19	Q1 19
Cross-border positions	**1,375.5**	**1,017.7**	**454.3**	**604.9**	**27.7**	**96.1**
By residence of counterparty						
Developed countries	1,031.9	769.4	464.6	541.0	96.4	166.9
Of which: euro area	544.5	492.2	345.6	380.6	75.8	72.4
Offshore centres	242.3	65.2	1.1	–54.9	–32.5	–38.0
Developing Africa and Middle East	33.5	17.5	12.9	11.7	–1.5	–3.9
Developing Asia and Pacific	6.4	79.4	–47.7	68.7	–31.1	–31.1
Developing Europe	–0.7	36.0	–7.4	22.9	–4.5	3.2
Developing Latin America and Caribbean	11.8	6.3	6.4	9.3	4.4	4.8
International organisations	23.1	19.5	1.6	2.6	0.1	0.1
Unallocated	27.0	24.4	22.8	3.6	-3.6	-5.9
By currency						
US dollar	419.6	221.9	16.1	102.4	–20.0	31.7
Euro	637.8	567.5	364.0	425.1	58.4	68.2
Yen	81.4	54.4	23.5	44.4	–0.3	17.6
Pound sterling	49.2	39.5	–17.3	–15.5	–17.0	–25.6
Swiss franc	12.1	7.7	6.8	3.0	–2.2	1.0
Other currencies	26.0	90.7	–23.1	38.6	–22.8	10.3
Unallocated	149.2	36.1	84.2	7.1	31.6	–7.1
By instrument						
Loans	721.2	798.4	324.8	576.9	42.3	65.3
Debt securities	470.7	85.9	87.9	9.8	10.1	2.4
Of which: short-term	.	–3.4	.	–10.3	.	0.7
Other instruments	177.1	125.1	34.0	17.4	20.8	3.2
Unallocated	6.5	8.2	7.6	0.7	–54.2	26.8
Local positions in foreign currencies	**–102.2**	**–102.7**	**–63.2**	**–86.7**	**–72.4**	**–67.7**
Local positions in local currencies	**1,112.2**	**1,083.2**	**251.5**	**64.9**	**101.3**	**104.7**
Unallocated	**8.8**	**46.8**	**–0.6**	**–5.0**	**0.0**	**0.1**

[1] Data are incomplete. See Table A2 for a list of countries that report non-bank subsectors.

Source: BIS Locational Banking Statistics June 2019

The figures show that interbank business as well as intra bank business continued to growth healthily, despite of slowing global economic growth and the stagnation of international trade due to rising trade tensions.

3. Proposed new Chinese interbank payments infrastructure

While Chinese banks and non-bank financial institutions are increasing their international operations, they basically use the existing infrastructure. While Non-banks like Alipay have offered retail payments solutions in various countries, the wholesale payment and settlement systems needs to be addressed, by not only using digital technology but also digital currencies.

While a Chinese-led overhaul of the global financial infrastructure is not realistic at present, a limited controlled experiment, such as within the BRICS, is feasible. China has gained experience in the past by limited controlled reforms, such as special economic zones (SEZ).

It is suggested that the BRICS Interbank Association, with major banks as members should be in charge of the reform of the interbank payments system among member countries[22]. An alternative would be the Belt and Road countries, but the scope is too large for an experiment and the diversity among countries and banking systems could be an impediment.

The four major banks in each of the BRICS countries should be assigned a role in the new wholesale payments system. For Brasil, these would be Bank Itau, Banco do Brasil, Bradesco and Caixa Economica Federal. For Russia these would be Sberbank, VTB, Gazprombank and Rosselkhozbank. For India the participating banks should be the State Bank of India, Baroda Bank, Punjab National Bank and Bank of India. Chinese banks, ICBC, BOC, CCB and ABC could play a leading role in this process. South African Banks which also offer ample cross-border experience are Standard, ABSA, First Rand and Nedbank. They would form a closed set of 20 participants with restricted access, a major requirement for DLT. The national development banks and export-import banks could be added.

Technological innovation would be the utilization of Distributed Ledger Technology (DLT) together with blockchain for the wholesale payment, clearing and settlement system. While banks have used correspondent accounts in the past, this technology would be similar by allowing banks access to each others' accounts, without recourse to banks' reserves at the central banks' domestic accounts. The introduction of DLT could reduce the traditional reliance on a central ledger managed by a trusted entity, such as the central bank for holding and transferring funds and other financial assets[23].

Proponents of introducing DLT argue that it (i) reduces complexity, (ii) Improves end-to-end processing speed and thus availability of assets and funds; (iii) decreases the need for reconciliation across multiple record-keeping infrastructures; (iv) increases transparency and immutability in transaction record keeping; (v) improves network resilience through distributed data management; and (vi) reduces operational and financial risks[24].

However, DLT may pose new or different risks, including (i) potential uncertainty about operational and security issues arising from the technology; (ii) lack of interoperability with existing processes and infrastructures; (iii) ambiguity relating to settlement finality; (iv) questions regarding the soundness of legal underpinnings for DLT implementations; (v) absence of an effective and robust governance framework; and (vi) issues related to data integrity, immutability and privacy. DLT is an evolving technology that has not yet been proven sufficiently robust for wide scale implementation[25].

[22] The Communique of the BRICS Interbank Cooperation Mechanism states "creating basic mechanisms for settling payments and financing projects in local currencies". Dimitry Kozevnikov (2015): The BRICS Interbank Cooperation Mechanism. In: Defence Technologies Review1/2015

[23] Committee on Payments and Market Infrastructures (CPMI) (2017): Distributed ledger technology in payment, clearing and settlement. An analytical framework, February, p1 www.bis.org/cpmi

[24] D Mills, K.Wang, B Malone et al (2016): Distributed ledger technology in payments, clearing and settlement. Quoted in CPMI, ibid, p1.

[25] CPMI(2017), ibid p1.

Figure 3

Stylised process flow of a DLT-based payment system

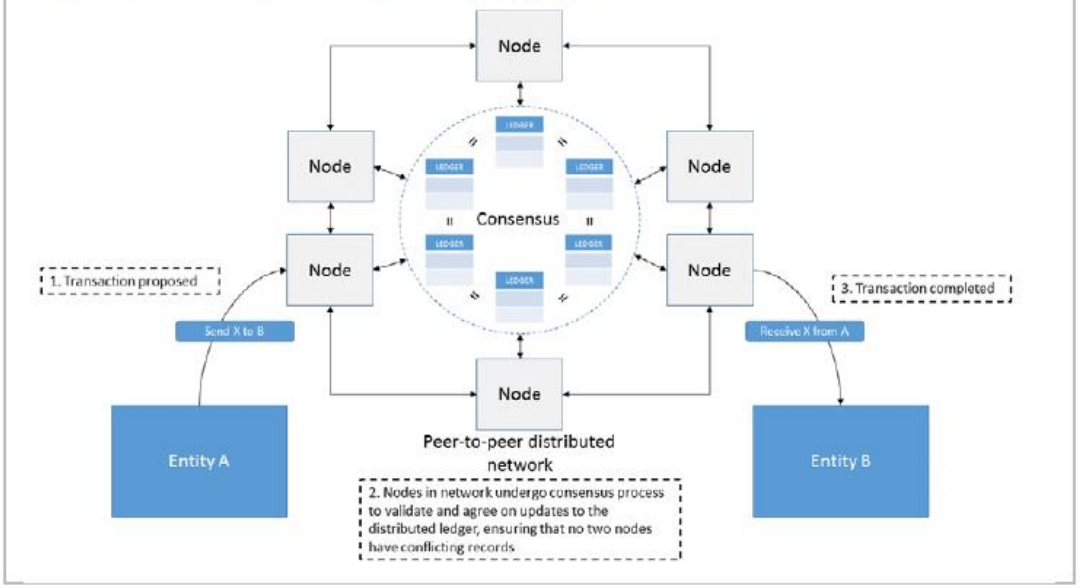
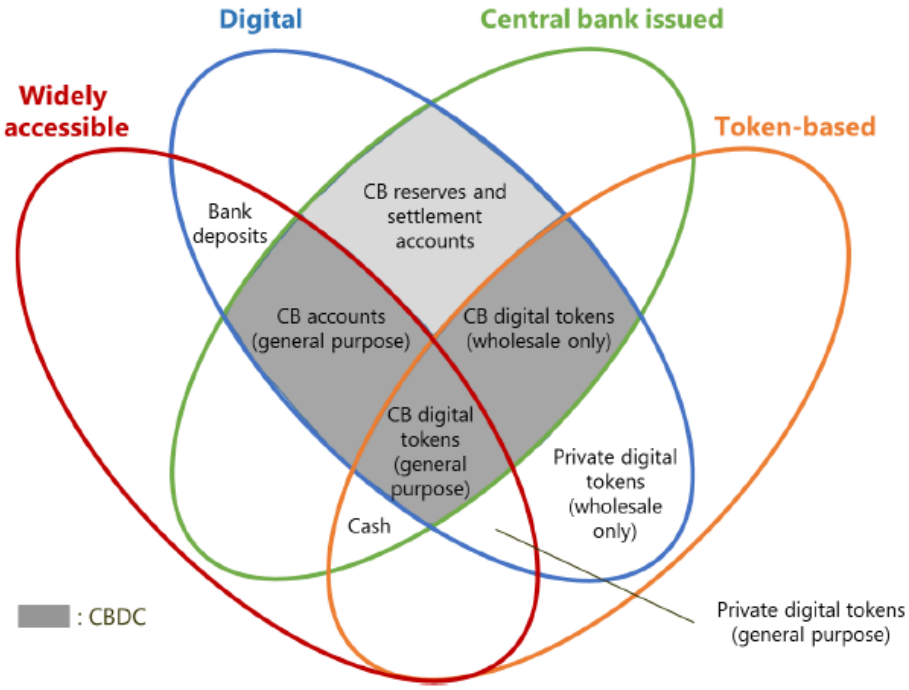


Figure 3 shows how payments will be processed in a DLT system. For example China imports oil from Russia, SINOPEC would make entry A to BOC (member of the peer-to-peer distributed network); on the Russian side VTB (also member of the DLT network) would receive this payment and credit it to Rosneft (entry B). The following two models show which digital currencies can be used.

4. Model 1: Central Bank Digital Currency (CBDC)

While at present all payments systems are anchored in central bank money, which was created at some point of time by a central bank. Commercial bank money is linked rigidly to central bank money as any commercial bank is licensed in a country with a central bank. Commercial banks have to deposit reserves with the central bank and can extend the money supply by a multiple, the so called money multiplier. Non-bank payment providers have to collect central bank money and deposit the float with the central bank. The following Graph 1, the 'money flower' illustrates the anchor function of central banks. The shaded areas are CBDC.

The money flower: a taxonomy of money — Graph 1



Notes: The Venn-diagram illustrates the four key properties of money: *issuer* (central bank or not); *form* (digital or physical); *accessibility* (widely or restricted) and *technology* (account-based or token-based). *CB* = central bank, *CBDC* = central bank digital currency (excluding digital central bank money already available to monetary counterparties and some non-monetary counterparties). *Private digital tokens (general purpose)* include crypto-assets and currencies, such as bitcoin and ethereum. *Bank deposits* are not widely accessible in all jurisdictions. For examples of how other forms of money may fit in the diagram, please refer to the source.

Source: Based on Bech and Garratt (2017).

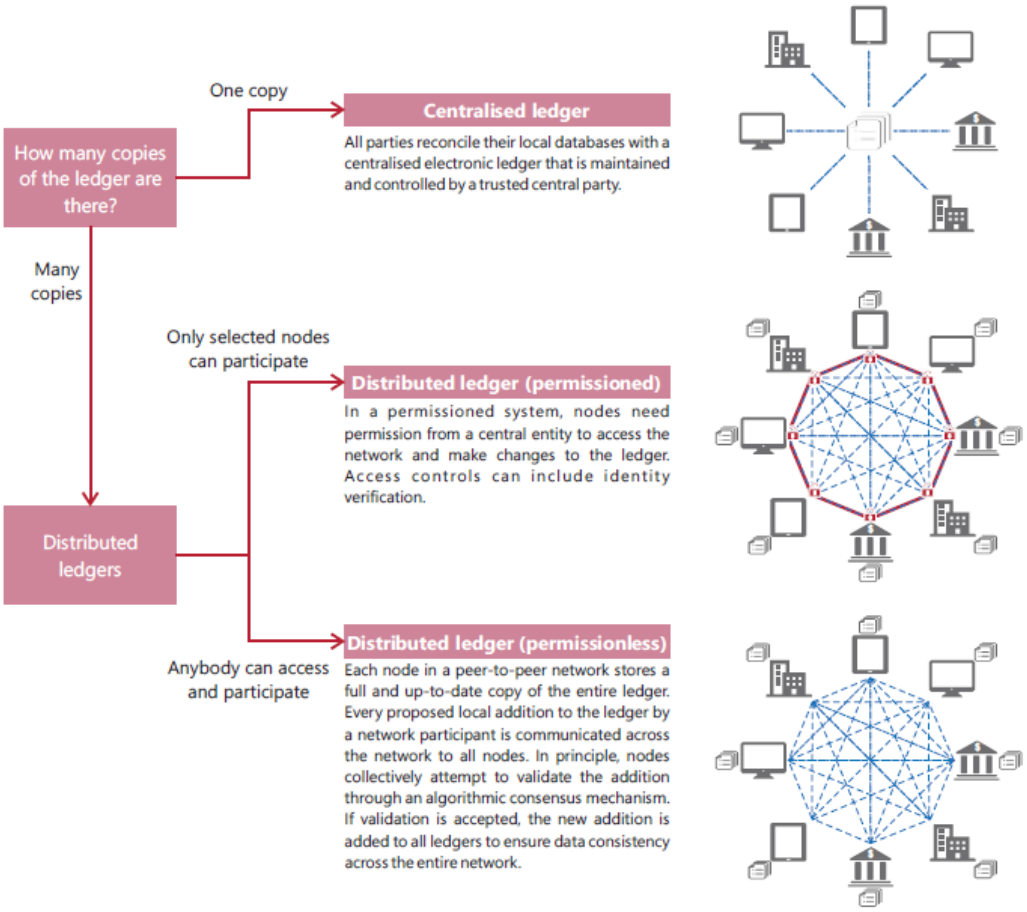
Digital currencies replacing cash do not exist presently. Those which call themselves peer-to-peer crypto currencies, such as Bitcoin and Ethereum are assets but not currencies as they do not fulfill the basic functions of money.

For the project suggested here, a national central bank has to provide the digital currency for wholesale and/or retail purposes. This could be any one of the BRICS countries but in view of the importance of China among these countries this would be the Peoples Bank of China (PBOC).

At the first stage there would be a centralized ledger for all 20 members at the PBOC, perhaps later a permissioned account if the DLT technology was adopted[26].

[26] BIS (2018): Annual Report 2018, Chapter V: Crypto currencies: looking beyond the hype, p 109. www.bis.org/publications

Centralised ledger and permissioned/permissionless decentralised ledgers Graph V.2



The PBOC would create the CBDC, similar to cash and distribute it to the participating 20 BRICS banks. Chinese banks would transfer RMB assets to the PBOC, not much different from the present mechanism. Foreign BRICS banks which do not have such RMB assets could transfer their national currencies to the PBOC swap account, receive RMB which will be deposited at the PBOC for Chinese W-CBDC. The swap account would receive BRICS currencies, BRL, RUB, INR, ZAR and provide RMB. The PBOC would take on the exchange rate risk, which would be the case in any swap agreement.

The key challenge is how to transfer CBDC to a distributed ledger. The currently most advanced projects, Jasper in Canada and Ubin in Singapore use a digital depository receipt (DRR) approach. A DDR is a claim on central bank reserves held in a segregated account against which the central bank issues digital tokens on the distributed ledger. In Jasper, the digital tokens – initially known as CADcoins20 – are created at the beginning of the day and redeemed at the end. In Ubin, banks acquire or redeem digital tokens at any point during the day and can keep them on the distributed ledger overnight. Hence, transfers on the DLT platform of the Singaporean proof of concept are not restricted to the opening hours of MAS[27].

[27]Bech, Morten and Garrat, Rodney (2017): Central Bank Crypto currencies. In: BIS Review, September www.bis.org/publications

The main issues which need to be addressed before the introduction of CBDC are the following: (i) anonymity; (ii) transfer mechanism; (iii) interest bearing or not; and (iv) limits or caps[28]. The later has bearings on the substitution between reserves and CBDC. These issues and the fallout for monetary and financial stability are intensively researched by central banks worldwide. A survey by the BIS finds that a wide variety of motivations is driving an increasing number of central banks to conduct conceptual research on CBDCs. However, only a few central banks have firm intentions to issue a CBDC within the next decade[29].

In China, the PBOC are actively exploring the use of CBDC[30]. A law on cryptography has been passed recently. However, Governor Yi Gang poured cold water on prospects of an imminent launch of CBDC, saying the PBOC "did not have a timetable". The development of CBDC needs further "research, testing, trials, assessment and risk prevention". In particular, if the CBDC involves cross-border use, it will involve a series of regulatory issues, regarding AML, CFT, tax evasion as well as KYC[31]. In addition they have doubts about the robustness of blockchain for CBDC purposes.

As the issue of a Chinese W-CBDC is further down the road, a second possibility will be explored. In this case a number of commercial banks would issue their own digital currency for wholesale purposes only.

5. Model 2: A wholesale digital currency issued by commercial banks

While acknowledging the inadequacies of the present cross-border interbank clearing and settlement system, in 2015 a small consortium of commercial banks explored the need and potential for a tokenized settlement asset to complement the DLT and blockchain developments under way[32].

They came up with a project called USC, or Utility Settlement Coin, to create a peer-to-peer digital cash asset to settle tokenized value transactions with finality. It must be available in multiple currencies and work across multiple business platforms. USC will be a digital representation, recorded on a private distributed ledger (DLT), of a claim…in or to central bank money held in a central bank account[33]. It thus deserves the title Stable Coin, as it is firmly anchored in central bank money and offers finality.

In May 2019, the consortium of members took the next step, investing in Fnality International[34], whose aim is to deliver the USC promise...Fnality has 15 major global banks as shareholders, Banco Santander, BNY Mello, CIBC, Commerzbank, Credit Suisse, ING, KBG Group, Lloyds Banking Group, Mizuho, MUFG, Nasdaq, Sumitomo Mitsui Banking Corporation, and UBS[35]. The following transactions will be possible:

[28] Committee of Payments and Markets Infrastructure (CPMI) and Markets Committee (MC) (2018): Central bank digital currencies, March www.bis.org/committees

[29] Barontini, Christian and Holden Henry (2019): Proceeding with caution-a survey on central bank digital currencies. IN: BIS papers No 101, January www.bis.org/publications

[30] Tommaso Mancini-Griffoli, Maria Soledad Martinez Peria, Itai Agur, Anil Ari, John Kiff, Adina Popescu (2018): Casting Light on Digital Currency. IMF SDN/18/08 www.imf.org

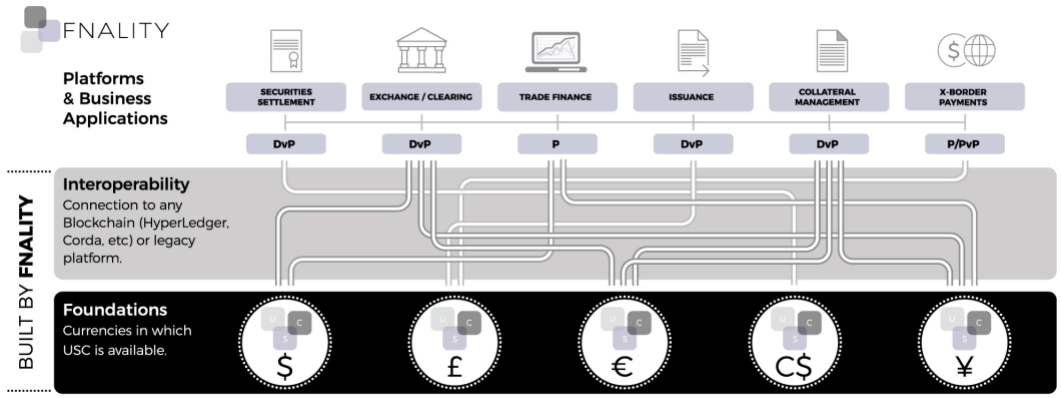
[31] Governor Yi Gang quoted in South China Morning Post, 24 September 2019 www.scmp.com

[32] Fnality (2019): The catalyst for true peer-to-peer financial markets, September www.fnality.com

[33] Fnality (2019): ibid, p6.

[34] Fnality was invited by the BIS to the summit of prospective private Digital Currency Providers, together with Libra/Calibra and JPM on 16 September 2019.

[35] Fnality (2019): ibid, p6.



Source: Fnality 2019

The following are the underlying considerations: (i) the CPMI paper on W-CBDC for wholesale market (quoted here); (ii) the project by the BOE, BOC and MAS on "Cross-border Interbank Payments and Settlements" (quoted here); (iii) the Swiss Federal Government paper on things DLT; and (iv) IMF paper on digital money in July 2019 (quoted here) which introduces the concept of a synthetic central bank digital currency (sCBDC)[36], where private institutions with access to central bank money create Stable Coins[37].

To enable peer-to-peer markets to function effectively, central banks need to be comfortable to allow banks from outside their jurisdiction (such as BRICS banks for China) to hold the USC units overnight, ie as a store of value. This is not an end in itself, rather as an enable of settlement[38]. The goal is for USC to be used by all wholesale market participants as a medium of exchange. There will be some restrictions on which institutions can hold USC overnight and in what quantities; USC is intended to be a store of value only to support settlement.

Applying the same logic to the BRICS banks selected in section 3, each country's commercial banks would deposit a certain amount of local currency of BRICS countries with the relevant central banks. These would deposit this with a central bank, such as the PBOC or any other institution to be designated. The BRICS Interbank Association should decide over this institution, which could be called the BRICS Fund. This Fund would issue the equivalent amount of digital currency, called 'bricks'. There would be an agreement as to which value the 'bricks' would have in terms of a basket of currencies, similar to the SDR. Alternatively, countries can deposit the main currencies of the SDR basket and the Fund would issue 'bricks' backed by SDR[39].

If China still wanted to respect the present financial infrastructure, a SDR based 'bricks' would be preferable. The share would be 41.73% for the USD, 30.93% for the EUR, 10.92% for the RMB, 8.33% for the JPY and 8.09% for the GBP. The total amount would be issued by the Fund against such deposits and allocated to countries according to their shares.

If China wanted to distance itself from present dominant currencies, ie get away from the USD, the other alternative could be adopted. Similarly to the SDR basket, countries would contribute according to their GDP weight, this would be the lion share of 67.6% for RMB, 14.0% for INR, 8.8% for BRL, 7.9% for RUB and 1.7% for ZAR. Daily exchange rates of 'bricks' would be

[36]First mentioned in: IMF (2019): Stablecoins, CBDC and cross-border payments: a new look at the International Monetary System. Speech by Tobias Adrian at the IMF-Swiss National Bank Conference, May www.imf.org/speeches
[37]Fnality (2019); ibid, p6/7.
[38]Fnality (2019; ibid, p10.
[39]Governor Zhou Xiaochuan suggested a greater international use of SDR in 2009.

calculated. Commercial banks from these countries would be allocated the corresponding shares of 'bricks' issued, in proportion of their GDP sizes.

The amount of 'bricks' to be issued should be related to the volume of payments made among these countries, and could be modest at an initial experimental phase. This limit needs to be in place to stop 'bricks' becoming a store of value. The settlement between each other would take place on distributed ledgers with blockchain technology[40]. All transactions could be permission less, as there is no central authority. Any excess bricks could be deposited with participating central banks.

6. Conclusion

The proposed two models would be modest contributions to introducing digital currencies for the sole use of cross-border interbank clearing and settlement. The concerns about verification of AML, CFT, KYC and tax evasion would be addressed as participating banks are properly supervised by their respective supervisory authorities. Transactions in 'bricks' would be authorized and executed by them. This would be a China designed and operated cross-border payments infrastructure, first for BRICS countries[41] and later for partner countries of the Belt and Road Initiative. Like this, China and its partner countries could wean themselves off an outdated USD based system, which needs to face the digital age in a reform of its own before long.

Literature

Adrian, Tobias and Mancini-Griffoli, Tommaso (2019): The rise of digital money. In IMF FinTech Notes, July www.imf.org/publications

Adrian, Tobias: Stablecoins, Central Bank Digital Currencies, and Cross-border payments: a new look at the International Monetary System, May . In: IMF speeches, www.imf.org

Aldasoro, Inaki and Ehlers, Torsten (2019): Concentration in cross-border banking. In: BIS Review, June www.bis.org/publications

Bank for International Settlements (2019): Statistical release: BIS international banking statistics at end-June 2019, October www.bis.org/statistics

Bank for International Settlements (2019): Triennial Central Bank Survey. Global foreign exchange turnover in 2019, September www.bis.org/statistics

Bank for International Settlements (2018): Cryptocurrencies: looking beyond the hype. In: Chapter V, Annual Report www.bis.org/publications

Bank of England (2018): The Bank of Canada, Bank of England and Monetary Authority of Singapore share assessment on emerging opportunities for digital transformation in cross-border payments, November www.bankofengland.com.uk

Barontini, Christian and Holden, Henry (2019): Proceeding with cautions-a survey on central bank digital currency. In: BIS Papers no 101, January www.bis.org/publications

Bech, Morten and Garrat Rodney (2017): Central Bank crypto currencies. In: BIS Review, September www.bis.org/publications

Boston Consulting Group and SWIFT (2017): International payments: Accelerating banks' transformation. In: White Paper, October www.swift.com

Committee on Payments and Market Infrastructure, IMF, G7 (2019): Investigating the impact of global stablecoins, October www.bis.org/cpmi

[40] President Xi Jinping recent propagated the use of blockchain technology.

[41] The forthcoming BRICS summit in Brasil could propose such an alternative clearing system.

Committee on Payments and Market Infrastructures (2018): cross-border retail payments, February www.bis.org/cpmi
Committee on Payments and Market Infrastructure and Market Committee (2018): Central bank digital currencies, March www.bis.org/cpmi
Committee on Payments and Market Infrastructures (2017): Distributed ledger technology in payment, clearing and settlement. February www.bis.org/cpmi
Committee on Payments and Market Infrastructures (2016): Correspondent banking, July www.bis.org/cpmi
Committee on Payments and Market Infrastructures (2012): Red Book-China www.bis.org/cpmi
Financial Stability Board (2019): FSB sets out work to consider regulatory issues of stablecoins, October www.fsb.org
Financial Stability Board (2019): FSB Action Plan to Assess and Address the Decline in Correspondent Banking, Progress Report, May www.fsb.org
Financial Stability Board (2015): Report to the G20 on actions taken to assess and address the decline in correspondent banking, November www.fsb.org
Fnality (2019): Fnality. The catalyst for true peer-to-peer financial markets, September www.fnality.org
Khiaonarong, Tanai and Humphrey, David (2019): Use of cash across countries and the demand for CBDC. IMF WP/19/46 www.imf.org/publications
Mancini-Griffoli, Tommasao, Maria Soledad Martinez Peira, Itai Agur, John Kiff, Adina Popescu, Celine Rochon (2018): Casting Light On CBDC IN: IMF SDN/18/08, November www.imf.org/publications
People's Bank of China (2019): RMB Internationalisation Report, August www.pbc.gov.cn
Poenisch, Herbert (2019): Big tech gaining trust over governments. In: OMFIF, September www.omfif.org
SWIFT (2016): SWIFT on Distributed Ledger Technology. In: SWIFT Position Papers www.swift.com

IMI International Monetary Review

International Policy Coordination and RMB Internationalisation: Theory and Historical Experience*

By QIAN ZONGXIN, GAN JINGYUN, TU YONGHONG AND WANG FANG*

Based on theoretical logics derived from the literature and the historical experience, we take a deep look at the relationship between international policy coordination and RMB internationalisation. International policy coordination and RMB internationalisation are complements. On the one hand, an effective policy coordination mechanism needs the support of an efficient international monetary system, thus calling for diversification of international vehicle currencies. RMB, supported by solid economic fundamentals, can be a good candidate as one of the international vehicle currencies in the diversified international monetary system. On the other hand, due to the existence of policy spillover effects, an appropriate coordination mechanism improves policy effectiveness in China, which promotes RMB internationalisation by enhancing China's economic and financial strength.

Keywords:Policy coordination; RMB internationalisation; Spillover effect

1. Introduction

As China's economic power rises over time, its currency has become more and more important in international transactions. Figure 1 shows the trend of the RMB Internationalisation Index (RII). The RII is a composite index which summarises RMB's relative importance in trade and financial transactions, as well as its role as an international reserve currency.[1] A higher RII suggests higher importance of RMB in international transactions and reserve system. The RII was steadily increasing between 2013 and 2015. The financial market disturbance in 2015 stopped the increasing trend. However, 2017 saw a recovery of the RII.

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[1]For more details on the construction of the RII, please refer to Renmin University of China's 2018 Annual Report of RMB Internationalization. Tu Yonghong and Wang Fang, 2018, Press of Renmin University of China

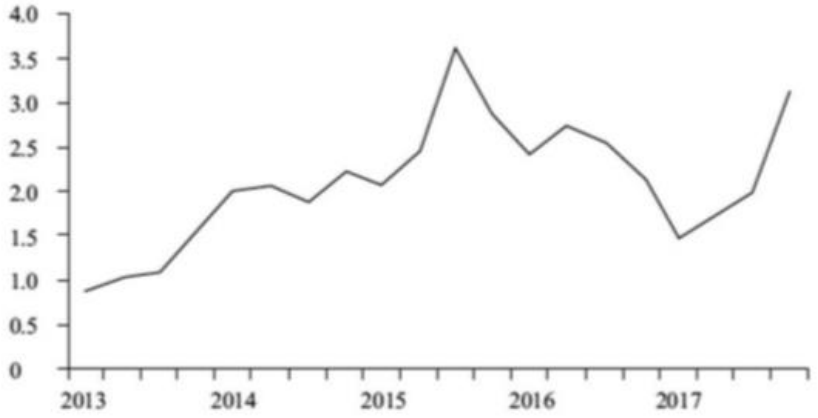

Figure 1. RMB Internationalisation Index (RII)

International policy coordination has become a major concern among policy makers, especially after the American Great Recession in 1930s, with a focus on the worldwide joint implementation of fiscal stimulus measures in the early studies, and on harmonised financial market regulations recently. Governments have coordinated and cooperated on economic policies for the sake of global prosperity.

Currently, studies about currency internationalisation can mainly be classified into four directions. The first research direction focusses on the definition, measurement, and conditions of currency internationalisation (Frankel 2012). Other scholars like Cohen (2012) and Kenen (2011) analyse the benefits and costs of RMB internationalisation, revealing that the benefits of currency internationalisation include lowering transaction costs, increasing macroeconomic flexibility, and expanding political influences; while the costs include appreciating exchange rate, lowering monetary policy autonomy, and increasing systemic risks. There is also a series of studies based on empirical models testing the determinants of currency internationalisation (Ito, McCauley, and Chan 2015; Batten and Szilagyi 2016). And the last direction is using currency competition theory to analyse currency internationalisation. Wang (2014) regards currency competition as oligarchic competition, analysing maximum welfare in the process of currency internationalisation.

The study of international policy coordination began with Cooper's (1968) 'international interdependence theory'. Buiter and Marston (1985) define international macroeconomic policy coordination as a process of mutual adjustment of economic policies among countries in the process of global economic integration. Several crises in the 1970s-1990s boost research in international policy coordination. Hamada (1976), Obstfeld and Rogoff (1995) use representative consumers and manufacturers to construct a theoretical model explaining policy coordination. Fatás and Mohov (2003), Darvas, Rose and Szapáry, (2005), Beneš et al. (2014) use empirical models to analyse the benefits of policy coordination. Eichengreen (2013) indicates that international policy coordination is better than currency wars.

However, few scholars study the relations between currency internationalisation and international policy coordination. Giving more attention to the mutual relationship between international policy coordination and currency internationalisation is crucial. Our research fills the gap and adds to this important literature. Does international policy coordination affect the pattern of the international monetary system, or does the internationalisation of RMB change the

pattern of international policy coordination? In our paper, we try to answer these questions based on theoretical logics and the historical experience.

We discuss in depth why the international policy coordination and RMB internationalisation have a complementary relationship. That is to say, a well-crafted policy coordination mechanism contributes to the process of RMB internationalisation, which makes a positive impact on the effectiveness of international policy coordination in return.

The paper is organised as follows. First, it derives the theoretical relationship between international policy coordination and RMB Internationalisation from the literature. In the next section, it goes on to explore the historical experience on policy coordination and currency internationalisation. The final section concludes.

2. Theoretical logics

The coordination of international economic policies and the internationalisation of the RMB are mutually reinforcing. On the one hand, RMB internationalisation will help establish a better international monetary system, thereby improving the efficiency of international policy coordination. On the other hand, international policy coordination can promote the internationalisation of the RMB, as it supplies appropriate economic and financial supports for currency internationalisation. Figure 2 describes the relationship between policy coordination and RMB internationalisation. We begin the theoretical analysis with a general demonstration of the complementary relationship between international economic policy coordination and RMB internationalisation. Then, we survey the literature on the determinants of currency internationalisation and the international transmission of economic policies. On the basis of a huge literature, we draw conclusions on the relationship between international policy coordination and RMB internationalisation.

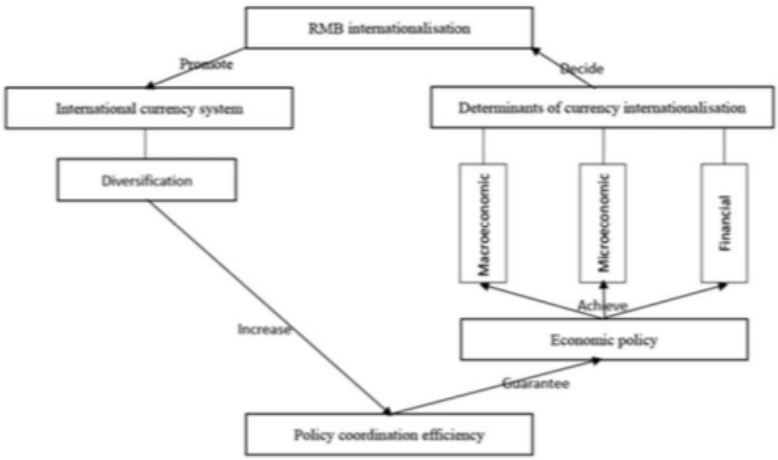

Figure 2. Relationship between RMB internationalisation and policy coordination

2.1 RMB internationalisation benefits international policy coordination

The efficiency of international policy coordination is greatly affected by the effectiveness of the international monetary system. However, the current monetary system needs reform. In the current international monetary system, the US dollar is the dominant international reserve currency (with a share of more than 60%). However, this monetary system may distort global resource allocation, and cause instability problems (Weng 2016). First, when considering monetary or fiscal policy, the US pays attention to its domestic economic situations and seldom takes into account international conditions. The spillover effect of the US policy exacerbates the volatility of the international market (Tian 2015). When the financial crisis broke out in 2008, the US issued a great amount of money, leaving other economies to suffer from a more serious financial crisis (Zhuang and Xu 2011). Second, the lack of necessary international constraints may essentially encourage the reserve currency countries to abuse currency issuance, leading to uncontrolled international liquidity, disordered supply and unstable global economy (Xiong and Huang 2010). Third, it is challenged by the 'Triffin Dilemma'.[2] An international currency faces the contradiction between maintaining currency stability and providing adequate international clearance ability. When the currency fails to guarantee the growth of international liquidity or its users lose confidence, the international monetary system collapses (Triffin 1960). Fourth, global systemic risks are highly concentrated since the global asset allocation is dominated by one single currency. The effects of US economic or policy changes will spread to the world and intensify the instability of the global financial market. Therefore, the current international monetary system needs to make adjustments so as to achieve effective policy coordination.

There are two possible directions of international monetary system reform. One is to create a super-sovereign currency, while the other is to build a diversified reserve currency system. The greatest advantage of a super-sovereign currency is that the issuance can be carried out according to the objective requirement of global economic development, avoiding the conflict between issuing countries' interests and global interests. But the super-sovereign currency scheme is so idealistic that it lacks political feasibility as well as economic rationality (Pan 2013). Therefore, building a diversified reserve currency system is more realistic. Theoretically, under a diversified international currency system, competition among international currencies will lay some restrictions on the currency issuing countries. The diversification of reserve currencies can provide more trading and reserve currencies, benefit the development of the world economy, and adapt to the multi-polarisation trend of the global economic development (Eichengreen and Flandreau 2009). Besides, it can solve the 'Triffin Dilemma' by the collective supply of reserve assets. Empirical evidence shows that the euro's participation in the international monetary system restricts the expansionary supply of the US dollar (Song 2004). In the short term, the currencies of Australia, Canada, Norway, and Sweden can supplement the current international monetary system, but these economies are quite limited in creating international liquidity to meet market needs, compared with the US, Europe, and Japan in terms of GDP. Therefore, it is more likely to achieve a stable financial architecture by integrating emerging economies into a more diverse global liquidity supply system (Taylor 2013).

The RMB is a suitable candidate when considering diverse reserve currencies. Since the reform and opening up, China has maintained a high economic growth rate, leading to a large output scale and huge foreign exchange reserves. The internationalisation of the RMB can enrich international reserve assets, enhance the supply capacity of reserve currencies, and improve risk diversification. Empirical studies also show that although RMB internationalisation will increase the impact of trade shocks on the net position of foreign assets, it will greatly reduce the response of exchange rate to the asymmetric trade shock and weaken the distortionary effects

[2]The 'Triffin Dilemma' was proposed by the American economist Robert Triffin in 1960.

caused by pegged exchange rate at the same time (Bénassy-Quéréand Forouheshfar 2015). Overall, RMB internationalisation contributes to the improvement of the international monetary system.

2.2 International policy coordination guarantees RMB internationalisation

On the other hand, international policy coordination is a powerful support for RMB internationalisation. The international vehicle currency status is determined by a few important factors, which are influenced by economic policies of many countries. So, the mutual coordination of economic policies affects the international currency system by influencing the dynamic changes of these driving factors in different countries.

The driving factors of currency internationalisation can be classified into three categories: macroeconomic factors, microeconomic factors, and financial factors. From a macroeconomic view, the main factors include economic scale and stability. The size of an economy is important for supporting the internationalisation of its currency. Countries that have a large share of global output, international trade, and financial participation show natural advantages in currency internationalisation (Chinn and Frankel 2007). The relative market size is an important consideration for companies to choose invoicing currencies. When foreign producers sell goods to large countries, they tend to choose destination currency to reduce the price volatility of their products relative to the dominant market. And the research on the US dollar and the euro also shows that the relative economic size is an important factor in determining the invoicing currency in international trade (Goldberg and Tille 2005). As a means of storing value, international currency should maintain stability. When choosing a reserve currency, companies are more inclined to choose the currency of a country with a stable economy to minimise the negative impact of exchange rate fluctuations (Baron 1976; Giovannini 1988). Using a two-country DSGE model, Devereux, Engel, and Storgaard (2007) show that the exporter will choose the least volatile currency in response to monetary policy shocks.

From a microeconomic perspective, industrial characteristics, product similarity, and substitutability are the most important considerations for enterprises when choosing the invoicing currency. In general, exporters will minimise the price volatility of their products relative to competitors' products, so that they experience least output volatility, which is called the 'coalescing effect'. The coalescing effect can explain the dominance situation of the dollar. Because foreign exporters face competitions with American companies, their products traded with the US are mainly denominated in the US dollar. And since exporters need to align their product prices with those of their competitors, products traded with other countries will still be denominated in the US dollar. The coalescing effect is closely related to industrial characteristics (Goldberg and Tille 2005).

In terms of financial factors, financial development and financial depth, as well as financial market liquidity, financing costs, and transaction costs, are among the top factors in realizing the currency internationalisation. International currency should not only serve as a settlement currency in trade but also play an important role in capital flows and financial transactions (Tu and Wu 2017). The best manifestation of the degree of internationalisation of a currency is to have a large share and top rank in international financial transactions, as the scale of financial transactions outweighs trade. In the context of global economic integration, a developed and open financial market can reduce participation costs, improve the capital supply mechanism, increase the efficiency of capital allocation, and smooth economic fluctuations. The depth and breadth of financial markets are highly correlated with the international level of a country's currency (Mckinnon and Kenen 2002; Gao and Yu 2010). Eichengreen and Flandreau (2012) find that financial depth was the key to the growth of dollar-denominated trade credit in the

1920s. Chitu, Eichengreen, and Mehl (2014) also argue that it was the most important reason for the rise of the US dollar share in the global bond market in 1918-1932. Financial development and financial integration were crucial to the international status of the euro (Papaioannou and Portes 2008; Portes and Rey 1998).

All of these driving factors of currency internationalisation, namely the economic scale, stability, the optimisation of industrial structure, and the deepening of financial development, require the support of corresponding policies. Effective macroeconomic policies can promote economic growth, optimise economic structure, and strengthen national strength in the long run. At the same time, they can also smooth economic fluctuations, and promote sustainable development, thus laying a solid foundation for currency internationalisation. So the formulation and implementation of these policies serve as important ways to achieve currency internationalisation. However, a country's economic policies will not only affect its own country but also have a profound impact on other economies in the context of economic globalisation. Different countries' economic policies may have negative spillover effects on the other countries. Deciding economic policies by considering only their own economic development goals is likely to trigger conflicts. Strengthening policy cooperation and coordination with other countries can, to a certain extent, ease the problems and uncertainties caused by isolated actions, thus paving the way for the internationalisation of a country's currency.

2.3 The mechanism of policy spillovers

In this part, we analyse the spillover mechanism of economic policies. The existence of spillover effects makes it necessary for countries to rely on policy coordination to meet the requirements of currency internationalisation.

2.3.1 Monetary policy

In an open economy, monetary policy affects other economies through the channels of direct interest rate, international capital flow, money supply, and international trade.

The first is the direct interest rate channel. An expansionary monetary policy will lower a country's interest rate, and the capital flows to high return area which directly leads to a decline in foreign interest rates and an increase in output. Second, international capital flows are highly sensitive to interest rates and exchange rate fluctuations. Generally speaking, a country's expansionary monetary policy with a lower interest rate will change the returns of capital investment, and cause the market to expect appreciation of other currencies, resulting in capital outflows. Thirdly, according to Mundell's trilemma, an open country can only choose two among independent monetary policy, free capital flow, and a fixed exchange rate. Facing a big country's domestic monetary policy shocks, if a country's monetary authority maintains restrictions on the exchange rate, its central bank's monetary policy must be adjusted accordingly. Specifically, under an expansionary monetary policy, interest rate falls and capital flows out. The pressure of appreciation of its currency forces the monetary authority to increase foreign exchange holdings and money supply, further stimulating its aggregate demand and output. Last, there is also an international trade channel. Trade is the main channel for the economies to interact with each other. In an open economy, a country's monetary policy will directly affect the spillover effects of international trade on other countries through exchange rates, domestic aggregate demand, and relative price levels.

In summary, there are significant spillover effects of the monetary policy. Under certain conditions, the net spillover effect may be negative, which means that the monetary policy of the international currency issuers may have a negative impact on other countries.

2.3.2 Fiscal policy

With global economic integration, fiscal policy shocks can also affect the economic development of other countries through various channels. The research finds that increasing government spending in the US leads to an increase in the US output and a decrease in Canadian output (Arin and Koray 2009). An analysis of China's 2009-2010 fiscal stimulus policy shows that China's fiscal expansion has effectively stimulated domestic demand, but has limited positive spillover effects on other countries in the world (Cova,Pisani, and Rebucci 2016). The research on OECD countries shows that fiscal policy spillover effect is significant and has a greater impact on output during a recession. Frenkel and Razin (1987) argue that the increase in budget deficits and temporary government spending has increased the value of domestic wealth and consumption and reduced the value of foreign wealth and consumption. Baxter (1995) finds that after the permanent increase in domestic government procurement, foreign output increased first but declined over time.

It is critical to understand the spillover effects and transmission paths of fiscal policy. Similar to monetary policy, international fiscal policy transmission also has four channels: direct interest rate, international capital flow, money supply, and international trade.

A country's fiscal policy changes will affect other countries by changing domestic and foreign interest rates, which is the direct interest rate channel. For example, when the income tax increases, residents will increase their current consumption levels and reduce their savings as the short-term household income suffers more than the long-term household income, which will raise interest rates (Arin and Koray 2009). And when a country adjusts its fiscal policy to increase government spending, its interest rate rises, and international capital flows in to seek for a higher return. The money supply channel is that fiscal policy pushes up domestic interest rates, stimulates the appreciation of the local currency and the depreciation of a foreign currency. Under the fixed exchange rate system, foreign countries will change their money supply. There is also an international trade channel. A country's fiscal policy will directly affect international trade via exchange rates, domestic aggregate demand, and relative price levels.

2.3.3 Macro-prudential policy

The macro-prudential policy is crucial for a country to maintain economic and financial stability and prevent systemic risks. A country's macro-prudential policy will have a systemic impact on domestic money supply, economic growth, and financial stability. For instance, the counter-cyclical capital requirement, differentiated reserve requirements under the Macro-Prudential Assessment System (MPA), credit window guidance, and mortgage rate restrictions in the real estate sector, all affect money supply and influence economic and financial stability. The impact of macro-prudential policies also influences other countries through the channels of international capital flow, money supply, international trade and the financial system stability.

The international capital flow channel: macro-prudential policies include limiting international capital flows or increasing the cost of financial transactions. It may drive international hot money to other countries, which will have a negative impact on the financial stability of other countries.

The money supply channel: after a country's macro-prudential policy directly raises the domestic interest rate level, international capital inflows will promote the appreciation of the local currency and its following spillover effects are similar to that of monetary and fiscal policies. The international trade channel: the implementation of macro-prudential policies may limit economic growth, leading to a decline in household income levels. The decline in aggregate demand will lead to a decline in foreign import demand, thus reducing foreign exports and

output. The financial system stability channel: in the context of economic globalisation and financial integration, a country's systemic risk will be transmitted through international capital flows and international financial markets. A macro-prudential policy strengthens financial supervision to prevent systemic financial risks and improve the stability of the financial system, which can greatly reduce the possibility of financial crisis and transnational transmission.

2.3.4 Structural transformation policy

After the recent financial crisis, most countries in the world are faced with the task of economic restructuring. It is an inevitable requirement for sustainable development. The economic restructuring reform requires the collective support of various economic policies, including trade policy, industrial policy, fiscal and monetary policy, as well as macro-prudential policy. Structural monetary policy and fiscal policy can also guide and accelerate the transformation of industrial structure. For example, China's green finance and technology finance policies are designed to promote the sustainable development of the economy and provide sustainable momentum for high-quality economic growth by stimulating innovation. Macro-prudential policies reduce speculation and enhance financial services to the real economy, better serving the structural transformation.

In the absence of coordination, the structural transformation policies of all countries are based on domestic goals. These policies will affect other countries in the world through channels such as international trade and capital flows. The negative spillover effects of policies can lead to unexpected deviations in the effects of national policies, which in turn can slow or even undermine the process of economic transformation in these countries.

Brander and Spencer (1985) use the Cournot model[3] to examine the competition between domestic companies' exports and foreign companies' exports in third-country markets and find that government export subsidies may cause domestic companies to enjoy higher output share, forcing foreign companies to reduce output. And the profit is transferred to domestic enterprises. Since the extra profits of domestic enterprises exceed the cost of the government, these export subsidies increase the national welfare of the country as a whole, but the economies of the competing countries are damaged.

This analysis shows that in the process of optimising their industrial structure and enhancing their international competitiveness through trade and industrial policies, countries may conflict with other countries. In the absence of coordination, there may be cases of vicious competition such as trade wars, subsidies, and exchange rate wars, whose final result will greatly reduce the policy effects of all countries.

3. Historical experience

In this section, we focus on the historical development of the international currency system and the corresponding international policy coordination mechanism. The changing process of the international currency and policy coordination can be a great example for RMB internationalisation. This process began with the establishment of the gold standard in the United Kingdom, followed by the dominance of the US dollar and the issuance of the euro, as well as the internationalisation of the Japanese yen. Along with changes in international currency, the international coordination mechanism has also transformed from political coordination led by major powers to multi-dimensional coordination led by international organisations. Since 1965, the status of a currency can be manifested via the currency composition of a country's official exchange reserves. Figure 3 presents the trend.

[3]The Cournot model is a model proposed by the French economist Cournot in 1838, which assumes only two oligopolists. This model is the earliest version of the Nash Equilibrium application.

Figure 3. Trend of currency composition of official foreign exchange reserves

Initially, the British pound was the centre currency during the years of the gold standard. In that period, international coordination was controlled by the military powers in the absence of international coordinating organisations. After World War II, the US played a leading role in the world economy, international politics as well as military affairs. Therefore, it became the centre of international coordination through its dominance in international institutions and the currency system. The yen and the euro also sought international coordination when emerging. The Japanese yen attempted to make a breakthrough among the G7 countries. Due to the ineffective policy coordination, however, the internationalisation of the Japanese yen ultimately failed. The euro has gradually improved its international status through the process of EU integration, but always faced internal coordination problems. The historical experience of pound, dollar, yen and euro shows that currency internationalisation needs to go along with international policy coordination, and the coordination ought to be matched with the economic level and social environment at that time.

3.1 The rise and fall of the British pound

In 1816, the United Kingdom launched the currency reform and established the gold standard system. It was agreed that the gold of 22 carats per troy ounce should be worth 46 pounds, 14 shillings and 6 pence. During the gold standard period, the British pound was the centre of the international monetary system. In 1899-1913, 40% of the worldwide official foreign exchange reserves were British pound assets, surpassing the total of those in the French franc and the Deutsche mark. There are two main reasons why the British pound can become the most important international currency under the gold standard system. First, the economic policy of the United Kingdom promoted its economic development and it had a proper policy coordination mechanism to ensure policy effectiveness. The United Kingdom imported cheap agricultural products and raw materials from developing countries using British pound as the valuation and settlement currency, which greatly facilitated its internationalisation. Second, the British economic power and maritime hegemony also laid a solid foundation for the dominance of its currency. The strong domestic productivity and blooming foreign trade boosted the economy. And the United Kingdom had a huge international trade volume, which guaranteed people's

confidence in its currency.

However, the gold standard system had a natural deflation characteristics. Domestically, the British pound-centred gold standard system weakened the competitiveness of British export products, and deteriorated unemployment. It also led to the outflow of gold, raised interest rates and caused the domestic economy to slump. Externally, the British credit fell sharply, which in turn intensified the instability of the monetary system.

What characterised the international policy coordination under the gold standard was that war constituted a barrier to international policy cooperation, and the interests of major powers played an important role. Under the gold standard, the most successful international cooperation was the 1867 international financial conference in Paris. In that conference, many countries reached a basic consensus on a unified international monetary system, but France didn't deliver a clear position, and that is why they didn't reach a final consensus. Under the gold standard, major powers dominated the international monetary order; only an international system that satisfied the interests of major powers can be realised. However, due to political and trade disputes between the powers, the frequent occurrence of wars made it impossible for all parties to negotiate at the table with peace in mind.

In addition, the coordination under the gold standard system was only temporary. As the international joint efforts to restore the gold standard after the First World War, a series of conferences were held, including the 1922 Geneva Conference, the 1922 Genoa Conference, and the 1924 Long Island Conference. However, none of these conferences resulted in a lasting agreement. The world's first international financial institution, the Bank for International Settlements, was established after the First World War, which was the embryonic form of modern international policy coordination. On the one hand, it was established to meet the growing needs for central bank cooperation in order to establish a stable post-war international monetary system; on the other hand, it was expected to find a new way to resolve the war debts borrowed by the European Allies from the US during the war and the payment of German war reparations after the war.

3.2 The establishment of the US dollar vehicle status

As early as 1873, the industrial output of the US already surpassed the UK, making it the world's No. One country. In the First World War, the US provided financing and war materials for the Allies, which enabled it to become the most advanced industrialised country in the world. The improvement of the US economic strength laid a solid foundation for the US dollar's hegemonic position on the international stage. In1923, the US possessed about 44% of the world's gold reserves. The large-scale accumulation of capital made the US dollar the most stable currency in the world at that time. After the collapse of the gold standard system, three currency zones emerged: the US dollar zone, the British pound zone and the franc zone, led by the US, the UK, and France, respectively. The monetary system was in chaos. Against this background, the US, UK, and France respectively issued a statement on 25 September 1936 and entered into the Tripartite Monetary Stability Agreement, which formed the basis for the subsequent implementation of the Bretton Woods system. Soon after that, the Second World War broke out and caused serious damage to European countries. Being far away from the European continent, the US economy did not suffer from the war but instead earned much money through arms trade. The economic power gap between the US and European countries was further widened.

After 1941, the US and the UK both proposed their own plans for the construction of a post-war international monetary order: the White Plan[4] and Keynes Plan.[5] On 1 July 1944, 44

[4]The WhitePlan was proposed by the US, declaring that an international stabilisation fund and a revival development bank should be built for post-war

governments held the United Nations Monetary and Financial Conference in Bretton Woods of the US. This conference passed the International Monetary Fund Agreement and the International Bank for Reconstruction and Development Agreement primarily based on the White Plan, which constituted the Bretton Woods Agreement. The Bretton Woods Agreement stipulated that the US dollar should be linked to gold while other countries' currencies be pegged to the US dollar. The formation of the Bretton Woods system shows that international coordination of the major countries was led by the US. This double-pegged international monetary arrangement makes the US dollar the basis for the valuation of other currencies, not only in reality but also in the international law, thus establishing the hegemony of the US dollar in the global monetary system.

The Bretton Woods system had its inherent defect, i.e. the 'Triffin Dilemma'. In order to maintain the fixed official price of the US dollar and gold and the fixed exchange rate system between the US dollar and other currencies, the US needed to maintain a current account surplus or balance. But the expansive demand for the US dollar requires the US current account to maintain a deficit to export the US dollar to other countries around the world.

In August 1971, the Bretton Woods system collapsed and the US dollar ceased its fixed price with gold. However, rather than losing the international status due to the lack of endorsement of gold, the importance of the US dollar rose slightly in the international monetary system. In 1977, the proportion of the US dollar in international foreign exchange reserves reached a record high of 79.2%. The US dollar's dominance in the international monetary system at this time was explained by its military capabilities and the oil dollar agreement.

Under the US-led monetary system, some multilateral coordinating bodies such as the International Monetary Fund and the World Bank emerged. According to the International Monetary Fund Agreement and the International Bank for Reconstruction and Development Agreement adopted at the Bretton Woods Conference, the two financial institutions were established in Washington on 27 December1945. The International Monetary Fund in the Bretton Woods system had three main functions: (1) maintain the adjustable pegged exchange rate system; (2) supervise the balance of payments and provide financial supports; (3) assist in multilateral trade among member states and eliminate exchange rate controls and current account payment restrictions. As to the World Bank, the US used its privileges in the World Bank to enhance its political influence. On the other hand, it also used the World Bank to assist other countries in economic development, with a view to building an open world market that was more conducive to the US.

After the collapse of the Bretton Woods system, the international monetary and financial system fell into chaos, and the international policy coordination mechanism was transformed to be under the leadership of the G7. In 1976, the International Monetary Fund organised the Interim Committee for the International Monetary System and reached the Jamaica Agreement, which gradually gave rise to the international coordination pattern under the G7. This international coordination mechanism played a key role in stabilising the world economic situation, as evidenced by the1978 Bonn Conference, the Plaza Agreement in 1985 and the Louvre Accord in 1987. During this period, the international coordination underwent a change from being led by a single power, the US, to a mechanism led by the G7, resulting in an international political structure of one superpower and several major powers.

The G7 is a super-national, super-organisational and super-regional coordination mechanism.

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reconstruction. This program also refused to provide international liquidityin a loose way.

5The Keynesian Plan was proposed by the UK, suggestingthe establishment of an international clearing alliance after the war, and theuseof the 'bancor' as the currency unit in the international clearing alliance. The 'bancor'should be valuated based on gold, while other currencies be valuated based on the 'bancor'.

The members must have enough economic strength and influence in order to ensure the effectiveness of the coordination. The G7 member countries have strong economic strength to the extent that the results of the coordination can make an impact not only on the seven countries but also on the whole world. As developing countries have become an important force in international politics, global governance calls for the participation of developing countries. In December 1999, the G7 invited the finance ministers and central bank governors of emerging economies to hold their first informal meeting in Berlin, marking the establishment of the G20. The G20 has played a significant role in many areas.

3.3 The internationalization of the Japanese yen

After the Second World War, Japan as a defeated country saw its economy severely weakened. The Japanese government adopted a strategy that took economic growth as paramount and international trade as the foundation. Since 1955, Japan had experienced 20 years of rapid economic development. In1968, Japan's GDP jumped to the second place in the world. In the process of economic development, Japan had been actively seeking opportunities to make its voice heard in the world political arena. In August 1952, Japan joined the International Monetary Fund and the World Bank. In 1955, it participated in the General Agreement on Tariffs and Trade and the Organisation for Economic Cooperation and Development (OECD). In the 1970s, while Japan's economy already assumed great importance in the world, its financial system remained backward, hindering the further economic and trade development.

After the collapse of the Bretton Woods system, the Japanese yen began to float freely. In 1979, Japan abolished its restrictions on non-residents in joining foreign exchange markets and restrictions on domestic enterprises in obtaining foreign exchange loans. In 1980, it revised the Measures for the Administration of Foreign Exchanges and Foreign Trade, declaring that Japan opened up the financial market, and then actively expanded the overseas banking business. All of these measures greatly promoted the internationalisation of the yen. The share of yen's total foreign exchange reserves rose from 0.1% in 1973 to 7.6% in 1985.

During the internationalisation process of the yen, Japan kept coordinating with the US. The continuous growing trade deficit between the US and Japan had led to a wave of trade protectionism in the US, which urged financial liberalisation in Japan and the yen appreciation. The US was eager to depreciate the dollar because of the continuous dollar appreciation and increasing economic pressure. In order to coordinate the actions between the two countries, the US and Japan held summit talks and established the US-Japan Committee in November 1983. Also, on 22 September1985, the G5 finance ministers and central bank governors reached a decision to jointly intervene in the foreign exchange market to solve the huge US trade deficit problem, which was known as the Plaza Agreement. The depreciation of the dollar and the appreciation of the yen were sizable. The yen rose by 20% in the following three months, reaching a peak of 120 yen per dollar. As the rapid appreciation of the yen severely hit the Japanese economy, Japan was forced to implement an expansionary monetary policy.

The international policy coordination of Japan in the entire period of the mid-to-late 1980s suffered from a mismatch. More specifically, Japan's international political status mismatched with its economic status. The lack of voice in the international political arena cost Japan a lot when dealing with problems. It was difficult to reach a reasonable internationally coordinated outcome for Japan at the right time.

3.4 The creation and prosperity of the euro

On 25 March 1957, six Western European countries, i.e. Belgium, France, Italy, Luxembourg, the Netherlands and Germany, signed the Roman Treaty, which was a major move to European integration. This treaty not only mentioned the establishment of a common market and the formation of a tariff union, but also discussed the coordination of economic, industrial and trade policies. The participant countries hoped to gradually realise European integration through the establishment of a single market. On 8 April1965, six countries signed the Brussels Treaty and decided to merge the institutions of European Coal and Steel Community[6], European Economic Community and European Atomic Energy Community[7] into the European Community. On 22 June 1972, the European Community expanded for the first time to include the UK, Ireland, and Denmark. In 1992, the European Community officially changed its name to the European Union, marking that Europe began to develop towards a community of economic, political, diplomatic and security affairs.

The euro was launched in 1999. The European search for monetary cooperation began after Second World War. In 1979, eight member states of the European Community (France, Germany, Italy, Belgium, Denmark, Ireland, Luxembourg, and the Netherlands) decided to establish the European monetary system. Under this system, the exchange rates of national currencies fluctuated against the US dollar while remained fixed against other countries. Under this system, the European Monetary Fund managed the foreign exchange reserves paid by participating countries, intervened in the money market, and issued a new currency. This new currency, the European Currency Unit, acted as the European Special Drawing Rights. Since the establishment of the European monetary system in 1979, Germany had always occupied the largest share of the European Currency Unit, which established Mark's central role in the European monetary system.

After the birth of the euro, the proportion of euro in the global foreign exchange reserves rose from 18% in 1999 to 27% in 2008. With the participation of Estonia in the Eurozone on 1 January 2011, the number of the Eurozone members increased to 17. However, due to the Greek sovereign debt crisis, the eurozone has to face the biggest threat since its inception.

There are multi-dimensional policy coordination and cooperation in the European region. In terms of monetary policy coordination, the European Central Bank system has gradually established since 1997, consisting of the European Central Bank and the Central Banks of the member states of the Eurozone. A unified monetary policy is implemented by the European Central Bank. As the institution that issues and directly manages the euro, the European Central Bank plays an unquestionable role. It is not subject to any government agencies in formulating monetary policy, so it can freely choose a monetary policy to guarantee the long-term economic development of the eurozone countries.

Different from the unified monetary policy, fiscal policies among EU countries are relatively decentralised. The Maastricht Treaty, signed in 1992, lays three requirements for the finance of the member states, including fiscal discipline, independence, and coordination mechanism. The 1997 Stability and Growth Pact requires countries to assume the obligations of the medium-term fiscal balance and regulate the early warning mechanisms and punishment mechanisms for fiscal budget deficits. If the member states' economic output falls by 0.75-2% or the budget deficit is greater than 3% of the GDP, it is considered a serious economic recession. If the member states do not take any timely remedial measures, a disciplinary mechanism will be initiated.

[6]European Coal and Steel Community was established in April 18, 1951 by France, Belgium, Federal Republic of Germany, Italy, Luxembourg and the Netherlands with the signature of the Paris Treaty.

[7]European Economic Community and European Atomic Energy Community was established in March 25, 1957 by France, Belgium, Federal Republic of Germany, Italy, Luxembourg and the Netherlands with the signature of the Rome Treaty.

The biggest problem in the EU policy coordination lies in the contradiction between unified monetary policy coordination and relatively decentralised fiscal policies. The unified monetary policy ensures the management of liquidity free from considering the restrictions of one single country's goal but leaves problems in fiscal policy. Countries in the EU can not use monetary policy to balance fiscal policy.

4. Conclusion

Based on the above analysis of the theoretical logics and historical experience of policy coordination during the process of international monetary system transition, we can arrive at the following conclusions:

First, since the policy coordination and currency internationalisation have a complementary relationship, it is necessary to improve macroeconomic policy coordination in the process of currency internationalisation. The US, Britain, and Europe all pursued policy coordination, which finally stabilised the international economic and financial situation and maintained a stable monetary system. Only through global macroeconomic policy coordination, can we ensure the effectiveness of macroeconomic policies, weaken the negative externalities, and achieve global optimality.

Second, the content of international economic policy coordination is not static. It changes with the international monetary system. Due to the change in the world economic structure and monetary status, the initial coordination mechanism may not be able to achieve desirable results, thus necessitates the establishment of a new coordination mechanism. The historical experience shows the point. The policy coordination during the gold standard period was mainly based on direct economic assistance. And the dollar-centred Bretton Woods system used the International Monetary Fund and the World Bank to regulate the new international economic and financial order. As the Bretton Woods system collapsed, the international coordination system could no longer be dominated by the US, as a result, a coordination mechanism centring around the G7 was established. The key issue of coordination in the Japanese yen internationalisation is the exchange rate with the US dollar. The coordination among eurozone countries focusses on the contradiction between centralised monetary policy and relatively decentralised fiscal policy.

Third, monetary policy, fiscal policy, and regulatory policy all have spillovers. If not coordinated properly, the spillover effect will weaken the effectiveness of these policies. Therefore, it is necessary to obtain a multi-level coordination mechanism. The multi-level coordination mechanism means that all policies should be taken into account and the consultation, supervision, and the disciplinary mechanism need to be combined together.

Based on the above conclusions, we propose the following policy recommendations to promote RMB internationalisation and realise a better international policy coordination mechanism：

First of all, China should pay attention to the improvement of policy coordination mechanism. Monetary policies, fiscal policies, and other economic policies all have strong externalities. And spillover effects require international coordination so as to maintain policy effectiveness.

In addition, it is a wise choice to build a diversified international platform. Under the economic globalisation and regional economic integration, the degree of interdependence between countries has increased remarkably, and the spillover effects have become more apparent. Therefore, the coordination institutions should be expanded to include more developing countries. As mentioned earlier, RMB internationalisation is conducive to improving the existing international monetary structure and building a diversified coordination platform.

Finally, it is a good chance to take the Belt and Road Initiative as an opportunity to accelerate economic coordination and RMB internationalisation. When China issues RMB-denominated

Silk Road Bonds for the Belt and Road infrastructures, it becomes more convenient to obtain and use RMB. The Belt and Road Initiative is also an important platform for China to participate in international policy coordination. In the implementation of the Belt and Road Initiative, China can strengthen cooperation with third-party international institutions such as the World Bank, the Asian Development Bank, the African Development Bank, and the European Bank for Reconstruction and Development. With such cooperation, countries will be able to improve existing coordination mechanisms based on the problems they face in the real world.

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References

ArinK. P., F. Koray. 2009. "Beggar the Neighbor? The Transmission of Fiscal Shocks from the US to Canada. "*Open Economies Review* 20 (3):425-434.

Baron D.P. 1976."Fluctuating Exchange Rates and the Pricing of Exports."*Economic Inquiry*14 (3):425-438.

Baxter M.1995."Chapter35 International Trade and Business Cycles. "*Handbook of International Economics*3 (05):1801-1864.

Batten J A, P. G. Szilagyi. 2016."The Internationalisation of the RMB: New starts, jumps and tipping points." *Emerging Markets Review*.

Bénassy-Quéré A, Y. Forouheshfar.2015. "The impact of yuan internationalisation on the stability of the international monetary system."*Journal of International Money & Finance*57(2):115-135.

Benes. J., M. Kumhof, D. Laxton, D. V. Muir, & S. Mursula. 2014. "The benefits of international policy coordination revisited." *Imf Working Papers* 13(262), 1.

Brander J.A., B.J.Spencer, 1985."Export Subsidies and International Market Share Rivalry."*Journal of International Economics*18 (1):83-100.

Buiter Willem H., Richard C. Marston.1985. "International Economic Policy Coordination." London: Cambridge University Press.

Chen, Xuebin and Zhong Li. 2012. “Huobi Guojihua de Quanqiu Jingyan yu Qishi” [Currency Internationalisation: Global Experience and Enlightenment]. *Caimao Jingji [Finance & Trade Economics]* 2012(2):45-51.

Chinn, M., J. Frankel. 2007. "Will the Euro Eventually Surpass the Dollar as Leading International Currency? In G7 Current Account Imbalances and Adjustment." Chicago: University of Chicago Press.

Chiţu L., B. Eichengreen, A. Mehl. 2014."When did the Dollar Overtake Sterling as the Leading International Currency? Evidence from the Bond Markets." *Journal of Development Economics* 111 (6):225-245

Cohen B J. 2012."The Benefits and Costs of an International Currency: Getting the Calculus Right."*Open Economies Review*23(1):13-31.

Cooper Richard N. 1968. "The Economics of Interdependence: Economic Policy in the Atlantic Community." New York: McGraw-Hill

Cova P., M. Pisani, and A.Rebucci. 2016 "Macroeconomic Effects of China’s Fiscal Stimulus."*Social Science Electronic Publishing*,

Darvas Z, A. K. Rose, and G. Szapáry. 2005."Fiscal Divergence and Business Cycle Synchronization: Irresponsibility Is Idiosyncratic." *Nber International Seminar on Macroeconomics* 55(3):261-313.

Devereux M.B., C. Engel, and P.E. Storgaard.2007."Endogenous Exchange Rate Pass-through When Nominal Prices Are Setin Advance."*Journal of International Economics*63 (2):263-291.

Eichengreen B., M. Flandreau. 2009."The Rise and Fall of the Dollar (or When Did the Dollar Replace Sterling as the Leading Reserve Currency?)."*European Review of Economic History* 13 (3):377-411.

Eichengreen B., M. Flandreau. 2012."The Federal Reserve, the Bank of England, and The Rise of the Dollar as an International Currency, 1914-1939." *Open Economies Review*23 (1):57-87.

Eichengreen B. 2013."Currency war or international policy coordination?"*Journal of Policy Modeling* 35(3):425-433.

Fatás, Antonio, I. Mihov. 2003. "On Constraining Fiscal Policy Discretion in EMU." *Oxford Review of Economic Policy* 19.1:112-131.

Frankel J. 2012."Internationalisation of the RMB and Historical Precedents."*Journal of Economic Integration*27(3):329-365.

FrenkelJ. A., A. Razin. 1987."Fiscal Policies and the World Economy."Cambridge: MIT Press.

Gao, Haihong and Yongding Yu. 2010. "Renminbi Guojihua de Hanyi yu Tiaojian" [The Meaning and Conditions of RMB Internationalisation]. *Guoji Jingji Pinglun [International Economic Review]* 2010(1):46-64.

Giovannini A. 1988."Exchange Rates and Traded Goods Prices."*Journal of International Economics*24 (12):45-68.

Goldberg L. S., C. Tille. 2005."Vehicle Currency Use in International Trade."*Federal Reserve Bank of New York*:177-192.

Hamada K. A. 1976."Strategic Analysis of Monetary Interdependence."*Journal of Political Economy*84(4):677-700.

Ito H, R. N. Mccauley, and T. Chan.2015. "Currency composition of reserves, trade invoicing and currency movements."*Emerging Markets Review* 25:16-29.

Kenen, Peter B. 2011. "Currency internationalization: an overview." *BIS Papers* 61: 9-18.

Mckinnon, Ronald , P. B. Kenen.2002. "Optimum Currency Areas and Key Currencies." *The Open Economy Macromodel: Past, Present and Future.*

Obstfeld M, K. Rogoff. 1995."Exchange Rate Dynamics Redux."*Journal of Political Economy* 103(3):624-660.

Papaioannou Elias, R. Portes. 2008. "The international role of the euro: a status report."*No. 317. Directorate General Economic and Financial Affairs (DG ECFIN)*, European Commission.

Pan, Yingli. 2013. "Guoji Huobi Tixi Gaige de Zhengque Fangxiang: Chao Zhuquan hai shi Duoji Hua?" [Reform Direction of the International Monetary System: Super-Sovereignty or Multi-Polarity?]. *Diyi Caijing Ri Bao [First Financial Daily]* 2013-09-09.

Portes.R., H. Rey. 1998."The Emergence of the Euro as an International Currency." *NBER Working Paper* No.6424: 307-343

Song, Xiaofeng. 2004. "Guoji Huobi de Jingzheng Wending" [Stability and Competition for International Currency].*Shijie Jingji Yanjiu [World Economy Study]* 2004(3):31-35.

Taylor J B. 2013."International monetary coordination and the great deviation"*Journal of Policy Modeling*35(3):463-472.

Tian, Guoli. 2015. "Renminbi Guojihua wei Guoji Huobi Tixi Gaige Tigong Xin Dongli" [RMB Internationalisation Provides New Impetus to the Reform of the International Monetary System.]. *Diyi Caijing Ri Bao [First Financial Daily]* 2015-12-01.

TriffinR.1960."Gold and the Dollar Crisis: The Future of Convertibility." New Haven: Yale

University Press.
Tu, Yonghong and Yuwei Wu. 2017. “Renminbi Guojihua Jixu Zengqiang Jinrong Tuidong Li” [RMB Internationalisation Needs to Enhance Financial Impetus]. *Lilun Shiye [Theoretical Views]* 2017(08):37-40.
Wang, Tingting. 2014.“Huobi Guojihua Jincheng de Boyi Fenxi-Liangguo Boyi Moxing jiqi dui Renminbi Guojihua De Qishi” [Game Theoretical Analysis on Currency Internationalisation Process: A Two- Country Game Model and Its Implication to RMB Internationalisation.]. *Jinrong Yanjiu [Journal of Financial Research]* 2014(5):80-95.
Weng, Dongling. 2016.“Guoji Huobi Tixi Biange yu Renminbi de Guojihua” [The Reform of the International Monetary System and the Internationalisation of the RMB]. *Jingji Xue Jia [Economist]* 2016 (12).
Xiong, Aizong and Meibo Huang. 2010.“Guoji Huobi Duoyuanhua Yu Guoji Huobi Tixi Wending” [International Monetary Diversification and Stability of the International Monetary System]. *Guoji Jinrong Yanjiu [Studies of International Finance]* 2010-(09):21-28.
Zhuang, Tailiang and Sushan Xu. 2011. “Renminbi Guojihua yu Guoji Huobi Tixi Gaige”[The Role of the RMB in the Reform of the Global Monetary System]. *Jingji Lilun yu Jingji Guanli [Economic Theory and Business Management]* 2011-(09):40-47.

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Who Are Good Entrepreneurs? Evidence from Financial Capability, Entrepreneurial Cognition and Entrepreneurial Emotion*

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This paper intends to divide entrepreneurs into different profiles based on financial capability, entrepreneurial cognition and emotions. Further, this paper examines whether the entrepreneurs' profiles are associated with entrepreneurial performance. Data on financial capability, entrepreneurial cognition, emotion and entrepreneurial performance were collected through online self-report questionnaire. Three distinct profiles were identified by Latent Profile Analysis. Findings suggest that financial capability, positive emotion, negative emotion and entrepreneurial cognition have different effects on entrepreneurial performance. This study contributes to existing research by integrating indicators from ability, emotion and cognition to divide entrepreneurs into different profiles and give an insight into entrepreneurial performance from a entrepreneur-centered perspective.

Keywords: Financial Capability; Entrepreneurial Performance; Entrepreneurial Cognition; Positive Entrepreneurial Emotion; Negative Entrepreneurial Emotion

1. Introduction

Entrepreneurs have become increasingly active in financial market. It is vital to the survival of start-up firms to make full use of financial products and services efficiently. Until now, entrepreneurial finance has got a marvelous increase. To get sufficient capital, entrepreneurs are always combining with crowdfunding, venture capital and angel invests. However, majority of these products are complex and difficult to grasp, especially for financially unsophisticated entrepreneurs (Rooij, Lusardi, & Alessie, 2011). Although, in most start-up firms, there are professional financial managers to help entrepreneurs to make relevant decisions, the final decisions will be made by entrepreneurs. Thus, entrepreneurs must assume more responsibility for their firms' financial situation (Custódio & Metzger, 2014). Unfortunately, it must be admitted not all entrepreneurs are well-equipped to make financial decisions, especially for young entrepreneurs. The lack of sufficient financial capability leads to failure to make financial decisions (Drexler, Ficher, & Schoar, 2014), which would undermine the probability of their firms' success.

The few studies that attempted to study entrepreneurs through person-centered analyses found that meaningful profiles, distinct from those created based on means splits, could be identified (Zampetakis et al., 2016). An advantage of person-centered analysis is that they can easily reveal complex interaction among multiple foci of entrepreneurs' characteristics than standard analysis

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(multiple regressions), for which interaction effects among more than 3 variables are very seldom analyzed (Morin et al., 2011). As such, we explore the effects of Financial capability (FC), Entrepreneurial cognition (EC) and Entrepreneurial Emotion (EE) on Entrepreneurial Performance (EP) from the person-centered perspective. We use latent profile analysis to divide entrepreneurs into different profiles and examine whether profiles are relevant to EP.

Our findings make several contributions to existing entrepreneurial literature. First, from the method perspective, drawing on FC, EC and EE, we use latent profile analysis to differentiate entrepreneurs. Furthermore, we examine the relationship of entrepreneurs' profile with EP. It provides us a new insight into entrepreneurial research and demonstrates the importance of focusing on entrepreneurs' characteristics. Second, from the theoretical perspective, our results show not only the positive effects of entrepreneurial cognition, financial capability and positive emotion, also the importance of modest negative emotion on entrepreneurial performance. It requires entrepreneurs to accept negative emotion when they are down, which would also help them promote performance.

2. Literature Review

2.1 Financial capability and entrepreneurial performance

FC reflects people's knowledge of financial matters, their ability to control their money and manage their finances (Von Stumm, O'Creevy, & Furnham, 2013). Moreover, through a large-scale survey, Atkinson et al., (2007) divided FC into four different factors: making ends meet, planning ahead, keeping track of accounts and stay informed of financial information (Von et al., 2013). Entrepreneurs with high FC usually have discernment and can make effective decisions on utilization of financial management.

For entrepreneurship success, it requires entrepreneurs to maximize wealth and profits, which could be realized through entrepreneurs' strategic decisions about organizing allotments of financial resources with considerable financial strength (Taylor, Jenkins, & Sacker, 2011). On the contrary, deficiency of FC commonly leads to entrepreneurship failure (Wise, 2013). Some scholars have examined the relationship of FC with EP. Briefly, FC affects EP through two ways.

First, FC can help entrepreneurs gain more financial accesses (Atkinson & Messy, 2007). Access to finance plays an important role in business start-ups, and entrepreneurial firms'development and growth (Lee, Sameen, & Cowling, 2015). Entrepreneurs with high FC stay informed, and especially pay attention to relative financial information, which is good for them to identify important opportunities to invest, to obtain essential resources and make competitive decisions. Second, FC can decrease relative financial cost for entrepreneurs. Considering information asymmetries in the financial markets, it is easy for entrepreneurs with low level FC to incur high cost of financing, resulting in decreased profits. FC links with financial knowledge. Poor in financial knowledge brings up high-cost borrowers (Lusardi & Mitchell, 2011).

2.2 Entrepreneurial emotion and entrepreneurial performance

Entrepreneurship is a changeable and unpredictable process (Lichtenstein et al., 2007). Emotions will play a more significant role in shaping individuals' behavior in a context filled with uncertainty and unpredictability than in a certain and predictable environment (Forgas, 1995a). Furthermore, entrepreneurial tasks are highly influenced by emotions for their variations in nature and changes in the unfolding process (Baron & Ensley, 2006). Thus, it is necessary for us to discuss the effect of emotions in the entrepreneurial context. Entrepreneurs' PE affects EP through influencing issue interpretation (Mittal & Ross, 1998), and enhancing self-efficacy (Bandura, 1982).

According to mood congruency effect, individuals selectively pay more attention to information with valences agreeing with their current emotional state (Forgas, 1995a). People in PE tend to interpret issues more positively than neural and NE. For instance, facing with a challenge in entrepreneurial process, positive entrepreneurs usually treat it as an opportunity, and take appropriate strategies to cope with it. The positive coping behavior would make full use of the challenge and gain potential gains for entrepreneurs. Thus, PE positively correlates with EP.

As to the effects of NE on entrepreneurial decision-making, it is much more complex. Many studies have addressed the negative effects of NE on entrepreneurial decision making. They treat the effects of NE as opposite to PE. And they stated that high NE could drive people to interpret challenges as threats leading to a loss of opportunities for development (Mittal & Ross, 1998); and decrease entrepreneurs' self-efficacy resulting in undermining motivations to adopt necessary strategies to cope with challenges (Das & Teng, 1998). However, it must be paid attention to positive side of NE. Bodenhausen (1994) pointed out modest NE could drive people to pay more attention to covariation information, and less halo bias in performance appraisals was appeared. People with modest NE appear to engage in a more thoughtful cost-benefit analysis to make a decision. Modest NE, as sadness, could trigger cognitive strategies, beneficial to solve problems effectively, by motivating individuals to think more systematically and thoroughly (Mohanty & Suar, 2014). Moreover, for sad individuals, it is a means for them to get rid of unhappy experience through cognitively absorbing in information processing tasks (Tiedens & Linton, 2001). Thus, compared with high NE, the modest NE may be better for entrepreneurs to promote their performance. Hence, Modest NE promotes EP, while high NE hinders EP.

2.3 Entrepreneurial cognition and entrepreneurial performance

There are co-existing system functioning when entrepreneurs are deciding what to do: cognitive heuristic system and logical-rational system. The aim of a heuristic is to make decisions more quickly with ignoring part of the information (Gigerenzer & Gaissmaier, 2011). Because entrepreneurship is changeable, unpredictable and uncertain, people with low EC tend to adopt cognitive heuristics for limited cognitive capacity. The cognitive heuristics mainly lead to erroneous evaluations and decisions, because heuristic decision is partially subjective, influenced by existing beliefs and experiences. On the contrary, entrepreneurs with high EC would make decisions according to ability and avoid overconfidence, diagnose problems happening to their firms, have sufficient entrepreneurial knowledge and recognize important opportunities (Seawright, Mitchell, & Smith, 2008). In summary, EC positively correlates with EP.

3. Method

3.1 Participants and procedures

We collected data from incubators throughout China. We connected alumni of our school engaging in entrepreneurship and asked them to finish our questionnaire online. 330 entrepreneurs returned the questionnaires to us. We obtained 305 questionnaires among the data, and the valid rate was 92.4%. 57% of these participants were male and 54.8% were married. The average year of these participants was 30.99 (S.E. =7.72). In terms of education, 51.8% of the participants had bachelor's degree, and 42.6% of the entrepreneurs had devoted to entrepreneurship for over 5 years. Most of the entrepreneurial firms belonged to technology and information industries, with a percent of 51.4%.

3.2 Measures

In accordance with the process of translation and back-translation, we translate English scales used in this study into Chinese. In the questionnaire, a five-point Likert scale was used to measure participants' response, with "1" representing "never" and "5" representing "extremely often".

Financial Capability (FC). We measured the FC by scales developed by Atkinson (2007). Considering the length of the scale, only highest loading items from Atkinson's report were administered (Von Stumm et al., 2013). Finally, 14 items were included in our research. The scale yielded a α= 0.817.

Entrepreneurial Performance (EP). Twelve items from Li and Atuahene-Gima (2001) were used to measure EP. The performance was divided into 3 parts: financial performance (e.g. ROE), growth performance (e.g. growth of market share) and innovation performance (e.g. proportion of innovative products). The scale was yielded a α= 0.818.

Entrepreneurial Emotion (EE). EE were measured by PANAs from Watson et al., (1988) (Watson, Clark, & Tellegen, 1988). Considering the length of our questionnaire, we used 12 items with highest loadings from Watson's research (Von Stumm et al., 2013). PE and NE were measured by 6 items respectively. The scale of positive emotion yielded a α = 0.82 and the scale of negative emotion yielded a α = 0.87.

Entrepreneurial cognition (EC). EC was measured by cognitive ability script developed by Seawright, Mitchell and Smith (2008). The scale included four factors: ability/opportunity fit, diagnostic ability, entrepreneurial knowledge and opportunity recognition. The scale yielded a α = 0.833.

Control variables. Gender, age, education, and entrepreneurial experience were chosen as control variables. Gender was dummy coded, with male participant coded as "0" and female coded as "1". For education level, "junior college and blow" was coded as "1", bachelor" was coded as "2" and "master and above" was coded as "3". For entrepreneurial experience, "under five years" was coded as "1", "5-10 years" was coded as "2", "10-20 years" was coded as 4, and "20 years or more" was coded as "4". Age was self-reported in years. Prior research suggested that these demographic variables might influence EP.

4. Results

4.1 Latent profile analysis

Latent profile analysis is a person-centered perspective statistical method, which can divide participants into different profiles. One of the two main goals of the current study is to identify distinct profiles of entrepreneurs based on their FC, EC and EE.

The fit indices of the LPA models were reported in table 1. According to related studies (Lai et al., 2015), we divided entrepreneurs into three different profiles: proactive entrepreneurs (Profile 1: high FC, high EC, high PE and modest NE) describing 49% of entrepreneurs, pessimistic entrepreneurs (Profile 2: modest FC, modest EC, modest PE, and high NE) describing 46% of entrepreneurs and indifferent entrepreneurs (Profile 3: low FC, low PE, low NE and low EC) describing 5% of entrepreneurs. According to table 1, the LMR test, bootstrap LMR test, AIC, BIC and adjusted BIC indicated that a 3-profile solution fit the present data better than others do (Akaike Information Criterion [AIC] = 2509.99, Bayesian Information Criterion [BIC] = 2576.96, Adjusted Bayesian Information Criterion [ABIC] = 2519.87, Likelihood Ration Test [LRT] $p<0.001$, Bootstrap Likelihood Ration Test [BLRT] $p<0.001$, Entropy=0.8).

Table 1 Results of Latent Profile Analysis (N=305)

Model	LL	Parameters	AIC	BIC	ABIC	Entropy	LMR(p)	BLRT(p)
1 Class	-1388.87	8	2793.74	2823.51	2798.13	Na	Na	Na
2 Class	-1283.57	13	2593.13	2641.50	2600.27	0.99	<0.001	<0.001
3 Class	-1237.00	18	2509.99	2576.96	2519.87	0.80	<0.001	<0.001
4 Class	-1220.10	23	2486.19	2571.76	2498.82	0.75	0.44	<0.001
5 Class	-1205.62	28	2467.25	2571.41	2482.61	0.80	0.43	<0.001
6 Class	-1197.74	33	2461.49	2584.26	2479.60	0.80	0.37	0.12
7 Class	-1183.34	38	2442.69	2584.06	2463.54	0.79	0.54	<0.001
8 Class	-1167.73	43	2421.46	2581.43	2445.06	0.83	0.17	<0.001
9 Class	-1165.73	48	2427.45	2606.03	2453.79	0.82	0.54	<0.001

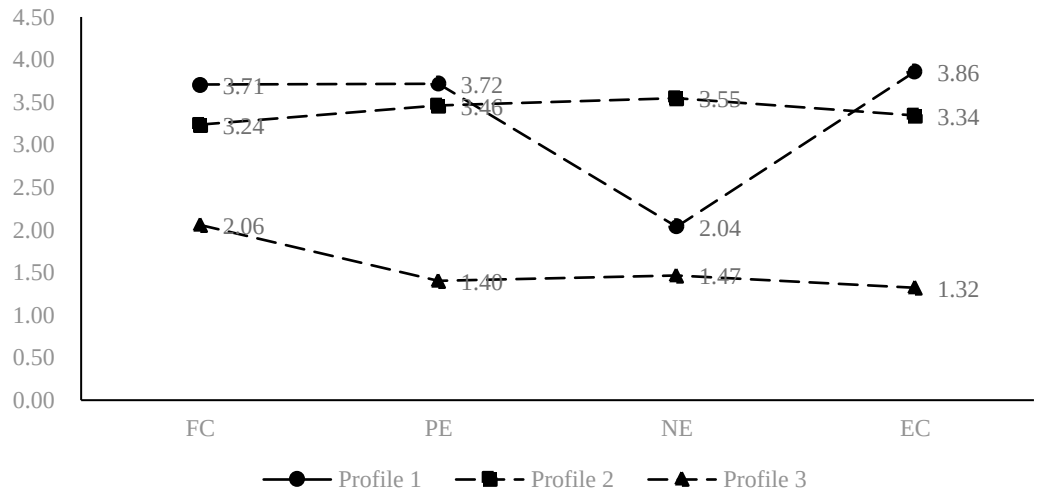

Figure1. Results of Latent Profile Analysis

To compare the differences of FC, EE and EC in three different profiles, we conducted ANOVA based on three profiles and the results were shown in table 2. Proactive entrepreneurs had the highest FC, PE, EC and modest NE. Pessimistic entrepreneurs had second highest FC, PE, EC and the highest NE. Indifferent entrepreneurs had the lowest FC, PE, NE, and EC. And the F tests and LSD tests for EE, PE, NE and EC were all significant at 99% confidence.

Table 2 ANOVA Test of Independent Variables (N=305)

Variables	Profile 1	Profile 2	Profile 3	F	LSD
FC	3.71	3.24	2.06	63.18	1>2>3
PE	3.72	3.46	1.40	53.65	1>2>3
NE	2.04	3.55	1.47	286.81	2>1>3
EC	3.86	3.34	1.32	156.93	1>2>3

4.2 Profiles and Entrepreneurial performance

So as to test the association of profiles with EP, we conducted one-way ANOVA test. According to table 3, results showed that the proactive entrepreneurs had the highest EP (M=3.31, F=58.69, p<0.001) and the LSD tests were all significant at 95% confidence. The results of ANOVA tests of the 3 dimensions of EP were the same (M=3.26~3.36. F>27.07, P<0.001). Hence, H1 to H4 were supported.

Table 3 ANOV Test of Entrepreneurial Performance (N=305)

Variables	Profile 1	Profile 2	Profile 3	F	LSD
Entrepreneurial Performance	3.31	3.18	1.42	58.69**	1>2>3
Financial Performance	3.27	3.20	1.37	37.14**	1=2>3
Growth Performance	3.36	3.19	1.45	46.32**	1>2>3
Innovation Performance	3.26	3.14	1.40	27.07**	1=2>3

Note: *$p < 0.05$, **$p < 0.01$;

5. Discussion

This study explores how entrepreneurs use their performance as a response to FC from a person-centered perspective. From person-centered perspective, we used latent profile analysis based on FC, EC, PE and NE to divide entrepreneurs into three different profiles. In addition, we used EP as the outcome, results showing that entrepreneurs with high EC, high FC, high PE and modest NE had the best performance. Our study not only provides evidence to indicate the importance of FC and EC, but also offers an insight into the complex effects of EE on entrepreneurial decision-making process. The effects of PE and NE are not always contradicted, and modest NE is also important to promote entrepreneurial performance.

5.1 Theoretical implications

From the perspective of method, our research applied latent profile analysis to analysis which type of entrepreneurs could finally get high entrepreneurial performance. Latent profile analysis is kind of person-centered approach, which has the potential to extend entrepreneurial research by identifying how different profiles of entrepreneurs based on FC, EC, and EE are differentially linked to entrepreneurial performance. Considering the complex structure of entrepreneurs' characteristics, variable-centered methods (e.g. regression analysis) may be not the suitable choice for our topic. From the person-centered perspective, we used latent profile analysis to differentiate entrepreneurs in to 3 different profiles: proactive entrepreneurs (high FC, high EC, high PE and modest NE) describing 49% of entrepreneurs, pessimistic entrepreneurs (modest FC, modest EC, modest PE, and high NE) describing 46% of entrepreneurs and indifferent entrepreneurs (low FC, low PE, low NE and low EC) describing 5% of entrepreneurs. Furthermore, we revealed the different characteristic structure based on FC, EC, PE and EE, which is the first step in the development of differentiate strategies targeting specific profiles of entrepreneurs.

From the perspective of theory, our research mainly has two implications. This study provides direct evidence that FC could exert influences on EP. Entrepreneur competency is the key point leading to the distinct performance of SMEs. Entrepreneurs' competencies are comprised by knowledge, experience and skills. Rooij et al., (2011) elaborated the positive relationship between FC and stock market participation, and it could ensure the success of financial decisions. However, there is no direct evidence to support FC could affect EP. Our study used latent profile

analysis to prove that high FC was necessary for high EP.

This study provides support for the view that modest NE is an effective tool to help individuals make decisions. With modest NE, individuals tend to think systematically and thoroughly, and notice the covariation information, leading to effective decision making (Tiedens & Linton, 2001). Our study clarifies paradoxical views in the entrepreneurial context and provide the corresponding context in which NE exerts specific effects. The effects of PE and NE are not contradicted, whereas they play different roles in making entrepreneurial decisions.

5.2 Practical Implications

According to our findings, it is enough to advocate that entrepreneurs should increase their FC to increase EP. Existing studies have proved that FC could be nurtured through taking part in related education programs.

Our study provides evidence that modest NE and high PE would strengthen entrepreneurial performance. Thus, entrepreneurs should improve their ability to regulate emotions. When entrepreneurs experience NE, they should accept it rather than resist it, which could take advantage of the cognitive schema triggered by NE.

Finally, EC plays an important role in shaping the effects of FC on performance. It is important for entrepreneurs to increase their entrepreneurial knowledge through education and practice and summarize their practical experience and transfer it into their inner cognitive schema.

5.3 Limitations and Future Study

Some limitations must be addressed for future studies. First, a cross-sectional design was used to test our hypotheses, which cannot determine causality efficiently and convincingly, and avoid social desirability. Future study with a field experiment or longitude research would help to verify the influence exerted by FC on EP. Second, all of the data collected from entrepreneurs themselves would inevitably lead to common source variance. Future study could use data from multiple sources, for example using objective indicators rather than subjective indicators measure EP.

Acknowledgement

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References

[1] Atkinson, A., McKay, S., Collard, S., & Kempson, E., Levels of financial capability in the UK. Public Money and Management. Vol.27(1),(2007),p. 29-36.

[2] Bandura, A., Self-efficacy mechanism in human agency. American psychologist. Vol.37(2), (1982),p. 122-147.

[3] Baron, R. A., & Ensley, M. D., Opportunity recognition as the detection of meaningful patterns: Evidence from comparisons of novice and experienced entrepreneurs. Management science. Vol.52(9),(2006),p. 1331-1344.
[4] Bodenhausen, G. V., Sheppard, L. A., & Kramer, G. P., Negative affect and social judgment: The differential impact of anger and sadness. European Journal of social psychology. Vol.24(1), (1994) ,p.45-62.
[5] Li, H., & Atuahene-Gima, K., Product innovation strategy and the performance of new technology ventures in China. Academy of Management Journal. Vol. 44(6), (2001),p. 1123-1134.
[6] Custódio, C., & Metzger, D., Financial expert CEOs: CEO′ s work experience and firm′ s financial policies. Journal of Financial Economics. Vol.114(1), (2014),p. 125-154.
[7] Das, T. K., & Teng, B. S., Time and entrepreneurial risk behavior. Entrepreneurship Theory and Practice. Vol.22(2), (1998) ,p. 69-88.
[8] Drexler, A., Fischer, G., & Schoar, A., Keeping it simple: Financial literacy and rules of thumb. American Economic Journal: Applied Economics, Vol.6(2),(2014), p. 1-31.
[9] Forgas, J. P.,Mood and judgment: the affect infusion model (AIM). Psychological Bulletin. Vol.117(1),(1995), p. 39-66.
[10]Gigerenzer, G., & Gaissmaier, W., Heuristic decision making. Annual Review of Psychology. Vol.62,(2011),p. 451-482.
[11] Lee, N., Sameen, H., & Cowling, M., Access to finance for innovative SMEs since the financial crisis. Research policy,Vol.44(2),(2015), p. 370-380.
[12] Lichtenstein, B. B., Carter, N. M., Dooley, K. J., & Gartner, W. B., Complexity dynamics of nascent entrepreneurship. Journal of Business Venturing.Vol.22(2), (2007), p. 236-261.
[13] Lusardi, A., & Mitchell, O. S., Financial literacy around the world: an overview. Journal of Pension Economics & Finance.Vol.10(4), (2011),p. 497-508.
[14] Mittal, V., & Ross Jr, W. T., The impact of positive and negative affect and issue framing on issue interpretation and risk taking. Organizational behavior and Human Decision Processes. Vol.76(3), (1998), p. 298-324.
[15] Mohanty, S. N., & Suar, D., Decision making under uncertainty and information processing in positive and negative mood states. Psychological Reports. Vol.115(1), (2014),p.91-105.
[16] Morin, A. J., Morizot, J., Boudrias, J. S., & Madore, I., A multifoci person-centered perspective on workplace affective commitment: A latent profile/factor mixture analysis. Organizational Research Methods. Vol.14(1), (2011), p. 58-90.
[17] Seawright, K. W., Mitchell, R. K., & Smith, J. B., Comparative entrepreneurial cognitions and lagging Russian new venture formation: a tale of two countries. Journal of Small Business Management.Vol.46(4), (2008),p.512-535.
[18] Taylor, M. P., Jenkins, S. P., & Sacker, A., Financial capability and psychological health. Journal of economic psychology.Vol.32(5),(2011),p. 710-723.
[19] Tiedens, L. Z., & Linton, S., Judgment under emotional certainty and uncertainty: the effects of specific emotions on information processing. Journal of Personality and Social Psychology. Vol.81(6),(2001), p. 973-988.
[20] Van Rooij, M., Lusardi, A., & Alessie, R., Financial literacy and stock market participation. Journal of Financial Economics. Vol.101(2),(2011), p. 449-472.
[21] Von Stumm, S., O'Creevy, M. F., &Furnham, A., Financial capability, money attitudes and socioeconomic status: Risks for experiencing adverse financial events. Personality and Individual Differences. Vol. 54(3), (2013),p. 344-349.

[22] Watson, D., Clark, L. A., & Tellegen, A., Development and validation of brief measures of positive and negative affect: the PANAS scales. Journal of personality and social psychology. Vol.54(6), (1988),p.1063-1070.

[23] Wise, S., The impact of financial literacy on new venture survival. International Journal of Business and Management. Vol.8(23), (2013),p. 30-39.

[24] Zampetakis, L. A., Lerakis, M., Kafetsios, K., & Moustakis, V.,Anticipated emotions towards new venture creation: A latent profile analysis of early stage career starters. The International Journal of Management Education. Vol.14(1), (2016), p. 28-38.

IMI News

- On October 4, the launch of 2019 RMB Internationalization Report in Seoul and Seminar on China-Korea financial Cooperation jointly sponsored by IMI, Renmin University of China, Korea Institute for International Economic Policy (KIEP) and International Business School of Zhejiang University was held in Seoul. Prof. Ben Shenglin, Co-director of IMI, Dean of the Academy of Internet Finance, and International Business School of Zhejiang University; Prof. Zhao Xijun, Associate Dean, School of Finance, RUC; Prof. Tu Yonghong, Deputy Director of IMI, Professor, School of Finance, RUC; Yang Pyeongseob, Associate Dean of KIEP; Dr. Kang Taesoo, former vice president of Central Bank of Korea and senior researcher of KIEP; Dr. An Sungbae, general director of Macroeconomic and Financial Research Office of KIEP and other experts and scholars attended the meeting and delivered speeches. Dr. Kim Hyo Sang, director of International Financial Research Office of KIEP, chaired the meeting. This is the first time that RMB Internationalization Report was released in Korea.
- On October 11, the Macro-Finance Salon (No. 130) was held in Renmin University of China. Professor Xu Xianchun, former Deputy Director General of the National Bureau of Statistics, director of China Data Center of Qsinghua University, attended the salon and made a speech titled “Changes in the Core Indicators of China's National Economic Accounting since the Establishment of P.R. China”. Wei Benhua, former Deputy Administrator-in-bureau, SAFE, former IMF Executive Director for China, Xu Xiongfei, Deputy Director-General of the Accounting Department of the National Bureau of Statistics, Yang Haizhen, Professor at the University of Chinese Academy of Sciences, member of the Central Finance Committee of CNDA, Zhao Weijiu, Director of the Policy Research Office of Beijing Local Financial Supervision and Administration, Huang Jun, Deputy Dean of the School of Applied Economics of RUC, Deputy Director of China Art Finance Institute participated in the salon. Tu Yonghong, Deputy Director of IMI, Professor at School of Finance of RUC presided over the salon.
- On October 28, Tao Xiang International Finance Lectures (No. 18) was successfully held at Renmin University of China. Ding Yi, Chairman of Huaneng Capital Services Company attended the event and delivered a speech entitled “International Practice of Industrial Finance –Financial Road of GE”. The lecture was chaired by Tu Yonghong, Deputy Director of IMI and Professor of the School of Finance of RUC. Duan Yiping, Director of R&D Department of Huaneng Capital Services Company, Zhao Xijun, Associate Dean of the School of Finance, Wang Fang, Deputy Director of IMI and Professor of the School of Finance, and the postgraduate students of the School of Finance attended the lecture.
- On November 5, the Launch of the IMF Global Financial Stability Report 2019 was jointly sponsored by the IMF Representative Office in China and IMI. Fabio M. Natalucci, Deputy Head of the IMF ’s Monetary and Capital Market Department; Wu Xiaoqiu, Vice President of Renmin University of China; Wei Benhua, former Deputy Administrator-in-Bureau of the State Administration of Foreign Exchange (SAFE) and former IMF Executive Director for China; Tu Yonghong, Deputy Director of IMI and Professor of the School of Finance at RUC; and experts and scholars from financial management departments, scientific research institutes and financial sectors attended the meeting and gave speeches. The meeting was chaired by Zhang Zhixiang, former director general of the International Department of PBoC, and former IMF Executive Director for China.

- On November 13, Macro-Finance Salon (No. 131) and China-Korea Economic, Financial and Trade Cooperation Seminar, co-hosted by IMI and Korea Institute for International Economic Policy (KIEP), was held in Renmin University of China. Il Houng Lee, Member of Monetary Policy Board, Bank of Korea, Sungbae An, Director of the International Macroeconomics and Finance Department of KIEP, and Dr. Kyu Yub Lee, Research Fellow of KIEP, respectively delivered speeches on China-Korea cooperation in finance, economy and digital trade. Wei Benhua, Former Deputy Administrator-in-bureau, SAFE and Former IMF Executive Director for China; Ben Shenglin, Co-director of IMI, Founder and Dean of Zhejiang University Academy of Internet Finance, and International Business School; Zhao Xijun, Associate Dean, School of Finance, RUC; Tu Yonghong, Deputy Director of IMI attended the meeting and made comments. The meeting was chaired by Zhang Zhixiang, Former Director-General, International Department, PBoC and Former IMF Executive Director for China.
- On November 14, Qu Qiang, Assistant Director and Research Fellow of IMI, at the invitation of Commerzbank of Germany, made a speech at the 13th Emerging Markets Macro Conference in Dubai. The speech centered on the investment and trade policy of China in Africa under the Belt and Road Initiative. Qu Qiang believes that in the era of asset shortage and negative interest rates in major economies around the world, various projects invested by China under the Belt and Road initiative are favorable arrangements for win-win development of all parties.
- On November 19, the Macro-Finance Salon (No. 132) was held in Renmin University of China. Georges Depeyrot, director of the research department of National Center of Scientific Research in France, delivered a speech on the topic "International Currencies in History". Professor He Ping and associate professor Luo Yu from School of Finance of RUC attended the salon and made comments. The meeting was presided over by Professor He Ping.
- On November 21, the Launch of 2019 Tianfu Financial Index and Symposium on Financial Supply-side Reform co-hosted by IMI and China Fortune Media Group and supported by Sichuan Financial Academy and Sichuan Tianfu Bank was held in Chengdu.Ouyang Zehua, vice chairman of the CPPCC Sichuan Provincial Committee and director of Sichuan Local Financial Supervision Bureau, Xie Ruiwu, member of the Standing Committee of Municipal Party Committee and executive vice mayor of Chengdu Municipal Committee, Zhou Xiaoqiang, secretary of the Party committee of Chengdu Branch of PBoC and president of Sichuan Financial Academy, Liu Yuanchun, vice president of Renmin University of China, Han Xudong, vice president of China Fortune Media Group and chairman of Huaxin Financial Holding Asset Management Co., Ltd., Huang Yi, President of Sichuan Tianfu Bank, and other guests attended the launching ceremony.
- On November 24, the Youth Roundtable on Money and Finance themed new trends in cross-border finance under the Belt and Road Initiative was held in Renmin University of China. This meeting was convened by Zhu Yugeng, IMI research fellow. Qu Fengjie, senior research fellow of IMI and member of the academic committee of the Institute of Foreign Economic Research of NDRC, Qu Qiang, assistant director and research fellow of IMI, Wang Shu, director of the Belt and Road Initiative Coordination and Promotion Department of China Export Credit Insurance Corporation, Liang Chengsi, deputy director of the Risk Office of China-LAC Fund and other experts attended the session and delivered keynote speeches. Qian Zongxin, senior research fellow of IMI, research fellow Liu Hongwei and Jiang Bo participated in the meeting.
- On November 30th, the Roundtable on Money and Finance 2019 and 4th Anniversary

Forum of Suning Institute of Finance was successfully held in Beijing. The conference was co-organized by the School of Finance of Renmin University (RUC) and Suning Institute of Finance, co-sponsored by IMI, RUC Fintech Institute, and Fintech 50 Forum. The theme of this conference is "fintech and inclusive finance". Zhao Xijun, Associate Dean of the School of Finance of RUC served as the chair of the first conference session. Zhuang Yumin, Dean of School of Finance of RUC, and Huang Jinlao, Dean of Suning Institute of Finance gave opening speeches. On behalf of the School of Finance and IMI, Zhuang Yumin extended a warm welcome to the guests present, and then elaborated on the history and significance of Roundtable on Money and Finance.

Call for Papers

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