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Special Column on Post Pandemic Challenges

High Attention to Regional Financial Risks, An Important Window Period for Deepened Reform and Adjustment*

By LIU YUANCHUN*

A Correct Understanding of Current Macroeconomic Performance Requires Multi-dimensional Examination of New Regularities and Issues of Economic Performance

Firstly, for the present we usually use YoY, fixed-base and MoM data to assess economic recovery. However, when the changes of the types of impact give rise to the changes of the driving forces and the structure of the economy, a specific type of data, used alone or collectively, will be hard to correctly identify the economic situation.

Secondly, it is necessary to correctly identify the changes arising from major impacts, particularly the changes of the stock factors. After a pandemic or major war, the estimation of potential growth rate will be quite different from before. Current pandemic causes heavy losses to the stock of human and physical capital. When the base is significantly changed as a result of demand and supply loss, how to estimate potential growth rate and how to connect the increment to the stock will become particularly important.

Thirdly, to have a clear understanding of the present economic situation, when interpreting data, it is necessary to: 1. coordinate YoY, MoM and fixed-base data; 2. align with microeconomic data; 3. distinguish exogenous impacts from endogenous ones; 4. identify the effect of different impacts on the stock and the increment.

Key Issues for Q3 Macroeconomic Performance

Firstly, the pandemic prevention and control in China will be under serious test in Q3 if the United States rapidly rolls out the vaccination and implements full opening.

Secondly, China and the United States will re-contact, re-assess and re-position the bilateral relationship that may remain unsettled until Q3.

Thirdly, the Politburo continues to be highly concerned with regional financial issues, and high-risk institutions in particular. In the future, individual risk events are very likely to trigger regional, systematic risks. Under triple pressure from local governments' hidden debts, local investment and finance platforms' debts as well as local SOEs' debts, local SOE reform and financial institution restructuring will have an important window period. For the present, with endogenous power already formed for economic growth and policy consistency, macroeconomic performance is starting a period of steady growth and low pressure. This means a new strategic opportunity for

*This article was first published by National Academy of Development and Strategy of RUC on June 1, 2021.
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SOEs reform and financial adjustment. Missing this opportunity, it will be hard to truly adjust market structure and fully restore private businesses' investment expectation.

Fourthly, attention needs to be paid to the employment of the youth aged from 16 to 24. Considering over 9 million new college graduates in this year, plus those not employed in last year and the year before last, overall employment is under heavy pressure. In spite of its outperformance when compared with the rest of the world, Chinese economy is still under pressure and not yet normalized.

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A Commentary on How the Pandemic Has Reshaped World Economy and the Challenges Going Forward

By IL HOUNG LEE*

The pandemic in a world with disappearing quality jobs

What were the conditions before the pandemic? When Covid-19 hit the news headlines, the world was still recovering from the global financial crisis (GFC). Relative to the period prior to the GFC, global growth has been sluggish throughout the 2010s. This slowdown was more pronounced in advanced economies (AEs) than among emerging economies (EMs), notably due to China's strong performance accounting for a sizable share of EMs' average growth. Global trade also exhibited a similar trait as demand in AEs were subdued, global value chain retracted, and growth in China relied relatively more on tertiary industry than export-oriented manufacturing sector.

The culprit for the sluggish demand in AEs is seen as a mixture of the fallout of globalization, technological progress, cross country imbalances, and excessive leverage. Notwithstanding the numerous literatures on the net impact (if any) of these factors as well as the ongoing debates, the fact remains that there were fewer quality jobs in ADs and more differentiated jobs in EMs.

In parallel, the world became more dependent on the future generation to maintain the level of consumption well beyond its earnings. This was partly enabled by not internalizing the cost of negative externalities into expenses, whereby the future generation is effectively being taxed in terms of degraded natural environment for cheaper consumer goods for this generation. For the same reason, debt stock has been on the rise in most economies, i.e., for AEs in the immediate aftermath of the GFC, and for MEs during most of the 2010s, to maintain a living standard beyond its means. This gap will need to be filled by a correspondingly higher productivity or savings by the future generation.

Perhaps most challenging from the macroeconomic management point of view is the weakened investment-income-consumption cycle. This fundamental premise usually taken for granted when devising demand management strategy is in serious need of a review. Rising mark ups,[1] industrial concentration, especially in high tech area as can be observed from market capitalization of these company stocks and the rise of multinational firms, and the increasing number of smaller and medium sized enterprises' (SMEs) interest coverage ratio falling below one all indicate income from investment becoming increasingly skewed towards fewer successful companies. Globalization of consumer product market has also raised the bar for market access for those with low skill and little start-up capital. Instead of competing within one's locality, irrespective of size and type, all businesses are now exposed to global competition at the very outset.

Corresponding changes are mirrored in the labour market. The growing number of underemployed from losing industries and the falling participation rate from high entry barrier has contributed to widening income inequality. Rising asset prices has made wealth inequality even worse. These widening inequalities, and hence shrinking middle class, have weakened consumption, undermining the natural link from income to consumption. For the average household, debt accumulation was the obvious means to supplement consumption and leveraged

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[1] "Markups and income inequality: Causal links," 1975-2011, Han M, J Pyun, Journal of Comparative Economics, Vol 49, Issue 2, June 2021

investment in financial or physical asset the only way to claim some share in the booming asset market. The increasing weight of this debt in turn required lower interest rates just to keep the economy afloat.[2]

The net result of all this was a global economy that was highly leveraged, asset prices that were highly overvalued (see below), wealth and income (before transfer) inequalities that have worsened,[3] and a natural environment that was degraded to the point of no return. Moreover, there were no obvious positive factors that could be expected to contribute to global growth as was the case over the past several decades, e.g., the initial positive effects from privatization and smaller government, the synergy from integration in Europe and the FSU countries, and the boom in trade notably from China's accession to the WTO. To make things worse, the US-Sino trade tension as well as national policies that encourage home bias have contributed to weaker trade flows.

How did the pandemic affect these conditions? The pandemic hit the services sector most, especially the SMEs and the self-employed businesses, followed by durable consumption good industries.[4] According to the ILO,[5] total loss of employment (largely in the form of inactivity rather than unemployment) amounted to 114 million jobs in 2020, effectively translating into an income loss of $3.7 trillion (or 4.4% of global GDP). The hardest hit sectors were accommodation and food services, arts and culture, retail, and construction. Even with income support measure, young workers, women, the self-employed and low- and medium-skilled workers suffered most. With higher-skilled jobs recorded growth, such as in information and communication, finance and insurance sectors, the pandemic has increased inequality within countries. A clearer picture will only emerge once government support is withdrawn, but developments in the labour market and in industries point to a further weakening of the investment-income-consumption cycle.

What were the key policy responses? Policy responses focused on keeping the economy afloat, to maintain the economy's productive capacity, and to protect the most affected group of population. Fiscal policy, the scope of which in AEs exceeded that of the GFC period aimed at supporting demand, including through fiscal transfers to household and to businesses. On the monetary policy side, interest rates were further lowered to alleviate debt burden and support economic activity. Some central banks extended direct lending to businesses and provided guarantees. Relaxed regulatory forbearance and moratorium also became a common feature across countries.[6]

These policy measures were well implemented. In most countries, growth quickly stabilize after the initial sharp fall in the first quarter of 2020. IMF staff estimated[6] policies to have contributed to about 6% to global growth in 2020. In the absence of these policies, growth could have contracted by more than three times the actual downturn. Accordingly, EMs (excluding China) with less policy space saw a larger decline in growth, and low-income developing countries yet to see the bottom of the decline.

What is the price tag effect, including the side effects, of these policies? These policy efforts were not for free. While they were critical in averting a major downturn in economic activities, the bill entailed further worsening of the underlying economic condition that prevailed before the pandemic. More specifically, the world is even more leveraged, asset prices are highly overvalued, wealth and income (before transfer) inequality has further worsened, and most likely the investment-income-consumption cycle has been further undermined. If so, macroeconomic

[2] It is no surprise that most macroeconomic models estimated a very low neutral rate given the structural characteristics which was probably also behind the decade long low inflation rate. Under inflation targeting framework, therefore, keeping policy rate low was inevitable.
[3] IMF Fiscal Monitor "A Fair Shot" April 2021
[4] Andre Dua et al. "US small-business recovery after the COVID-19 crisis" McKinsey & Company, July 7, 2020 https://www.mckinsey.com/industries/public-and-social-sector/our-insights/us-small-business-recovery-after-the-covid-19-crisis
[5] ILO Monitor "Covid-19 and the world of work. Seventh edition (Updated estimates and analysis)."
[6] IMF World Economic Outlook "Managing Divergent Recoveries" April 2021

policies to support recovery will have a short-lived policy effect upon implementation and could even worsen the structural distortions over the medium term.

Total credit to the non-financial sector in G20 countries (market exchange rate based) as percent of GDP has risen from 247% to 292% during 2020 alone.[7] The same indicator for the AEs stood at 321% at the end of 2020.[8] Similarly, government gross debt in G20 AEs rose by 18 ppts of GDP to 131%. Such a level has not been seen since the end of WW2. Even more worrisome is the fact that these high levels are the result of the longest spell of debt accumulation, i.e., from the early 1970s, in the last century.[3] Previous episodes of debt peaks were each during the hights of the two world wars and the Great Depression; in all three cased, they were followed by a rapid deleveraging, indicating a correction.

Asset prices have further surged. Even before the pandemic, global market capitalization[9] at end 2019 had reached 113.9 % of GDP, which compares with 116.4% in 1999 and 114.1 in 2007, i.e., the two previous peaks before stock market crash. Since then, key stock prices have further surged in most key markets, although their performances were differentiated by sector, economic, and geo- political developments. Between January 2020 and June 2021, Dow Jones and US 30 Futures indices both rose by 21%, while the technology heavy Nasdaq Composite index rose by more than 60%. Equities in Europe and Asia recorded strong growth with DAX and CAC rising by 18% and 10% respectively, and Nikkei and Shanghai rising by 23% and 17%, respectively. These surges were partly fuelled by leverage expansion, well above the increase in the value of their underlying assets.[10]

Property prices have also followed the surge, albeit with some delay, reflecting the lack of alternative investment opportunities. Housing prices in key countries measured as a ratio to income and rent[11] have both either reached or surpassed their levels at the global financial crisis. Countries such as the US and the UK, whose ratios had increased sharply between the beginning of 2000 and the GFC reached their previous peak, while in Germany where it saw a small decline prior to the GFC rose by 40%. The average ratio for the OECD overall has surpassed the GFC peak by 8%, or by 38% when compared with the early 2000. In China, housing prices started to rise sharply since January 2021, rising by 15% (Jan-May average year on year).[12]

What will it take to cement a recovery? The IMF baseline scenario projects the AEs to recover their pre-Covid19 per capital GDP by 2023, and emerging and developing countries with limited policy space to take longer to do so. Permanent loss of capital stock, including human capital due to education and employment gaps will leave a permanent scar. The number of bankruptcies has declined both in absolute terms and relative to previous crisis,[6] but once the blanket loans and credit guarantees are rolled back, the situation could quickly unravel. Moreover, the pandemic is still lingering on with the potential for the fourth wave still very alive.

It is unclear whether even a careful timing and phasing of policy withdrawal alone can moderate these negative effects. The Fed managed to raise its policy rate well in the years leading to the pandemic despite the initial taper tantrum in 2013. The carefully planned and pre-announced normalization by the Fed sustained financial market stability, but did not induce a fundamental structural change in the US or the global economy. Moreover, rolling back financial forbearance and moratorium inevitably will have to be gradual, further delaying needed restructuring and imposing deadweight on the economy even long after the pandemic ends.

[7] BIS Data http://stats.bis.org:8089/statx/srs/table/f1.1?f=xlsx
[8] For G7 (unweighted average), credit to non-financial sector during 2020 rose by 41 ppt, which compares with 0.4 ppts per annum over the previous few years (BIS data).
[9] World Bank data https://data.worldbank.org/indicator/CM.MKT.LCAP.GD.ZS
[10] For example, debit balances in customers' Securities margin accounts in the US alone rose by 34% in 2020, and further by 11 ppts during Jan-May 2021 (FINRA statistics).
[11] OECD data https://data.oecd.org/price/housing-prices.htm
[12] CEIC data https://www.ceicdata.com/en/indicator/china/house-prices-growth

On the positive side, much progress has been achieved in the tech sector as can be seen in the increasing share of value added in GDP[13] from professional scientific and information and communication sectors especially since 2015. Furthermore, in parallel with the tech sector innovation, greater concern for climate change is opening a new avenue that has yet to be fully explored. Digitalization of payment system is reducing domestic as well as cross border settlement cost that would help businesses. It remains a question as to whether development of these new areas will have a positive effect on income and wealth distribution.

What are the potential challenges? On top of the pandemic induced challenges discussed above, the heightened geopolitical risk from increased tension between the US and China could dampen technological innovation. Depending on the nature and the scope of US-Sino technology-competition, innovation could noticeably slow from loss of global synergy. This is particularly so as joint research among top 5 countries (according to the SCIE ranking) and China has grown in scope since the GFC.[14] This, in turn, will have adverse impact on global trade and transition to Industry 4 i.e., Fourth Industrial Revolution.

Irrespective of who stays ahead of the other, global trade could be further undermined by this divide of technology especially if this tension will lead to product incompatibility among different group of countries. This is because growing "Internet of Things" implies that most devices will be linked ever more closely with one another, and thus compatibility of product and services will become increasingly more important. Together with growing reshoring policies,[15] including on security of supply concerns as experienced during the COVID-19 pandemic, and strategic independence more broadly, trend toward more regionalized production structure could strengthen, thereby accelerating the reshaping of the global value chain. The outcome will be negative to all parties.

Slow progress in innovation will also stall the ongoing transition from labour and physical capital-intensive manufacturing sector to Industry 4, i.e., smart manufacturing involving yet to be fully explored areas of data sciences, cloud computing, advanced robotics, artificial intelligence, and virtual and augmented reality. To the extent that a noticeable share of Chinese manufactured consumer goods is exported to the US and the EU, impediment to trade could slow China's move to Industry 4. This is particularly so since demand by conscientious consumers worldwide would be an important incentive for Chinese traditional industries to upgrade their production modality using greater interface between human and AI, robotics and automation.

Finally, the weakened investment-income-consumption cycle remains the main economic challenge. Whatever economic stimulus is provided, the positive impact will be short lived and to keep the economy afloat, continued support will have to be provided in the form of government transfers or credit from financial institution. This in turn will keep fuelling asset price valuation, widening wealth inequality and increase the deadweight of the economy. Interest rates will have to be kept low to neutralize the large debt burden, which in turn will lead to inefficient resource allocation, creating a vicious cycle.

Where do we go from here? To correct the structural distortion, the most obvious place to start is to ensure the world economy is running on a level playing field. It should be grounded on fair competition, to include minimizing the scope of policy arbitrage across countries such as the ongoing discussions on the Inclusive Framework on Base Erosion and Profit Shifting by the OECD/G20 and minimum corporate tax. Simple (to the extent possible) and transparent rules, clear and strong intellectual property rights (important for Industry 4), market-determined flexible

[13] OECD data https://data.oecd.org/natincome/value-added-by-activity.htm
[14] KIEP Research Paper (19-25), "How competitive is Chinese industries?" (In Korean); Feb 2020
[15] European Parliament, "Post Covid-19 value chains: options for reshoring production back to Europe in a globalised economy," Mar 2021 https://www.europarl.europa.eu/RegData/etudes/STUD/2021/653626/EXPO_STU(2021)653626_EN.pdf

prices, a regulatory environment that ensures that all agents price their cost of production fully reflecting risks, and a macroeconomic framework that will ensure assets are valued according to their real value, i.e., net present value of their future stream of returns.

Efforts should focus on lowering market access to the general (and potential) work force by overhauling the education system and refocusing vocational training all tailored to implementing transition to Industry 4.[16] Evolution in the distribution system, catering, and health service provision are all hinting to a growing need for a new generation of work force. Establishing an ecosystem that nurtures creative thinking would need to accompany the changes in the education system, including providing a breeding ground for the rise of digital nomads and human cloud workers.

The world has paid a very high price to deal with the pandemic in terms of human life and financial expenses. The only positive side effect from all this is the heightened awareness of the danger of climate change. However, unless this awareness also extends to accepting the fact that the world cannot continue to live on borrowed resources indefinitely, it will not be possible to ensure a recovery that is sustainable.

[16] The US-Sino tension is an important policy challenge, but an issue beyond the scope of this paper.

IMI International Monetary Review

Post Pandemic Economic Challenges

By HERBERT POENISCH*

The Covid 19 pandemic which has plagued virtually all countries in the world has brought an unprecedented relapse into nationalism not seen by the present generation. The relapse in terms of sanitary and economic emergency not only resorted to measures for residents of one country but to their nationals. Borders were closed and existing agreements on free movement of people were suspended. Foreigners were shown the door and if they stayed they received no special attention. However, the spillover of domestic measures affected the whole population of countries including expats and foreign workers. The economic emergency measures adopted for nationals of countries had global implications.

This article will not cover the fallout of the pandemic on economic growth and the dislocation of various factors of production which are analysed widely and deeply by various experts and organisations such as the BIS and the IMF. It will rather assess the spillover, or contagion of various measures to the global economy. In the first part the major fallout of the pandemic for domestic and international economies will be assessed. The measures taken by national authorities to save their citizens from this fallout with the effects on the global economy will follow in the second part. The third part deals with the fallout of these measures for the Chinese economy.

China has been successful in controlling the spread of the pandemic and thanks to tough measures taken, reverted to robust growth earlier than other countries. However, they have been affected by policy measures taken elsewhere. There are positive effects but also negative contagion makes itself felt as the dust settled and growth resumed. Ample use will be made of statistics published in the 2020 IMF article IV consultation and by the PBOC.

1. Fallout from pandemic to domestic and global economy

The pandemic which spread in early 2020 led to widespread disruptions affecting countries' economies to more or less equal measure. Countries were forced to reduce the movement of people domestically and cross border in order to stem the contamination. Large swathes of the population, with the micro small and medium enterprises (MSME) worst affected, lost their jobs mostly in the gig economy, or were reduced to part time work or put on furlough. Some sectors such as tourism, organisation of events, sports and entertainment shut down completely whereas other sectors, such as medical, logistics and online platforms expanded exponentially.

The financial impact was that some sectors and part of the population badly affected could not pay their liabilities on time and had to be rescheduled. For those continuing to earn incomes their savings increased sharply as consumption declined. Equally, the stock market remained buoyant after periods of sell off. The banking sector weathered the storm well thanks to improved cushions built up after the GFC and the buoyancy of savings.

During the past year uncertainty about the duration of the pandemic, possible insolvencies, changing consumption patters and disruptions in global supply chains led to a negative growth of 3.4% for the whole world, with China the only exception with a positive growth rate of 2.3%.

The global economy, including global value chains and global trade had entered a period of uncertainty before the pandemic struck because of geopolitical tensions. Goods trade recovered

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sharply after a drop of 20% in the first half of 2020. Only trade in services did not recover and international tourism collapsed.

Unemployment rates which crept up somewhat do not tell the whole story. Members of the workforce were kept on, but had reduced their working hours and continued working online. Many were furloughed but these schemes mostly expired by the end of 2020, contributing to the rise in unemployment rates. However, the historical relationship between a deep recession and rising unemployment was broken in AE.

These patterns did not work in EME where the decline in growth had full impact on unemployment as support measures in AE were not working there. The population in EME bore the full brunt of the economic and sanitary fallout of the crisis.

Regarding sectors, manufacturing and construction bounced back after the initial lockdown, but customer related services have not recovered until today. While retail shops were forced to shut down e-commerce boomed. Commercial property bore the full brunt due to working from home. At the same time demand for residential property boomed as online workers looked to upgrade their working environment.

The disinflationary effect of the pandemic was prevalent in AE during most of 2020 due to the drop in demand, less wage pressure and firms' cost cutting. Interests rates and other borrowing costs remained low. The picture was somewhat different in EME where a tighter supply situation caused inflation to emerge. Rising raw material prices added to the picture even in China where the PPI started to rise in early 2021.

The asset markets, such as stock and real estate markets showed resilience, very untypical during a recession. This gave rise to the discussion on a disconnect between finance and the real economy. It might be the result of a more unequal income and wealth distribution when the rentiers are worried about returns on their assets while the average wage earners struggle with everyday survival. This was fuelled by monetary accommodation as outlined below.

2. Measures taken by national authorities

Once the pandemic struck, authorities were quick to respond in all countries. They all faced the choice between sanitary and economic consideration. They needed to walk the tightrope day by day as the pandemic unfolded. Needless to say that the spectre varied from country to country. Some were putting priority on health measures, others on economic concerns. What saved the ordinary people from catastrophe was the decisiveness by authorities to abandone principles and theories in favour of a flexible response, summed up by the phrase: whatever it takes!

The catalogue of measures compiled by the Financial Stability Board (FSB) was under the heading: extending, amending and ending, thus clearly denoting a sequencing over time, adapted to changing circumstances. The response was different to various phases. Authorities in AE implemented an unprecedented package of measures of fiscal and monetary policy as well as financial regulation to alleviate the suffering of the population while putting neither the fiscal solvency nor monetary and financial stability at risk.

The measures according to the FSB fall into the following categories:

2.1. Payment moratoria and tax deferrals: to avoid a liquidity crunch for economic agents
2.2. Public guarantee schemes: mostly for MSME and self-employed
2.3. Public guarantee schemes for trade credit insurance: to sustain exports
2.4. Short time work schemes: to avoid laying off staff and ensure income streams
2.5. Direct grants, tax relief and equity injections for big firms to continue operations
2.6. Measures to facilitate continued and orderly operation of capital markets: thus big companies continued to obtain funds in the equity and bond markets at good terms

The authorities also opened the spigots to ensure adequate liquidity by

2.7. Monetary policy accommodation helped to mitigate liquidity short falls and volatility spikes to ensure orderly functioning of financial markets. In this course central bank balance sheets expanded in the USA from 16% to 33% of GDP, in the Eurozone from 40% to 60% of GDP and in Japan even reached 120% of GDP. Interest rates remained at their historically low levels.

2.8. Fiscal authorities used various measures as listed above to support households and firms. The fiscal packages adopted amounted to 25% of GDP in the USA, including the new packages under the Biden administration, in Japan some 20% of GDP and 18% in the UK. In Eurozone countries these packages amounted to 10-12% of GDP.

2.9. Measures adopted by regulatory and supervisory bodies to ensure banks continued to lend to customers in need.

2.10. Prudential measure to complement monetary policy and thus enhance transmission.

As a result national money supply as measured by M2 increased moderately, in the US by 13.8% and Eurozone 15.9% between 05M20 and 05M21, but volatility might have declined as people spent less. Global liquidity, measured as credit provided by banks in their international operations increased even less, 4.8% in 02Q20, 2.3% in 3Q20 and 5.6 in 4Q20.

A brightening economic outlook together with fiscal stimulus, monetary accommodation and increased vaccination rates led to a so called 'reflation trade' with rising sovereign spreads in AE. This spilled over into EME, aggravated by rising raw material prices. As result, inflation raised its head again, with expectations of a short term spike in AE but a prolonged increase in EME.

What is the long term impact of these measures? As financial conditions were benign while indebtedness of households, firms but mostly governments increased well above the trend. The unwinding of these positions once the pandemic is surely under control and economic recovery is on a solid footing will pose challenges for the domestic and global economy.

On the domestic front, monetary tightening will become inevitable, the 'reflation trade' acting as a stark reminder that benign conditions cannot continue. The fiscal packages will have to be phased out. The higher debt levels can be accepted in the short term but have to be wound down as the economic recovery gains momentum. In this case the 'flattening of the debt curve' served the purpose by avoiding household and corporate insolvencies.

On the international front, responding to monetary tightening in AE reminds of the tapering a few years ago. Countries in EME again face capital outflows and weakening of exchange rates, pressure to tighten their monetary regimes while not having fully controlled the pandemic. Markets will continue to provide adequate financing for higher debt levels in AE at higher remuneration.

3. Response in China

The experience of China was rather unique during this period. China was the first country to be affected by the pandemic and the first one to return to economic growth thanks to the stringent sanitary measures adopted in 1Q2020.

Although China did not follow the full out support of monetary and fiscal policy adopted in AE, emergency measures were taken to cushion the impact of the pandemic on growth, demand and employment, particular in MSMEs. China prided itself of not resorting to quantitative easing or extreme fiscal stimulus, keeping the central government budget deficit at 3.6% of GDP.

The monetary policy measures included reducing reserve requirements for banks, increasing lending targets, credit support by the policy banks, loan repayment moratoria, zero interest funding for lending to MSME and window guidance to steer lending to the hard hit sector. The monetary survey statistics show that M1 increased moderately by 15% in 2020, and M2 was growing between 8-10% during 2020, much faster than GDP, continuing the previous trend.

As credit quality deteriorated banks recorded higher NPLs and credit provisions, growing by 18% and 34% respectively in 2020. Banks were also hit by local government financing debt which reached 25% of GDP in 2020. Local governments were asked to implement many of the support measures. While the central government borrowing was kept under control, total government borrowing increased from 6.3% of GDP in 2019 to 11.9% in 2020. The IMF calculated augmented fiscal borrowing increased from 12.6% of GDP in 2019 to 18.2% in 2020.

While it is true that China's stimulus during the pandemic was less than in AE it was not negligible either. It contributed to the increase in the financial risk in the Chinese economy as outlined by Guo Shuqing in his speech to the 2021 Lujiazui Forum. In particular he stated the following concerns:

3.1. End of debt moratoria for MSME will increase NPLs
3.2. Leverage of shadow banks
3.3. Illegal security issues carrying government risk
3.4. Spillover from derivatives risks
3.5. Ponzi schemes disguised as FinTech products

In his speech he also singled out the increase of money supply in AE during the crisis as a power source for global inflation. While it is true that inflation is a monetary phenomenon following Milton Friedman, it is not evident why this would affect China particularly strongly.

China with its capital controls in place can isolate itself from a direct spillover which works as transmission in open economies. Due to its excellent export performance in 2020 China achieved a current account surplus of USD 274bn. This is largely due to the monetary and fiscal packages adopted in AE and EME which sustained demand for Chinese exports. This would lead to an appreciation of the currency in a normal country and was also allowed to work in China where RMB appreciated by close to 10%. This would induce capital inflows which in turn increase the money supply and subsequently cause inflationary pressure.

According to available statistics from the PBOC this did not occur in China as foreign exchange reserves in RMB did not increase during 2020, and M0 declined somewhat. The current account surplus was offset by an outflow of USD 106bn on the financial account and 160bn in errors and omission. The financial account result was reached by portfolio inflows of USD 254bn, outflows of USD 167bn and other investment of USD 314bn.

Checking also the global liquidity indicator published by the BIS this increased moderately in 2020 thus not suggesting a global spillover of the increased money supply in AE. The massive increase in fiscal packages in the AE led to greater issue of government securities, notably US treasuries which caused higher yield in the bond market and a weakening of the USD, the mirror image of the RMB appreciation.

How far the rise in commodity prices in 2021 can be ascribed to the monetary and fiscal stimulation in AE is a mute point as these prices are normally affect by demand and supply expectations. As worldwide demand was weak, the only other explanatory factors are future markets, expectations and transport bottlenecks.

4. Conclusion

While China embarked on a different cycle from AE and EME thanks to its determined response to the pandemic, its early normalisation and return to growth, it will face second round effects. The favourable performance was due to excellent response of Chinese authorities but also due to support measures in AE and EME. China could not have done it alone without the global economy functioning adequately. Looking forward, the uncertainty caused by the pandemic has not been lifted and various economic scenarios have been linked to how quickly the pandemic can be controlled. The BIS runs two alternative scenarios. The first one assumes a quick return to normal

conditions under the heading ‘higher inflation and tightening of financial conditions’ and the second one based on a prolonged pandemic with mutations of the virus called ‘recovery stalls and business insolvencies rise’. Both these scenarios will have a stronger impact on the Chinese economy as second round effects.

Literature used

BIS (2021): Covid and beyond. In: 91st BIS Annual Report, June www.bis.org/publications
BIS (2021): Global liquidity indicator www.bis.org/statistics
FSB (2021): Covid-19 support measures: extending, amending and ending www.fsb.org
Guo Shuqing (2021l): Speech at the 2021 Lujiazui Forum www.cbirc.gov.cn
IMF (2021): PRChina 2020 Article IV consultation. In Country Reports 21/6 www.imf.org

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Be Mindful of the Risks*

By WANG JINBING*

The outbreak of the novel coronavirus in 2020 took a heavy toll on the world economy, as evidenced by the dismal global GDP figures. According to the International Monetary Fund Policy Tracker, 187 economies have adopted macro policies to address the pandemic-induced recession. However, the output gaps created by the pandemic are different from those caused by the subprime mortgage crisis in 2008-09, not least in terms of severity.

According to the IMF's World Economic Outlook in October 2020, the output gaps of the G7 countries, other developed economies and the eurozone were 5.80, 4.94 and 2.84 percentage points respectively in 2009, and 3.57, 3.80 and 5.08 percentage points respectively in 2020. Except for the eurozone, the G7 countries and other developed economies in 2020 had much narrower gaps than in 2009.

In addition, the gaps are narrowing at diverging speeds. It took a long time for the output gaps caused by the 2009 financial crisis to regain lost territory. It was not until 2018 that the output gaps of the G7, other developed economies, and eurozone turned positive at 0.20, 0.24 and 0.18 percentage points respectively. In other words, it took nearly 10 years for the developed economies to return to their potential output, from the deep recession in 2009 to the slight positive gap in 2018.

According the IMF forecast, the G7 countries and the eurozone will reverse the pandemic-induced recession and reach potential output in 2024 or 2025, which is about half the time compared with the previous recession.

Due to its aggressive fiscal and monetary policies, the United States may outpace other developed economies in bridging the output gap, and it may realize its potential output faster than predicted by the IMF given US President Joe Biden's huge infrastructure investment plan. Pressing down hard on the gas pedal and bent on achieving its goals, the policies of the US Treasury Department and the Federal Reserve in response to the "high-pressure economics" will likely make the US output gap shrink even faster than anticipated.

The output gap of the eurozone as a whole rose to 5.08 percentage points in 2020 due to relapses in the pandemic situation and the lack of a unified fiscal policy. Although Germany's gap stood at 3.46 percentage points, the output gaps of France and Italy rose to 5.64 and 5.41 percentage points respectively and have narrowed only slightly so far in 2021.The eurozone output gap is narrowing at a slower pace and on a smaller scale than that of the United States, although it has adopted zero or even negative interest rates and the European Central Bank has made large-scale purchases of securities, which has boosted financing availability.

The US Dollar Index should be anything but weak in 2021, as component economies represented by the euro, Japanese yen, British pound and Canadian dollar are seeing their output gaps closing less than that of the US. The index is expressed in relative terms, so the fact that the US dollar is strong relative to the euro and yen doesn't mean it is strong by itself.

According to the recent IMF WEO, the pandemic will cause less output losses in advanced economies than in emerging markets, developing and low-income economies in the medium term

*The author contributed this article to China Watch, a think tank powered by China Daily. The views do not necessarily reflect those of China Daily.

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(four years), compared with the pre-pandemic forecast. This also indicates that developing and low-income economies as a whole are slower than developed economies in closing the gap.

In the non-financial sector, for buffering the impact of the pandemic, all economies have a smaller credit-to-GDP gap (the gap between the credit-to-GDP ratio and its long-term trend) or a wider positive gap, which shows that credit has increased relative to GDP. Considering the debt levels and narrowing output gaps of different economies, we conclude that economies across the world will diverge in terms of economic cycles during the post-pandemic recovery-there will be divergences among developed economies, among emerging economies, and between developed economies and some emerging economies. Against the backdrop of financial globalization, more foreign-currency denominated debts will lead to higher currency mismatch risks exacerbated by divergent economic cycles and cause disorderly cross-border capital flows, which may lead to exchange rate overshooting or even potential currency crises. Obviously, there are potential systemic risks, in particular, for economies with current account deficits and large foreign debts.

The US has adopted aggressive macro policies to close its output gap quickly, relying on its dominance in the international monetary system dominated by the US dollar. Increased US imports have boosted the aggregate demand of the global economy, which is a positive spillover, but emerging economies should be more mindful of the external debt risks caused by rising interest rates on the heels of the narrowing US output gap and exchange rate fluctuations triggered by cross-border capital flows.

It is thus an immediate concern for emerging economies to prevent and defuse the negative spillover effects of US macro policies and financial markets. The basic approach is to step up macro-prudential regulation and address as soon as possible debt problems that may pose potential systemic risks, while ensuring that macro-prudential regulation does not undermine funds availability for the real economy and a sustainable recovery.

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Central European Outliers Stick to Inflation Targeting*

By MIROSLAV SINGER*

By the end of the month, two central European nations, Czechia and Hungary, may tighten monetary policy. In many senses, their clearly communicated intentions contrast with those of major global monetary policy authorities, like the European Central Bank.

However, both the Czech National Bank and Magyar Nemzeti Bank's plans reflect an economic reality of a post-Covid world facing more pronounced inflationary pressures. They also reflect the monetarily conservative cultures of these central banks. In addition, both feel pressure from their constituencies to emphasise their anti-inflationary credentials.

The common understanding between the political leaders of both countries, Andrej Babiš in Prague and Viktor Orban in Budapest, is often pointed to by many commentators. Both prime ministers certainly do share some values, stemming from similarities between their core political constituencies. However, the closeness of the probable direction of monetary policy in both countries also comes from the similar financial backgrounds of Czechia and Hungary.

The conservative, if not hawkish, central bank plans reflect the culture of these institutions. Of course, that culture, to a large extent, reflects the general feeling of the societies and financial systems which they oversee. Central Europe's financial mentality has been shaped by its shared history under conservative Austro-Hungarian values. These are similar to German financial traditions which value saving over investing, with conservative retail banking preferred over investment banking.

One could have judged Hungary's financial traditions as more adventurous than Czechia's before the end of the previous decade. However, that decade concluded with a sobering reminder of financial limits brought about by the foreign exchange loan crisis, which pushed the country towards tightening and more cautious habits.

More fundamentally, a majority of households in both countries, as well as in the most other countries of central Europe, hold more assets than liabilities. This explains why most people are less accepting of economic policies that favour debt over savings. A similar savings structure helps explain why citizens of some nations, notably Germany, find quantitative easing policies hard to bear, especially compared to the more indebted and future cash-flow dependent households of the Anglosphere.

Still, differences between Czechia and Hungary exist. The hawkishness of the MNB has been prompted by its experience with the last decade's financial and exchange rate crises. In contrast, the last exchange rate crisis in Czechia took place almost a quarter of century ago, in 1997. Compared with exchange rate developments in other countries, the 5% average annual drop of the koruna hardly represents the cataclysmic disaster most Czechs consider it to be.

The MNB and CNB now stand out from the rest of the central banking world with their commitment to inflation targeting, prioritising price stability over other considerations. Despite the different causes of their position, both central banks are openly communicating similar intentions. By the end of June, we are likely to see their words translated into action.

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*This article first appeared in OMFIF Commentary on June 17, 2021.
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IMI International Monetary Review

South Africa Unearths Hidden Strengths during Pandemic*

By NATALIA OSPINA*

This October, OMFIF and Absa launch the fifth edition of the Absa Africa Financial Markets Index, the region's financial market development benchmark. South Africa, the index's top scorer, is steering through the Covid-19 crisis better than initially expected. Its fiscal deficit is lower than was predicted at the beginning of the pandemic, and the country is projected to experience a more robust recovery in 2021.

At a meeting hosted by OMFIF in May, a prominent representative from the central banking community said, 'The Covid shock that hit the South African economy found an economy that was already in a recession,' having undergone a meagre growth of 0.15% of gross domestic product in 2019, down from 0.79% the year before.

The South African Reserve Bank responded to Covid-19 through a range of conventional monetary policy instruments. The policy rate was reduced progressively during the pandemic, and has remained at 3.5% since July of last year. SARB provided liquidity to the money market by extending its repurchasing facilities. The monetary authority announced a temporary relief on capital requirements and reduced the liquidity coverage ratio. To incentivise the flow of credit by banks, SARB issued guidance to provide debt relief to borrowers. With the Treasury, a loan guarantee scheme was introduced to provide government-guaranteed loans to businesses. And to ease liquidity strains in the bond market, the central bank purchased government bonds worth around Zar32.6bn.

The government deployed several fiscal policies to counteract the economic effects of the pandemic. These ranged from funds to assist the unemployed and small- to medium-sized enterprises, to tax subsidies for low-income households and increased budget allocations for public work programmes and the health system.

This response led the Treasury to initially forecast a budget deficit of 14.7% of GDP for the 2020-21 fiscal year. However, the shortfall reported in March 2021 was 11.2% of GDP, around 350 basis points lower than initially estimated. 'What that meant was that the vulnerability of the South African economy was reduced,' affirmed one monetary policy expert.

As the rollout of vaccines began in advanced economies, confidence returned to the global economy. With reviewed outlooks for economic growth, commodity prices began to recover. South Africa's commodity price exports outperformed imports, resulting in positive trade shocks and enabling South Africa to record its largest current account surplus in over 30 years. This was due to the government spending Zar16.2bn less than expected and the fact that, for the first time in five years, the Treasury was able to raise more revenue than estimated. In the words of a member of the central banking community, 'You're seeing credibility returning to fiscal management'.

SARB reviewed its growth outlook at the end of May. The central bank expects a 4.2% GDP growth in 2021, up from the 3.8% it had previously estimated. 'The stronger growth forecast for 2021 reflects better sectoral growth performances and more robust terms of trade in the first quarter of this year', explained Lesetja Kganyago, SARB's governor.

South Africa's stock market has also shown an above-average performance. The FTSE/Johannesburg Stock Exchange All-Share Index, which represents 99% of the full market

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capital value of all ordinary securities listed in the JSE, has increased 28% since the end of October 2020.

After a sharp depreciation during the early months of the pandemic, the rand has appreciated by 11.4% against the dollar since the beginning of March. 'The currency recovered all the losses it had experienced during last year,' stated one monetary policy expert.

Consumer price inflation hit a 14-month high in April, jumping to 4.4%, the highest inflation rate since February of last year. Despite this, at the SARB's meeting in May, the vote was unanimous in maintaining the accommodative monetary policy and keeping the repo rate at the all-time low of 3.5% for the fifth consecutive meeting. The inflation forecast to 2023 reveals that SARB estimates it will remain within its 3% to 6% target and is likely to meet the 4.5% midpoint.

According to one central bank member, 'The key risks of inflation are basically the oil price and international food prices, it's not domestic […] Although the economy will be growing at 4.2% there is still significant lag in this economy, there is still a significant negative output gap.' Domestically, much uncertainty remains around how much of the potential economic growth was eroded due to the pandemic. In the past, unit labour costs have also been an internal risk to inflation. In the opinion of one monetary policy expert, 'The current wage demand is trying to take off from what we had before the shock.' If this materialises and leads to wage growth, it could bolster inflation in South Africa again.

South Africa has undoubtedly discovered some hidden strengths during the pandemic. However, economic recovery is still vulnerable. OMFIF's Absa Africa Financial Markets Index will analyse these and other developments that have taken place during the past year in the financial markets of South Africa and 22 other countries from the region.

IMI International Monetary Review

How Are Central Banks Helping to Make the Recovery from the Covid-19 Pandemic More Sustainable and Inclusive?*

By LUIZ AWAZU PEREIRA DA SILVA*

Without the timely, coordinated, countercyclical and massive policy response to the Covid-19 pandemic by fiscal and monetary authorities around the globe, the downturn could have been much worse. On top of their own unprecedented monetary policy response, central banks are facilitating a sustainable and inclusive recovery in many ways. First, by raising awareness that climate-change related risks are a significant threat to global financial stability. Second, by showing that collective coordinated action, changes in supply and demand behaviour, and other public policies including adequate carbon pricing are required. Third, by fostering policies that ensure low financing costs of mitigation and transition and providing guidance that this will be maintained for an appropriately long horizon. Fourth, by developing analytical tools as public goods to improve the measurement, assessment and mitigation of such risks (such as new risk models, climate stress testing, climate scenarios, disclosure of carbon exposures and analysis of the redistributive impact of climate policies). And fifth, by engaging with the financial private sector to develop new financial instruments to accelerate adaptation and transition towards a net zero goal, which is increasingly endorsed by many countries.

For a long time, we believed that there was an infinite supply of natural resources and that their use entailed little to no cost. The consumption of air, water, forests and natural capital in general had very few restrictions and, amid those restrictions, technology would make it possible to use natural resources ad infinitum. Scepticism about "limits to growth" started in the 1970s with concerns about energy consumption from fossil fuels, and by the late 1980s, repeated warnings by climate scientists led to the creation of the Intergovernmental Panel on Climate Change (IPCC), which was established with the support of the UN Environment Programme and the World Meteorological Organization. The link between global warming and human activity – in particular through the emission of greenhouse gases (GHG) – continued to be analysed and gained traction thanks to further research by prominent social scientists. By the end of the 1990s and 2000s, the cumulative growing evidence about GHG effects had changed social awareness of the risks related to climate change, the sustainability of the way we produce and consume, and the need for transitional solutions to a less risky, carbon-based economy, for all. Finally, this evolution of mindsets received further support, especially after the Global Financial Crisis, amongst the central banking community.

The reasons for central banks to become involved with climate change had to overcome two extreme viewpoints. On the one hand, by limiting its involvement a central bank was simply respecting its strict explicit mandate and preserving its independence. On the other hand, central banks were summoned to involve themselves even with no explicit mandate since they would be acting on a greater-than-the- Global Financial Crisis "emergency". De facto, many central banks have since pragmatically been addressing many climate issues interpreted within their mandates,

*Based on remarks by Mr Luiz Awazu Pereira da Silva at the People's Bank of China / International Monetary Fund High Level Online Seminar on Green Finance and Climate Policy, 15 April 2021.

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while also recognising that there is no silver bullet against global warming and that they alone cannot mitigate all climate change-related risks.

Indeed, the impact of climate change directly undermines the objectives of most central bank mandates. Financial stability is potentially threatened by severe weather events, with massive losses of capital related to physical and transitional climate change-related risks. Moreover, price and macroeconomic stability are affected by climate change-related shocks and uncertainty, including food prices, shortages, mass migration, savings, lower employment and financial crises. Finally, and more importantly, central banks need to take into account rapid changes taking place in the real economy and financial sector. Both are moving faster than the official sector: demand is increasing among investors and consumers for greater commitments to sustainability, transparency and consistency; and the supply of green portfolios is growing, coupled with an evolving taxonomy, a higher volume of green financial assets, and an increased appetite to hold and manage them.

"The green swan" contribution to the debate: it is about risk!

The publication 'The green swan: central banking and financial stability in the age of climate change' tried to move the climate change debate in the financial sector from an ethical to a risk-based discussion. The metaphor was inspired by Nassim Nicholas Taleb's black swans during the Global Financial Crisis – they represented the exceptional and rare nature of a sequence of financial meltdowns that nevertheless created a global financial crisis. A green swan also represents an event, but one that is bound to happen because it is the result of climate change and is therefore, according to today's science, a quasi-certainty. When and in what form the event will take place are unknown. However, in recent years we have seen numerous, glaringly obvious manifestations of these growing risks, including those related to natural weather catastrophes. In addition, cases of zoonosis – which can spark pandemics such as the one our world is currently witnessing – are also the result of the destruction of animals' natural habitat and the loss of biodiversity. The Covid-19 pandemic, which has paralysed the global economy over the last year, servesas a useful illustration of how expected events related to climate change, albeit unfolding at a very slow pace, can materialise suddenly and accelerate dramatically.

The messages in The green swan come directly from today's best science. First, climate change calls for an epistemological rupture in risk models, breaking away from: (i) Gaussian distributions of risk (with fat tails or not); (ii) the linearity of transmissions of climate change-related risks; and (iii) the convenient extrapolation of the consequences of these events using historical data. Second, the best science warns us of: (i) the quasi-certainty of the occurrence of climate change-related catastrophic material and human losses; and (ii) the crossing for our societies of irreversible tipping points if we emit GHGs beyond the 420 billion tonne threshold of CO2 equivalents. Indeed, the latest IPCC reports calculate that this emission budget is the maximum limit (at the 66% confidence level) for average temperatures on the planet to grow by less than 1.5°C. In a nutshell, The green swan alerted us to the reality that, given these risks, the "wait-and-see" attitude behind our benign neglect is itself very risky.

The green swan highlights that the risk of waiting too long is not worth taking, and that we need to act even in spite of radical uncertainty because climate change-related risks are asymmetrical. That is, we are faced with the quasi-certainty of incurring huge future losses versus paying a small mitigation cost today. Therefore, it is better to prevent risks, to insure against future losses and to build buffers now even in the absence of supportive optimal carbon pricing, better models than our integrated assessment models (IAMs), other models in a general equilibrium framework or even an ideal understanding of all the ramifications of climate change. We also need to act by moving towards financing the transition to a less carbonised economy and thinking about its

complex coordination issues. There is no entity within society that can perform this transition by itself, no matter its influence – be it central banks, governments, global banks or private firms. We must work together for the common good – all hands on deck.

How central banks are and should continue contributing: providing public goods on climate change-related risks, and fostering global and local coordination

Beyond promoting awareness and building consensus, central banks are providing guiding frameworks for the public and private financial sector and civil society. The Network for Greening the Financial System (NGFS), which regroups the community of central banks and supervisors, has been instrumental in offering such public goods. In addition, public interventions by central bank Governors have been explicit about the importance of climate change for central banks in both advanced and emerging economies.

The central banking community is addressing climate change in five key ways. First, they are continuing to improve analytical tools to assess climate change-related risks and test the resilience of our financial sectors, in particular developing new macro models – beyond IAMs or DSGEs – as well as new risk metrics, climate-related stress tests, and scenarios for 1.5°C with sustainable growth for the real economy and financial sector.

Second, central banks are continuing to discuss the scope and role of macroprudential tools and monetary policies, including those for collateral and asset purchase programmes. The Basel Committee, for example, has a task force on climate-related financial risks. These are not trivial issues, and the discussion has to weigh the pros and cons of introducing some form of shadow asset pricing while we still have not been capable of introducing an adequate global real carbon price.

Third, central banks are working on policies for disclosure and accounting standards, together with the Financial Stability Board and its Task Force on Climate-related Financial Disclosures (TCFD), and the International Financial Reporting Standards (IFRS) consultation on sustainability reporting.

Fourth, the central banking community is working to make the taxonomy on green investment products for investors and civil society more consistent, with an emphasis on such things as comparable environmental, social and corporate governance (ESG) criteria and green bond standards.

And finally, the central banking community is seeking a greening of its own assets, such as reserves and pension funds, while offering investment options for investors that favour green finance.

But it doesn't end there. The central banking community is also working to strengthen coordination between local and global agents to avoid free riding and problems arising from collective action, while favouring greater cooperation and helping to find a reasonable balance of burden-sharing for mitigation and adaptation policies. Central banks realise that climate change actions require a significant amount of coordination, especially in the light of governments' commitment to a net zero emissions approach. It requires the involvement of governments, treasuries and fiscal policy to address Pigovian carbon taxes, trading and pricing emissions. It requires international institutions and development banks to help leverage the financing costs of transition and mitigation. Lastly, but equally important, it requires real sector firms, banks, insurance companies, regulators, standard-setters and ratings agencies to ensure consistency with the commitments established.

While recognising the dramatic cost Covid-19 has had on human societies and the global economy, one collateral effect is that the pandemic may have triggered a behavioural change. It showed, overwhelmingly, the evidence of the huge costs of green swans and, amid the pain and

suffering, helped relay to societies, policymakers and the private sector the asymmetric risk-return that global warming entails, and the need for immediate action.

The "first-best" solution of combating climate change faces redistributive challenges

Acting now comes with a warning: there are distributional consequences of climate change policies and for the transition to be successful, the political economy must be considered. The risks and impact of global warming disproportionately affect poor countries and poor households in rich countries. The global and local short-term social effects of mitigation policies might be regressive on impact before the medium- to long-term welfare benefits materialise. Therefore, there is an urgent need to think about and design such policies keeping in mind compensation and transfers, as these are important elements to build support and fairness. This is not specifically a central bank role, but this concern can be present in the overall coordination process with fiscal authorities.

To change relative prices in our economies to favour less carbon-based production and consumption, the textbook solution is to fix a price and internalise the negative externality arising from the emission of GHGs. A carbon price via tax or an emission right is needed, but we now know that it not only presents technical difficulties – such as its transmission to the whole economy – but has a redistributive and therefore also a political impact, particularly because of the diversity of social groups potentially subject to this tax and their uneven capacity to absorb its costs. Any transition to a new carbon regime in a new society has a redistributive impact. In theory, changes happen seamlessly, free of adjustment cost and pain, and entail an instant reallocation of resources to different entities and sectors that emit less carbon. But there is de facto a transition cost with highly significant redistributive consequences. These effects must not be overlooked by economic policymakers as they can exacerbate the inequalities within our societies. If we were to implement good climate policies that could increase inequality and social fragility without considering compensation mechanisms, we could inadvertently trigger a backlash. That applies at both the national and international level. For example, the capacity to finance the transition to a lower carbon economy in India, Brazil or Indonesia is not the same as in Norway, Switzerland or France. That means while working on fixing a suitable price for carbon, we must also look at alternatives and use other complementary instruments, which are also required for this transition. That naturally raises the question of financing the transition and, subsequently, the role of finance. It is vital to know how to finance a transition to make it more likely that it will entail, not as many people fear, an economic contraction, but rather an expansion. It's not a minor issue.

Last but not least, while these are mostly issues for fiscal authorities, central banks are increasingly aware of how inequality can influence the effectiveness of their policies. For example, the issues of transmission across different groups and, implicitly, inequality have featured more prominently in major central banks' current reviews of monetary policy. In practical terms, some central banks are extending their description of the monetary transmission channel to heterogeneous agents and thus are considering the role played by inequality.

Central banks can enhance the positive role of the financial system in the transition

For a start, it is vital to make the financial system more resilient in the face of the increasingly massive potential costs of accidents caused by extreme natural catastrophes (storms, hurricanes, forest fires etc). We need to reflect on the capital and other buffers that need to be put in place to face these climate shocks, so as to avoid a new global financial crisis. The central bank community is aware of this, and the pandemic has actually proved that the consolidation work undertaken after the Global Financial Crisis added resilience to the financial sector.

Then, we need to look at how to finance the numerous good ideas that are emerging from many quarters. Obviously, supporting innovation in new technologies (clean energy and climate-related

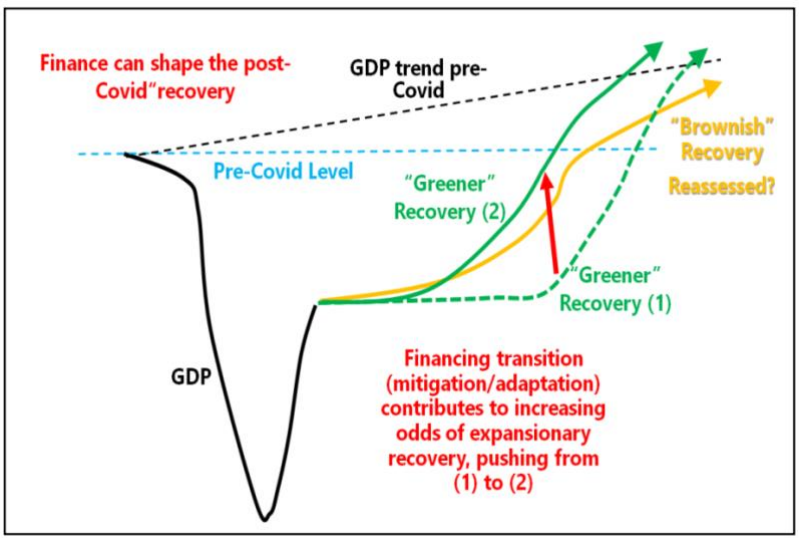
R&D) is paramount, as is acting and investing in green infrastructure that uses better standards and lower-carbon production processes.

Therefore, we need to develop new financial instruments to help us channel savings and invest them into these new fields and help alter investor behaviour. Green finance is, in general, the route the financial sector is thinking of taking in this transition. This sector is looking at new green instruments because it makes business sense as the demand is there. But the financial system's creativity is also responding to a reputational risk. Some governments, companies and portfolio managers are aware of a behavioural change among consumers and investors, for example in Norway with the sovereign wealth fund, or BlackRock or Amundi. There is a growing willingness on the part of the entire financial sector to improve the clarity and taxonomy of these new instruments and central banks and regulators are helping to incentivise this process. How exactly can we improve the definition of a green bond? How can we better illustrate and bring together the various concepts behind ESG criteria in a given financial instrument? What are the implications of the risks and returns of investing in such a product? These new demands can improve investor behaviour and the way in which certain financial institutions present these products to finance a transition. When we put all this together, we are assembling the various pieces of what could later be a consistent new macroeconomic policy for addressing climate change.

Conclusions: never "waste a crisis". Use the Covid-19 crisis as an opportunity to aim at sustainable and more inclusive recovery

Central banks have been acting in significantly to mitigate the pandemic's devastating effects. They have also coordinated with other actors, as mentioned above. They have been contributing to promote new ideas for green finance. Why is this transition so critical, and why is it important to find the means to finance it? My short answer is because it will increase the likelihood of an expansionist outcome that, in turn, will help overcome the political economy and redistributive challenges alluded to earlier. Chart 1 shows a hypothetical example of the opportunities the Covid-19 crisis can offer.

Chart 1: Post-Covid recovery: the role of green finance

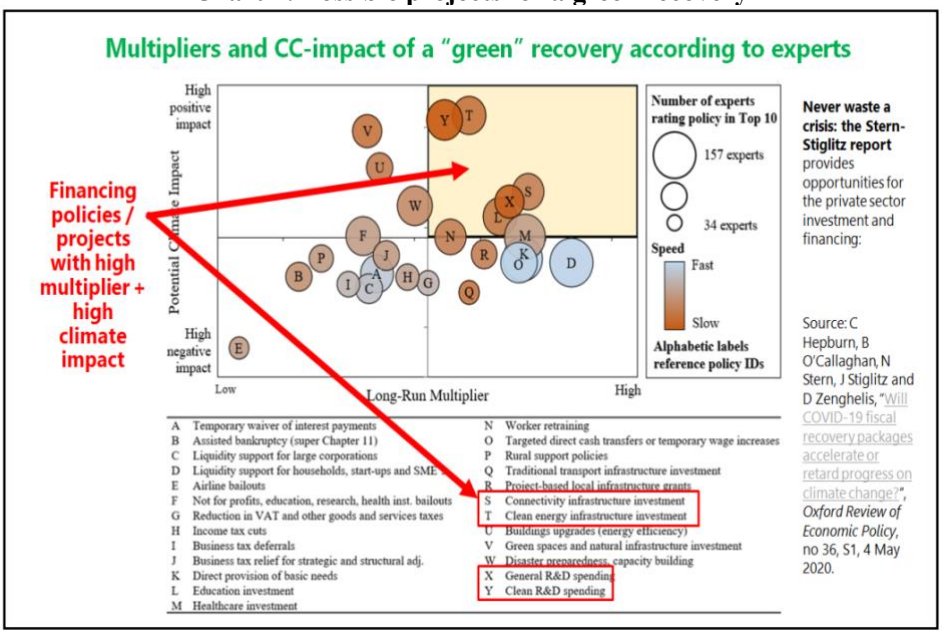


As we already know, the Covid-19 pandemic made global GDP growth (solid black line in the stylised Chart 1) fall dramatically. In an uneven way in many countries, we are beginning to witness a V- shaped recovery, or rather a "square root", as activity levels have yet to return to pre-Covid levels. What type of recovery can we expect from now? Could it combine a rebound in activity, job creation and a greener economy?

At first glance, this crisis is so severe that it would be better not to set extra goals and instead accept a more "brown" recovery, with an upturn based on the traditional instruments and technologies that stimulate employment and economic activity. A recovery powered in part by green investment is represented by the green dotted line: it would be slower as it would take longer to mobilise the technologies that are slightly more expensive. This chart, admittedly rudimentary and simplistic and which is not a forecast, illustrates how more green finance (with debt and equity) in the transition with more green technologies can hasten the availability and impact of new technological solutions. Green financing instruments for investment in innovation and more risk-taking may offer the possibility to increase the pace of the recovery, substitute our existing capital stock faster, incentivise shifts in consumption and push it higher, to that solid green line, which would enable a recovery trajectory that would be quicker over the medium term than the traditional recovery fuelled by the type of consumption and production we had pre-Covid. The challenge is to use the current crisis as an opportunity to accelerate the transformation of our societies using new instruments to finance innovation, a kind of Schumpeterian creative destruction. And indeed, in 2021 this is being implemented in the United States and Europe, with bold action being taken aiming at both sustainability and more inclusion.

Is that path totally unrealistic? No, it isn't. If we move from a macroeconomic to a project perspective, a study by Nick Stern and Joseph Stiglitz compares the different public policy measures that can be implemented to boost a recovery, for example research, infrastructure investments etc. Chart 2 shows the growth activity multipliers on the horizontal axis to the right, and the impact of the reduction in negative climatic effects on the vertical axis.

Chart 2: Possible projects for a green recovery



Different economic policy measures and eligible projects are points on this diagram, and we ideally would like these measures to be in the upper-right quadrant, where the projects have a strong impact on activity (high budgetary multiplier) and a strong mitigating impact on climate risk. The study provides at least four good examples of that: greener infrastructure, the search for alternative energies, research and development led by the private sector but also by the public sector, and connectivity and virtual infrastructure.

That means there are projects for relaunching the economy and, at the same time, carefully choosing the effects of this relaunch from the perspective of a transition and fighting climate change. Therefore, having the debt and equity financing for these projects is key since most of these new endeavours will represent a higher risk. The private financial sector has a role to play, but green R&D innovation will also require a longer-term return horizon that the public sector can provide and the coordination of all these actions. This coordination must include governments, regulators, international organisations and central banks. It is indispensable, not only on the supply side, ie technology, including financial technology, but also on the demand side, meaning the behaviour of each one of us. What will each of us consume and how will we receive price signals and information that will enable us to adjust our consumption to the low-carbon option?

The Covid-19 pandemic has produced the unprecedented contraction that we long feared with the consequences of physical and transition risks related to climate change. So what is the lesson? It's simple: never waste a crisis. The macroeconomic conditions are favourable. For example, interest rates are low at the moment, savings are higher in many rich countries, demand and awareness is increasing for green products, and there is growing ambition in the United States, European Union, China etc. There are also a number of projects, such as those involving green infrastructure, greener cities, carbon footprint tracing, new technologies and new ways to act using social networks. On the demand side, consumer information and incentives favour a lower-carbon economy and are increasingly aligned. For example, public awareness has risen to allow progress on carbon pricing, GHG emission taxation and emission certificates etc. On the supply side, green finance investors are asking for practical diversification for their portfolios and more projects to lower carbon content and finance the transition. There is more green research and R&D, and new technologies emerging, such as carbon capture.

Conditions seem to be emerging for an expansionary, green and more inclusive recovery, and central banks have played an important role in shaping them. Today, due to the Covid-19 crisis, the urgency is to finance an expansionary, sustainable and inclusive transition, find the good instruments and the best interlocutors, and coordinate and act in a way that actually reverses and stops the current trend of CO2 emissions. However, as a final point, we also have to change the way we think and we measure our performances. If natural capital is not free, we must innovate and change, from our national accounts to our models, and analyse the effects of climate on our economies. How can we measure the utilisation and depreciation of natural resources? How could we also value our activity with other metrics beyond market prices? How can we better understand the risk in our models connecting the macroeconomy with the climate in measuring happiness and our wealth? We need to use our time well, because time is not on our side. The pandemic has served as a glaring warning that we don't have eternity before us, that we really are living on borrowed time, and that we need to act decisively to put in place measures that can mitigate the catastrophic risks of global warming.

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China

Accommodating China Is Unavoidable*

By ANDREW SHENG AND XIAO GENG*

"Absolute national security" might have been a reasonable goal for the US when the country stood at the helm of a unipolar world order. But in today's world, attempting to "contain and confront" those with different values or systems, rather than negotiating a new global compact that accommodates them, is a recipe for conflict.

In their latest communiqué, NATO leaders declared that China presents "systemic challenges to the rules-based international order." The response from China's mission to the European Union was clear: "We will not present a 'systemic challenge' to anyone, but if someone wants to pose a 'systemic challenge' to us, we will not remain indifferent." Such a tit-for-tat rhetoric is unnecessary, and most of the world's population probably does not want it to escalate. Yet escalation is becoming more likely every day.

That is largely because China is one of the few policy areas where US President Joe Biden has largely upheld the approach of his predecessor, Donald Trump: compete fiercely, cooperate when needed, and confront when necessary. So, as China's response to the NATO communiqué implies, it has adopted its own three-pronged response: don't look for a fight, don't be afraid to fight, and fight when necessary.

NATO is hardly the only forum where Biden is pushing the US approach. At the recent G7 summit and during his meeting with EU leaders, Biden also sought to convince America's allies to form a united front against China (and Russia).

US Senator Bernie Sanders sees the problem. He recently warned that, by casting China as an existential threat, the US political establishment is effectively "beating the drums" for a new cold war, which will have no winner. As he put it, organizing US foreign policy around a "zero-sum global confrontation with China" would be "politically dangerous and strategically counterproductive."

America's flawed approach to China is rooted in an enduring belief in the concept of absolute national security. But, while this might have been a reasonable goal for the United States in the decades after World War II, when the country stood at the helm of a unipolar world order, it is not realistic in today's multipolar system.

In today's world, attempting to "contain and confront" those with different values or systems, rather than negotiating a new global compact that accommodates them, is a recipe

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for conflict. It certainly impedes the ability to pursue mutually beneficial economic engagement and cooperation on shared challenges like climate change. As a spokesperson for the Chinese embassy in London noted after the G7 summit, "The days when global decisions were dictated by a small group of countries are long gone."

But the problem runs deeper: even within this "small group of countries," decisions like courting conflict with China do not necessarily reflect the will of the majority. As Joseph E. Stiglitz has argued, the US today looks more like a plutocracy – with the top 1% of income earners able to steer most public policy in their favor – than a representative democracy.

If the top 1% in a country that accounts for 5% of the world's population pushes the two largest economies into conflict, the entire world will suffer immensely, with the vast majority of people getting no say in the matter. If the US and its Western allies genuinely believe in democracy, they should find this unacceptable.

A better approach – and one that reflects the values Western liberal democracies claim to hold dear – would account for the interests of "One Earth," encompassing all of humanity and the planet on which we depend. That means expanding our perspective beyond national security to pursue global security – the greatest good for the greatest number – and ensuring that every human being has a say in determining our collective future.

We are not arguing for global government. The natural and social sciences have shown the fragility of monoculture. In human civilization, as in nature, diversity brings stability and progress. Even competition can be a good thing, but only if it is balanced by effective cooperation, and violence, against humans or the environment, is eschewed.

So, how would a One Earth system be realized? Bottom-up feedback mechanisms, enabled by technology, will be crucial. The objective must be to break the silos that global elites, aided by abstruse language, have traditionally created. This would enable more people – with expertise in more areas – to contribute to discussions.

The benefits of such an approach are thrown into relief by the tension between traditional economic thinking – focused on ever-more consumption, investment, and growth – and environmental imperatives, like reducing greenhouse-gas emissions and protecting biodiversity. In a One Earth system, more of a "good thing" can often be very bad.

The obsolete, siloed approach is also reflected in the facile narrative that the US and China are locked in a "clash of civilizations." Empires clash. Civilizations should be "civil" to one another, not least because we are all sharing the same Earth.

To that end, leaders must move beyond a narrow focus on national security to broad, inclusive discussions about how to deliver global security, in the form of peace, stability, adequate nutrition, and environmental sustainability. But, first, the US must give up on containing China and start accommodating it.

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Principle Hijacked for Political Profit in Xinjiang Cotton Row*

By LIU JUN*

China and Western countries have recently been trading barbs on several issues, each side citing inviolable principles. One critical issue revolves around the produce of Xinjiang, a major grower of high-quality cotton not only for the domestic market but also for international brands. For the West, this is a human rights issue.

So-called evidence of forced Uygur labour and other human rights abuses have been produced. A group of Western governments including the United States have voiced concerns and even anger towards Beijing. Countries such as the US, Canada and the Netherlands have labeled Chinese policies in Xinjiang genocide, which is a highly explosive accusation.

In light of this, international brands have been urged to stand on the side of principle instead of profit, and boycotts of cotton and related products from Xinjiang have been advocated.

For China, this is about defending the truth.

Beijing has protested strongly against the misinformation and false claims in the Xinjiang cotton dispute. The array of videos and audio files produced can hardly be classified as findings; they only give information from one side. Mere stories cannot be treated as material evidence where there is a dearth of facts that can be verified and validated.

For the powerful Chinese consumer, there is also the principle of national pride. Brands, no matter how popular, that do not behave in line with China's core national interests, or whose China-bashing declarations are not based on fact, can also expect to face a punishing boycott.

There are no grounds to assume that Chinese consumers' actions are unjustified or politically driven, or that their purchasing decisions are manipulated by the government or propaganda. Chinese consumers are quite able to come up with their own judgments and decisions.

So now, there are boycotts in both directions. Foreign boycotts on China driven by the principle of human rights. And Chinese boycotts on foreign entities driven by the principles of truth and national pride.

This is a balanced reciprocity, and it rightly reflects the respective freedoms to choose, based on what each side believes to be right. Yet the Chinese market is one of the biggest magnets for companies worldwide. They see enormous business opportunities in China's industrialisation and urbanisation, and now digitisation. So this tussle leaves many companies in a quandary.

First, how to verify which allegations are true? We need verifiable information -evidence and facts to lead us to the truth. But the Xinjiang cotton case is full of unhelpful misinformation.

Second, how to balance truth and purpose? The purpose of firms is to make a profit. We seek truth to advance civilisation. Truth without truthful solutions is not what human beings pursue. It is all about finding solutions to the obstacles that hinder the improvement of society. Yet in the Xinjiang cotton issue, both sides are unable to agree on the truth, nor can they work towards truthful solutions.

Third, how to distinguish between principle and profit? Principles are about the highest moral standards, and can influence the material world in a powerful way. Unfortunately, politicians and

*This article is first published in South China Morning Post.

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opportunists in the West often distort the concept, using it to serve their political and economic interests. Meanwhile, Chinese consumers are merely voting with their feet, based on market economy principles. For the US in particular, "principle" has become a byword for political profit, which can be coupled with financial profit to achieve supremacy. In this way, the path to upholding a principle is not through reasoning, but through finger-pointing and blame games instead, and the mechanisms and actions to reinforce such principles are not rules-based, but centered on punitive sanctions.

For the international brands stuck between making a financial profit and a government's "political profit", decisions have to be balanced very carefully.

The right way out of the quagmire is to build platforms for communication and negotiation, enabling a conducive exchange of information, evidence and facts, and pushing out as much misinformation as possible. Only this way can a solution be reached.

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China's Global Financial Footprint*

By HERBERT POENISCH*

Most statistical data on China's global financial presence only include residential transactions. China's offshore activities are not taken into account when looking at the country as a global financial player.

China is a global net creditor, as measured by its net international investment position, published by the International Monetary Fund. Taking offshore borrowing into account, China's NIIP would be halved to only $1.1tn. Hong Kong has played an important role in financing China's development (inflows) as well as Chinese contributions to global development (outflows). In the past few years, financing in other offshore centres such as the Caribbean has reached magnitudes which could change the picture of Chinese activities markedly.

Chinese banks have increased their global presence by mostly buying up local banks in emerging market economies and increasingly acting like local banks. They have been following the trend from cross-border banking to international banking. While cross-border banking funds have moved from the head office, in the international model, banks finance themselves through local deposits and lending, mostly in domestic currencies. China's cross-border banking activities, which correspond to the balance of payments, have been reported to the Bank for International Settlements' locational banking statistics since 2015.

However, China has not followed calls to disclose its consolidated banking statistics. Long-term reporters include banks in Spain and the UK, which have local currency business abroad of 70% and 50% of total foreign assets, respectively. Reporting to the CBS would give the full picture of global activities of Chinese banks, including their local currency business.

We have some idea of China's global business. There are close to 50 reporting locations disclosing data on banks' business according to nationality, which include Chinese banks. This is a very different picture to the cross-border one. In the cross-border survey at the end of 2020, banks in China had assets of $1.37tn and liabilities of $1.48tn. In the global statistics based on nationality, Chinese banks had assets of $2.47tn and liabilities of $2.27tn – a substantial difference. This figure is probably much higher considering that only 50 financial centres report these data.

Similarly, portfolio statistics are distorted by Chinese entities – non-bank financials and non-financial companies issuing equity and debt securities in offshore markets, usually in foreign currencies and notably the dollar. These data can be captured only by the statistics collected in these offshore centres.

The BIS debt statistics offer a partial picture for Chinese national issuers compared with resident issuers of international bonds. At the end of 2020, the total outstanding Chinese bond debt based on residency amounted to $18.55tn. The total international issues by Chinese nationals was $1.25tn, compared with resident issues of only $230bn. Banks accounted for 29% of the $1.25bn, NBF for 16% and NFC for 52%. Data published in a recent BIS study show that the majority were issued in the Caribbean offshore centres, notably the Cayman Islands and British Virgin Islands.

Unfortunately, similar statistics on holdings of Chinese equity in offshore centres are not available. Partial results can be obtained from the Global Capital Allocation Project bilateral data. They suggest that US investment funds held common equity in 2017 amounting to $154bn only

*This article first appeared in OMFIF Commentary on June 28, 2021.

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in China, but $547bn in the Cayman Islands, where a large chunk has been issued by Chinese NFC entities.

Altogether this suggests that China's activity in international banking, bonds and equity markets is much larger than the cross-border activities captured in the BOP based on resident principle. The offshore activities of Chinese affiliates need to be added. These affiliates can either be directly controlled by the parent company or at arm's length, which would complicate the classification by ownership even further.

In the absence of a Chinese effort to get to grips with their international financial activities, the world needs a coordinated effort to collect more data, like BIS is doing. This would serve both international investors in assessing risk in portfolios and Chinese authorities in keeping track of their global assets and liabilities.

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Working Together with Mutual Respect for a Better and Shared Future*

By YUE XIAOYONG*

The name of this session "The Euro-Mediterranean and China: emerging scenarios" is well made. It perfectly explained the current situation of this Euro-Med region with 70 countries altogether (44 Europe+19 West Asia+7 North Africa countries), which are geographically connected as one while diversified in many ways. No matter how you would like to divide or define this region, it still shared a common aspiration: Jointly striving for a community of shared future with peace, common development and win-win cooperation.

Under the influences of Covid-19 and other unstable factors increasing since last year, huge changes have been taking place. Challenges keep growing for the whole world. Recent conflict between Palestine and Israel is very troubling. Many other hot spots remain unsolved. Protectionism, unilateralism and old power politics persist ondestructing the fruit of national, regional and global efforts. Climate change, energy, infrastructure-upgrading, poverty-lifting, immigration, anti-terrorism, cyber-security and nuclear proliferation all call for stronger cooperative efforts. Fighting pandemic and striving for an economic recovery are daunting tasks for all. International and regional community need to work harder to enhance dialogue and cooperative measures to tackle with those challenges.

It is clear now the test for humanity system and wisdom is not whether we have seen new challenges facing international community after decades of development of globalization and post-cold war changes of world situation. The test is how those challenges shall be handled and tackled in collaborative, fair and just way with rules enshrined in the aim and principles of the UN Charter. We will tackle them by dividing ourselves or by unity, by respecting each other in equality or by ignoring others sovereignty and independence, by power politics of some, one country and a few or by democratization of international relations participated by many and all, by slandering other's achievements to fabricate and spread fear or by exposing dis- or misinformation to bring more mutual understanding, mutual learning and mutual adapting? The right way certainly is the later rather than the former. We in China believe that only by mutual respect among all nations with unity, big or small, strong or weak, will we be able to find way to tide over waves of our common challenges. Not any one country or a small circle of countries are able to solve problems we face globally alone.

The relationship between China and Euro-Mediterranean Region remain sound on the whole. Bilateral and regional cooperation continues to advance, which has a bright future. Confronting new challenges, how to approach to a better relationship between China and Euro-Mediterranean Region, how to tackle with complex problems, strengthen cooperation and seize opportunities together are urgent topics for both sides.

With all those in mind, I would like to further share some of my views about China-Euro-Med relations in four parts.

*This is a keynote speech at the session "The Euro-Mediterranean and China: emerging scenarios" at the webinar of A Strategic Nexus: the Euro-Mediterranean Region and China jointly held by IGCU, CMAS and ToChina Hub with English excerpts.

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I. Relationship between China and Euro-Med region remains promising and bright.

Firstly, the overall prospects of China's relations with European countries, including the northern coast of the Mediterranean, and with countries in West Asia and North Africa are optimistic and positive. One important reason is that China has confidence in itself, its stability, its further open-up reform and development. From all aspects, China will continue to unswervingly follow the path of peaceful development, promote win-win cooperation with European and Mediterranean countries, and jointly create a better future

The spirit of the fifth plenary session of the 19th CPC Central Committee speaks clearly, China's judgment on the general trend of world peace, development and cooperation has not changed; China's goals, tasks and policies for its reform and development remain unchanged; China's commitment to strengthening communication and promoting win-win cooperation with countries in Europe and the Mediterranean region on the basis of mutual respect remain unchanged. This is what China has said and done. Since 2020, China has maintained high-level dialogue and communication with the EU and European countries, actively promoted cooperation regarding to the epidemic and economic recovery, and worked with European countries to overcome difficulties and has made continuous progress.

At the same time, China has also seen the impact of changes in the international situation caused by the adjustment of domestic and foreign policies of various countries since the world economic crisis in 2008 and the Covid-19 pandemic in 2020, especially the changes in the domestic and foreign actions of the United States. While encouraging unilateralism, America-first populism and mass withdrawal, the US also manipulates divisions in the international community, creates cliques and spreads the China threat theory at the same time.The US has resorted to trade protectionism on the grounds of national security, which has brought new uncertainties and destabilizing factors to the international situation and raised new issues. In particular, China opposes interference in other countries' internal affairs on the pretext of human rights, and firmly opposes words and deeds that undermine China's sovereignty, dignity and security.

II. Inspiring stories and achievements regarding China-EuroMed relationship keep coming out. It is a big growth with a huge potential ahead.

(1) China-Europe ties have achieved new results in spite of pandemic shock and economic downturn. China has become the number one trade partner of EU after the 2020. Sino-European Agreement on Geographical Indications has taken effect. Both sides agreed to build up a high-level dialogue mechanism in digital, environment and climate change affairs. Negotiation on CAI concluded on time. In my exchanges with European friends, many of them have realized that enhancing China-Europe cooperation is a much better way to meet challenges.

Facts have been proved that it is natural for countries to have differences. As long as the two sides respect each other's core interests and concerns, it is possible to promote dialogue and cooperation. The China-EU Comprehensive Investment Agreement and the Regional Comprehensive Economic Partnership (RCEP) are good examples. China-EU relations possesses a solid foundation in history. China and the EU are comprehensive strategic cooperative partners with far more common ground than differences. In the economic and trade field, there are more opportunities for cooperation than competition. China and the EU adhere to the principles of peaceful coexistence, open cooperation, multilateralism, as well as principle of dialogue and consultation. Both sides should continue to work together for the world economic recovery, strengthen the policy alignment, jointly combat COVID-19, defend genuine multilateralism and respond to challenges such as climate change, balanced global development and world peace and security. China still believes that as long as the international community countries abide by the charter of the United Nations as the core purposes and principles of international relations on the

basis of the international order and its ideal, and the international community truly committed to the democratization of international relations and equal treatment, mutual respect, properly handle differences and the common efforts of all countries, the international community can find ways to cope with the various challenges facing mankind. China will also take an active part in such efforts. As the recent China-U.S. and international multilateral dialogues on climate change have shown, we believe that other areas of international peace, security, stability and development can also demonstrate healthy engagement, communication and cooperation.

(2) Cooperation mechanism of China and Central and Eastern European Countries (CEEC) is working well with great potential. This mechanism embraces EU, non-EU members, most Balkan and Mediterranean nations. On February 9th, the China-CEEC Summit in Beijing via video link is very successful with 2021 new cooperation plan successfully agreed, serving as a good guidance for future progress. With its focus on real results, China-CEEC cooperation has served the purpose of supporting our respective development and bettering the lives of our peoples. To make our cooperation more balanced, we have pursued both economic cooperation and cultural exchanges, placed equal importance on trade and investment, and made sure that the fruits of cooperation are shared by all countries and communities.

It is also very encouraging to see that trade between China and CEE countries is now nearly 85 percent bigger than nine years ago, and growth in China's import from CEE countries is 22 percentage points higher than that of export. The number of mutual tourist visits has grown nearly five times. The China-Europe Railway Express has reached most of the CEE countries, running over 30,000 freight services so far. Impressive progress has been made in some major cooperation projects, such as the Port of Piraeus in Greece, the Smederevo Steel Plant in Serbia, and the Peljesac Bridge in Croatia.

Both sides will enhance cooperation on vaccines and public health and are ready to build high quality BRI cooperation, expand trade and investment, promote connectivity, scientific and technological innovation, digital economy and green development, facilitate personnel exchanges and deepen cultural communication so as to achieve more cooperation results and benefits to people of all countries.

In the coming five years, China is going to import more than 170 billion US dollars of goods from CEE region. Platforms like the China International Import Expo and the China-CEEC Expo would provide very good platforms for that purpose; Both sides are planning to deepen agricultural cooperation in a bid to double CEE countries' agricultural exports to China and raise two-way agricultural trade by 50 percent over the next five years.

The Beijing 2022 Olympic and Paralympic Winter Games are also a good opportunity for strengthening China-CEEC cooperation in the sports field. To enhance green development, we may take the China-CEEC Year of Green Development and Environmental Protection as an opportunity to deepen exchange and cooperation in green economy, clean energy and other related areas.

(3) Relationship between China-West Asian and North African countries relationship have been witnessing good development.

With pandemic and changing global and regional situation, this relationship has shown its unique strength and resilience. It has become a best example for South-South cooperation.

Recently when Chinese foreign Minister Wang Yi visited the Middle East, he put forward five points proposal of China which indicates clearly China’s positions for the region, namely advocating mutual respect, upholding equity and justice, achieving non-proliferation goal, jointly fostering collective security and accelerating development cooperation. China in this region has always been supporting efforts of realizing fair and just peace, stability and sustainable

development through dialogue and political means, including endeavors for de-escalation and ease of tensions.

Specifically, over the year passed, dialogues and communication between leaders of both China and the regional countries are frequent and strong, giving timely guidance for the direction of the ties. Our cooperation in fighting pandemic and economic recovery keeps buoyant. Mutual trust is further enhanced, and fields of collaboration is expanding.

Regarding Iranian nuclear issue, it is obvious that relevant parties in the process need to move in the same direction with concrete actions and formulate the roadmap and timeframe for the United States and Iran to resume compliance with the JCPOA. The pressing task is for the US to take substantive measures to lift its unilateral sanctions on Iran and long-arm jurisdiction on third parties, and for Iran to resume reciprocal compliance with its nuclear commitments, in an effort to achieve early harvest. At the same time, the international community should support efforts by regional countries in establishing a Middle East zone free of nuclear weapons and other weapons of mass-destruction. sustainable security in the Middle East.

The recent escalation of the Palestine-Israel conflict has caused great casualties and property damage, and a humanitarian crisis is heartbreakingly unfolding in Gaza. The Palestinian question has always been the core of the Middle East issue. Only when the Palestinian question is resolved comprehensively, fairly and permanently, can the Middle East truly achieve lasting peace and universal security. China welcomes a ceasefire between parties of the Palestine-Israel conflict and hopes relevant parties can effectively cease fire and stop violence. China appreciates the mediation efforts made by Egypt, the UN and others. China has also been trying hard to promote peace talks and is ready to continue to work with the international community to further ease the tensions.

The conflict that dragged on for over 10 days have resulted in grave humanitarian situation in the Gaza Strip. Urgent assistance is needed from the international community. China has committed to provide 1 million US dollars of emergency humanitarian assistance to Palestine in cash, will continue to provide humanitarian supplies in light of Palestine's needs, and take an active part in the reconstruction of Gaza. People in China will also provide tangible assistance to the Palestinian people by offering 1 million US dollars of donation and 200,000 doses of COVID-19 vaccine to the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA).

To prevent the tragedy of the Palestine-Israel conflict from happening again, the international community should promote the resumption of peace talks between Palestine and Israel and the settlement of the Palestinian question in a comprehensive, just and durable manner on the basis of the "two-state solution". China has been working with members in the Security Council for that purpose and will invite peace advocates from Palestine and Israel to China to hold discussions in due course and welcome Palestinian and Israeli representatives to come to China for direct negotiations.

For other hot spots like tensions in Syria and other countries, China all hope to find way for solution through dialogue and political means, respecting their independence, sovereignty, territorial integrity as well as will and legitimate rights of their own people.

Look into the future, China and the regional countries will keep on with strong mutual support for combating pandemic and economic recovery. With Arab states, we have fully covered almost all aspects in vaccines and pandemic fighting, donated and exported over 17 million doses to 17 Arab states and the Arab League, offering support to Arab states' fight against the virus. Over 50 medical expert virtual meetings with all Arab states and the Arab League were held, and nearly 100 visits were made by Chinese medical experts to eight Arab states.

China has steadily been top trade partner with Arab countries, with total trade in 2020 of about 200bn US dollars, oil import 250 million tons annually, 50% of all our oil imports. Both sides are

actively advancing high-quality Belt and Road collaboration, deepening cooperation in traditional areas as energy and industrial capacity, exploring high-tech cooperation on 5G, artificial intelligence, aviation and aerospace, and make digitalization, health and green development new highlights in cooperation.

III. Concluding remarks

This year of 2021 marks the beginning of China's 14th Five-Year Plan for economic and social development, and the start of the country's new journey toward fully building a modern socialist country. It means a lot for China, and also for the world. Entering a new stage of development, China is quickening its pace in fostering a new development paradigm with domestic circulation as the mainstay and domestic and international circulations reinforcing each other. This will further unlock the potential of China's vast market and domestic demand generated by the 1.4 billion population, including the over 400 million Chinese in the middle-income group.

It will thus further boost global demand and create more opportunities for the rest of the world. China will continue to open its door wider, with a focus on institutional opening-up that covers rules, regulations, management and standards. We will continue our efforts to foster a business environment that is based on market principles, governed by law and up to international standards.

We in China will take a more active part in bilateral, multilateral and regional cooperation that delivers higher levels of mutual benefit for all. China's continued development and opening-up will inject powerful impetus into global economic recovery, growth and broaden the horizons for China-EuroMed region cooperation.

Specifically, three aspects I want to emphasize for China’s future efforts with EuroMed region:

Firstly, enhancing cooperation in combating pandemic is the top priority. Lessons should be drawn from some states for loosening untimely guard and alertness. China is ready to work with the countries in the region with our help and support for winning the fight.

Secondly, to push for economic recovery is of paramount importance. It means not only to have the performance of the regional and global economic recovered, but also actively tackle structural challenges like infrastructure upgrading, macro-economic policy coordination, climate change, public health, opposing all forms of protectionism as well as energy, innovation and digital challenges, to name a few. China is ready for working with the region as well as the world community to offer our ideas and contribution.

Thirdly, to safeguard and enhance genuine multilateralism is essential for lasting peace, stability and common prosperity of all. Facing all the changes of the world, history and reality have all shown that the only fair and just way to handle and surmount challenges and difficulties is to follow the multilateral international order through unity and rules enshrined in the UN Charter based on international law. That is the core of our current international system. From my reading of both China’s public and knowledgeable opinions, China is ready to work harder with EuroMed region countries as well as the world community with our common efforts to maintain peace and security, promote common cause of human rights and common development in a bit to facilitate solutions of regional and global issues.

IMI International Monetary Review

Global Economy

US Inflation Surge Is Harbinger of What's to Come*

By STEVE H. HANKE*

Wednesday's headline inflation figure of 4.2% shocked many. It didn't shock me nor would it have come as a surprise to Milton Friedman. Money dominates, but that monetarist perspective is not held by most. Indeed, the majority adhere to the precepts of fiscalism. Even Federal Reserve Chairman Jerome Powell has confessed that the Fed pays little attention to the growth of the money supply. During congressional hearings on 23 February, he proclaimed that the relationship between economic growth and the money supply is something we must unlearn. It's rather obvious Powell has followed his own advice. But contrary to his musings, the rate of growth in the money supply, broadly measured, dictates the course of a country's nominal gross domestic product growth and inflation rate.

The dramatic growth of the US money supply began in March 2020. It will do what increases in the money supply always do. Money growth will lead in the first nine months to asset - price inflation. Then, a second stage will set in. Over the 18 months after a monetary injection, economic activity will pick up. Ultimately, the prices of goods and services will increase. That usually takes between one and two years after the injection. Given this sequence, it's clear that more — perhaps much more — inflation will enter the system.

To get a handle on how the economy works and where it's going, one needs a model of national income determination. A monetary approach to this is what counts. Indeed, in a fundamental sense, it's a theory of everything. The close relationship between the growth rate of the money supply and nominal GDP is unambiguous and overwhelming.

So, what is the current US monetary temperature? We first need to determine the money supply's 'golden growth' rate and then compare the actual growth rate to that. To calculate the golden growth rate, I use the quantity theory of money. QTM states that MV=Py, where M is the money supply, V is the velocity of money, P is the price level and y is real GDP.

QTM provides benchmark calculations to determine what the golden growth rate is. This figure will be the rate of broad money growth that would allow the Fed to hit its 2% inflation target.

The average real GDP growth from 2010 to 2020 was 1.8% per year, the average growth in total money supply (M4) was 6.5% and the average change in the velocity of money was minus 2.5%. Using these values and the Fed's inflation target, the golden growth rate for M4 is 6.3%.

The average growth rate of M4, which has been 6.5%, slightly overruns the golden growth rate of 6.3%. This has resulted in realised inflation of 1.7%, slightly below target. That the realised inflation rate is, however, a bit below the Fed's target is not surprising when you recognise that prior to the explosion in the money supply in 2020, the average rate of growth of broad money was very modest from 2010-19. It averaged only 4%, rather than the 2010–20 average of 6.5%.

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In response to the Covid-19 pandemic, the growth rate of M4 skyrocketed. By the end of 2020, it was growing at 28.9%, the highest year‐end rate since 1943. Today, it is still surging at 24%. That dramatically exceeds the golden growth rate, a growth rate that would be consistent with the Fed's inflation target.

Armed with those numbers and the monetarist model for national income determination, it is obvious that April's year‐over‐year consumer price index inflation rate of 4.2% is simply a harbinger of more to come. This haunting spectre could spell the end of President Joe Biden's triumphal march.

IMI International Monetary Review

Central Banking

Central Banks and Inequality*

By AGUSTÍN CARSTENS*

Introduction

It is a pleasure to share with you my thoughts on how central banks can best contribute to a more equal society.

Central banks are concerned about inequality. As public institutions, their end goal is to ensure economic conditions that support the well-being of citizens. I will argue that, over the long run, inequality is not a monetary phenomenon, though central banks' actions can have an impact on the distribution of wealth and income over shorter horizons. Prolonged periods of high inflation and recessions can hurt the economy and disproportionately hit the most disadvantaged. Therefore, the best contribution monetary policy can make to an equitable society is to try to keep the economy on an even keel by fulfilling its mandate. Governments can reduce inequality through more direct fiscal and structural policies.

In this lecture, I will review the recent trends of rising inequality and ask why central banks have engaged in this debate only after the Great Financial Crisis (GFC) – more than two decades after the trend increase in inequality picked up. I will argue that both the actions needed to achieve the mandated objectives, and the interaction between monetary policy and inequality, have become increasingly complex over time. This is due to a change in the nature of the business cycle. Two characterising features of this change – particularly since the GFC – are low and less responsive inflation, and financial factors playing a more prominent role in amplifying economic fluctuations.

The focus of my lecture will be on monetary policy in its macro stabilisation role. The nature and precise interpretation of central banks' mandate in this regard has evolved historically. These days it is primarily interpreted as limiting business cycle fluctuations – measured in terms of output and employment – and delivering low and stable inflation. And low and stable inflation is rightly seen as a necessary condition to maximise output and employment sustainably over time.

But there is another necessary condition for macroeconomic stability: financial stability. While most central banks do not have financial stability as a separate objective in their monetary policy mandates, changes in the business cycle have brought it to the fore. In a narrow sense, creating conditions for financial stability means mitigating the likelihood and severity of events such as banking and financial crises and the large output losses they bring about. But in a broader sense financial stability relates to financial factors as amplifiers of business cycle fluctuations and, as such, forces that can stand in the way of achieving monetary policy objectives. For this reason, I will include financial stability under the broader objective of stabilising economic activity.

*Speech given at Markus' Academy, Princeton University's Bendheim Center for Finance, Basel, 6 May 2021.

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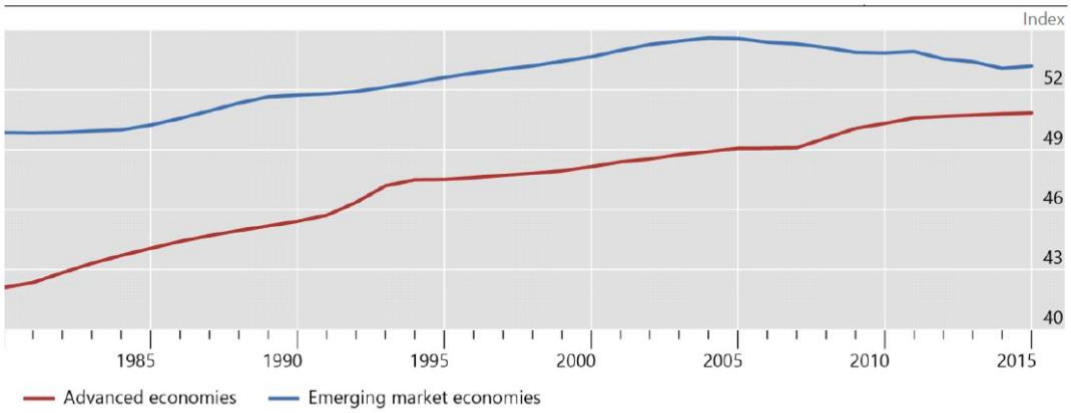
Inequality has been on the rise, as recognised by central banks

Distributional issues have gained prominence in the public debate over the past decades, as the two main dimensions of economic inequality – income and wealth – have been on an upward trend. Graph 1 displays a popular measure of income dispersion among the population – the pre-tax and transfers Gini coefficient–and shows that it has been rising since the 1980s. A similar – although less steep – trend emerges when looking at measures of wealth inequality.

While income inequality has remained consistently higher in emerging market economies (EMEs) than in advanced economies (AEs) throughout the period, it has seen a much steeper increase in AEs. The increase has not only been more modest in EMEs, it has even partially reversed over the last 10 years. A concrete example to show the recent rise in income inequality is the case of the United States, where the share of income held by the top 1% of the population grew from 11% in 1986 to 19% in 2019.

Importantly, the trend in inequality is largely the outcome of long-run structural forces, widely explored and documented in the literature. Among those, technological change, globalisation and institutional changes have played a major role during the past decades. These forces are largely independent of and insensitive to monetary policy, so the trends to which they contribute are best corrected by public policies, particularly fiscal policies.

Gini index based on pre-tax, pre-transfer income — Graph 1



Defined as the amount of money coming into the household pre-tax, excluding government cash or near-cash benefits. The series are weighted averages of AEs and EMEs calculated based on GDP (PPP) with fixed 1980 weights. AEs = CA, DE, FR, GB, IT, JP and US; EMEs = BR, CN, IN and ZA.

Sources: Standardized World Income Inequality Database (SWIID); national data; BIS calculations.

Central banks are fully aware of the growing prominence of inequality in the public debate. Inequality is part of the environment in which monetary policy is set, and central bankers have to reflect it in their decisions. For instance, rising inequality affects monetary policy decisions to the extent that it weakens the transmission of monetary policy. Households with relatively higher income and wealth typically have a lower tendency, or marginal propensity, to consume and tend to react less to changes in policy rates. Therefore, monetary policy has to act more forcefully to provide the same economic stimulus in a more unequal economy, as supported by recent BIS research.

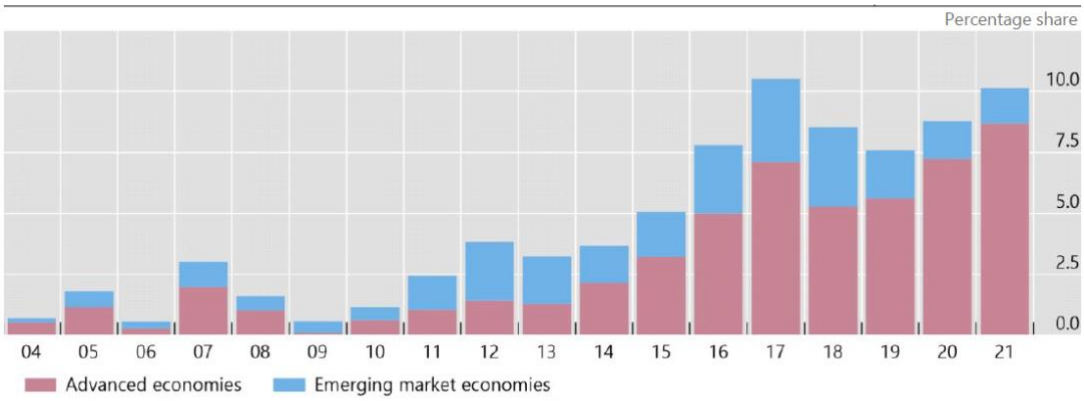
Central banks' increasing attention to inequality is seen in Graph 2. It shows how the share of a sample of central bankers' speeches mentioning the words "inequality" and "distributional impact of monetary policy" has grown over time. In line with differences across countries in inequality trends, references to inequality are less common in EMEs.

The references to inequality in central bank communications to a large extent mirror concerns by some observers that by keeping interest rates very low and purchasing financial assets, central banks are creating conditions for income gain amongst those who already have a greater portion of wealth. Indeed, house prices and stock market indices has been rising since the GFC. One consequence is that households which hold more equity in their portfolios – typically the very wealthy (top 1% or even top 0.1% of the wealth distribution) have made large capital gains. To be sure, this partly reflects the intended effect of monetary policy, as the higher valuations stem from an effective transmission of monetary policy. Yet the main losers are younger households, which may be increasingly excluded from access to property markets, and pensioners, whose interest income on bond portfolios shrinks.

These criticisms generally fail to cite the reason why accommodative monetary policies were deployed in the first place: to avoid a depression, and then to support the recovery. The alternative scenario would have had markedly worse consequences for employment and inequality. Many more jobs would have been lost. And these jobs benefit all, including the young and low-skilled households which suffer from higher and more cyclical unemployment.

This suggests that discussing monetary policy and inequality calls for a comprehensive approach: we need to consider the link between monetary policy and macroeconomic stability more generally, and do so against the context of policy mandates. Once we do so, it becomes clear that delivering on central banks' mandate of ensuring macroeconomic stability provides the best foundation for an equitable society. Let me now elaborate on why.

References to "inequality" in central bankers' speeches — Graph 2



Speeches of central bankers mentioning the keyword "inequality" and "distributional consequences/impact of monetary policy" expressed as a share of all central bankers' speeches in the BIS database. Data until February 2021.

Sources: BIS; BIS calculations.

Inequality and monetary policy: price and economic stability objectives

In most AEs, and increasingly in EMEs, inflation has been low and stable over the past decades. Yet we should not forget the long-lasting scars of uncontrolled inflation on inequality. History abounds with episodes of high and runaway inflation that increased poverty and inequality via sharp reductions in real wages. The experiences of accelerating inflation, falling real wages and increasing poverty in Latin America in the late 1970s and 1980s, and in eastern Europe in the 1990s, are cases in point.

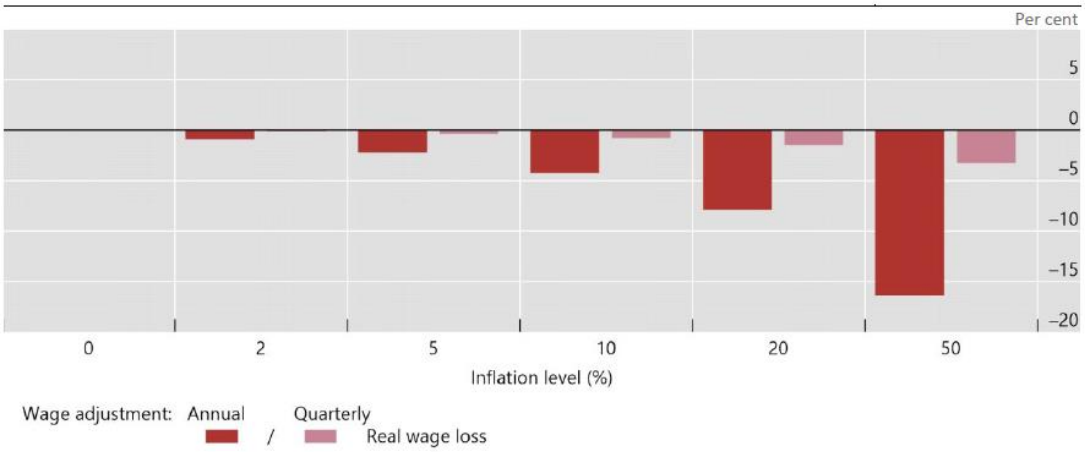
Inflation is often rightly portrayed as one of the most regressive taxes. The households at the lowest end of the income spectrum are the least able to hedge against it: their income is usually fixed in nominal terms and their savings held in cash or bank accounts. Indexation mechanisms, where present, offer only partial relief, as the frequency of wage adjustment often fails to keep pace, especially when inflation runs very high. Moreover, they tend to entrench inflation – with all its broader economic costs. This makes inflation more likely to increase further and harder to bring down.

To illustrate how inflation erodes wages, Graph 3 shows simulations of the burden of the "inflation tax" in terms of real wage loss at different levels of inflation. In this experiment, nominal wages are paid monthly and changed either quarterly or annually, depending on the indexation scheme. The figure shows that even when indexation occurs quarterly, the "real wage loss" associated with an inflation rate of 10% eats up about 1% of annual earnings.

Interestingly, the relationship between inflation and real wages is non-linear. There are large benefits for the poor in taming inflation from high levels, but negligible gains from reducing inflation from already low levels – such as those currently experienced in many AEs.

Moreover, once inflation gets out of control, taming it brings additional costs. The necessary tightening of policy/financial conditions brings on recessions and boosts unemployment, which disproportionately hit the most disadvantaged households. And the higher and more entrenched inflation is, the larger the costs – just think of the US experience in the early 1980s.

High inflation erodes wages — Graph 3



This graph shows the effective tax due to inflation when wages are adjusted once a quarter or a year by past inflation.

Source: BIS calculations.

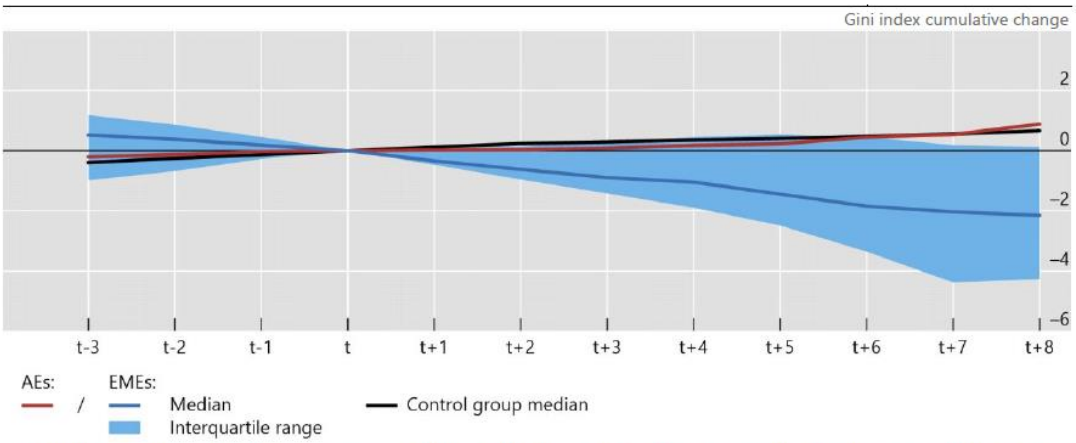
Once inflation is brought under control, the benefits become apparent. In many historical episodes, stabilising inflation from high (and volatile) levels helped stimulate growth by supporting savings via higher real interest rates, promoting investment and creating more and better paid job opportunities. The resulting economic prosperity meant income was more equitably distributed.

Graph 4 shows a comparison of 34 episodes of disinflation over the past 30 years, which mainly relate to the experience of EMEs. It illustrates that the "conquest of inflation" – here defined as bringing the inflation rate sustainably below 5% – has generally been followed by a decline in income inequality, as measured by the Gini coefficient. This may be one of the factors that helped abate the rising inequality trend over the past decade in EMEs. In AEs, where inflation has been

low since the mid-1980s, the graph shows a much less clear pattern. This result suggests that the interaction between inflation and inequality becomes much more complex when inflation is low.

The conquest of inflation and subsequent income Gini variation

Graph 4



Year *t* is the year in which the 10-year average realised inflation rate fell below 5% for the first time, without subsequent reversal of average to one pp above that. The vertical axis represents variation in each country's net income Gini index relative to year *t*. The conquest of inflation episodes range from 1992 to 2016.

Sources: IMF, *International Financial Statistics* and *World Economic Outlook*; World Bank; BIS calculations.

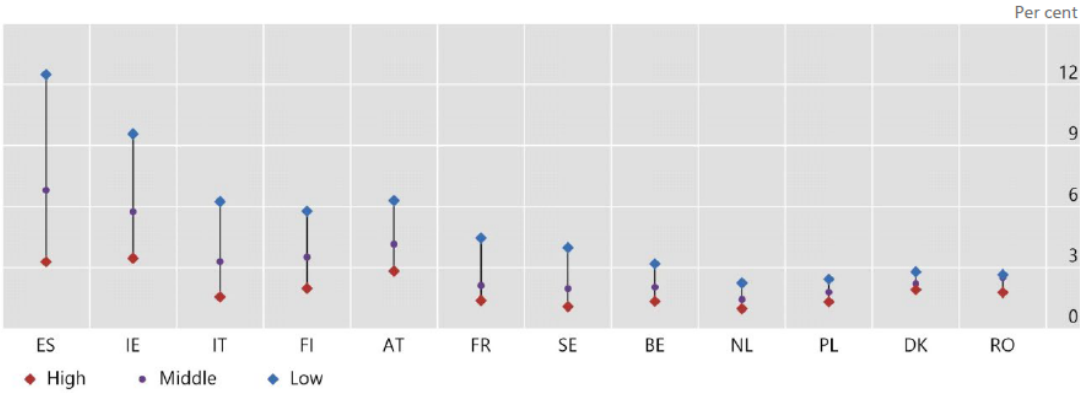
The other typical objective of central banks is sustained growth and economic activity – and low inflation is a means to that. Work remains the predominant source of income in society. Stable macroeconomic conditions that keep unemployment low increase opportunities for people to secure an income and sustain their living standards. As Jay Powell said in his webinar here at Princeton in January, "maximum employment is a broad and inclusive goal, which reflects […] the benefits of a strong labour market for many in low- and moderate-income communities."

Indeed, unemployment tends to hit unskilled workers disproportionally and for longer. As recessions hit, the lower-skilled workers are typically the first to be laid off.

The pandemic is a case in point. As shown in Graph 5, for European countries, based on Eurostat estimates, low-income workers are more at risk of losing jobs. For the most disadvantaged, the probability of losing their jobs can be up to 10% higher compared with high-income workers. When those at the bottom of the income distribution lose their income and those at the top keep it, the wedge between the two widens.

In the same vein, let me quote Jay Powell again in a speech he gave three days ago: "While the recovery is gathering strength, it has been slower for those in lower-paid jobs: Almost 20 percent of workers who were in the lowest earnings quartile in February of 2020 were not employed a year later, compared to 6 percent for workers in the highest quartile."

Euro area: risk of job loss by income in Q2 2020 Graph 5



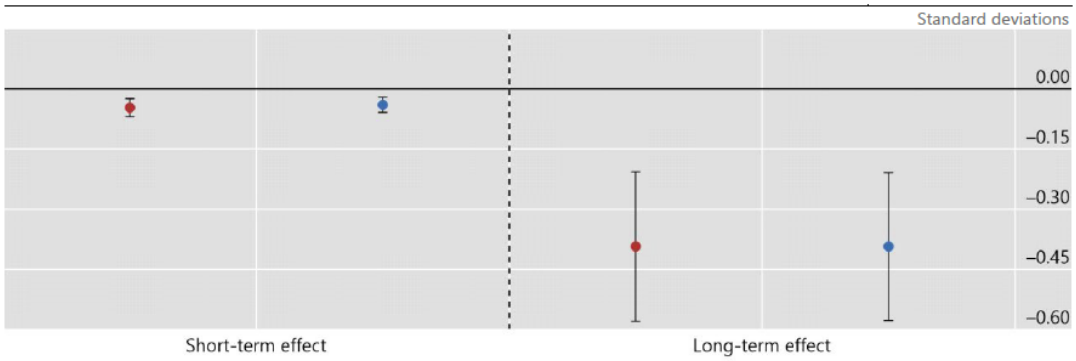
Low income earners comprise individuals in deciles 1, 2 and 3; the middle group comprises deciles 4, 5, 6 and 7; deciles 8, 9 and 10 define the high-income category.

Source: Eurostat.

Unfortunately, after a downturn, low-income and low-skilled workers also find increasing difficulties in re-entering the labour market as the economy recovers: their qualifications deplete faster, and they may be forced to accept jobs paying less than they earned before becoming unemployed.

This explains why unemployment has a persistent impact on income inequality (Graph 6). The impact of a typical fall in unemployment during recessions is initially small but tends to build up over time. A one standard deviation decrease in the unemployment rate pushes down measures of inequality like the Gini index or the share of income accruing to the top 10% by about 0.4 of their standard deviation.

Lower unemployment rates reduce income concentration Graph 6



Estimated effects of a one standard deviation rise in the unemployment rate on the inequality measures, also in standard deviations. The black poles represent the 90% confidence interval.

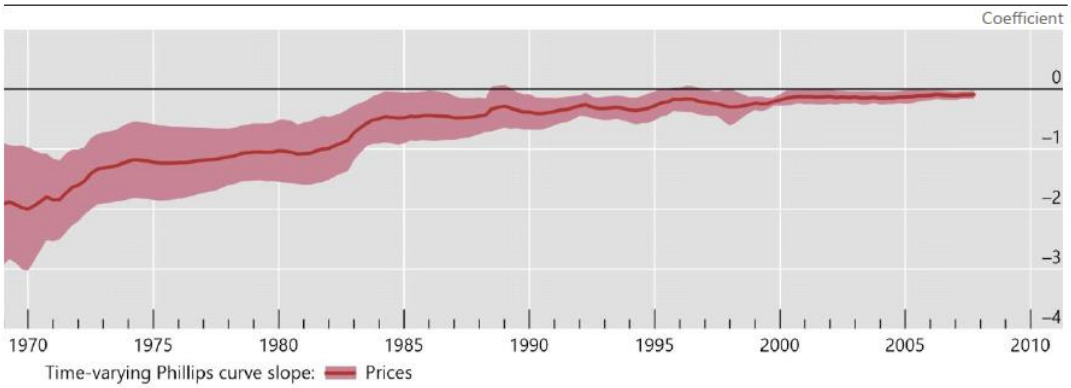
Sources: World Bank; BIS calculations.

Monetary policy is operating in a more challenging environment

By keeping inflation in check and seeking to keep output stable – that is, recessions are fewer, shorter and milder – monetary policy can play its part in promoting equitable growth. Yet changes in the nature of business cycles over the past decades are complicating its task.

The first noticeable change is that the Phillips curve has become flatter for at least two decades now (Graph 7). Inflation is not just low and stable, particularly in AEs, but also less responsive to changes in the pace of economic activity. The challenge for central banks is that bringing inflation back up to target from below, where it lies in many countries, requires a much larger increase in economic activity and employment than in the last century. As a consequence, monetary policy needs to be more proactive for inflation to hit the target.

Prices are no longer sensitive to unemployment — Graph 7



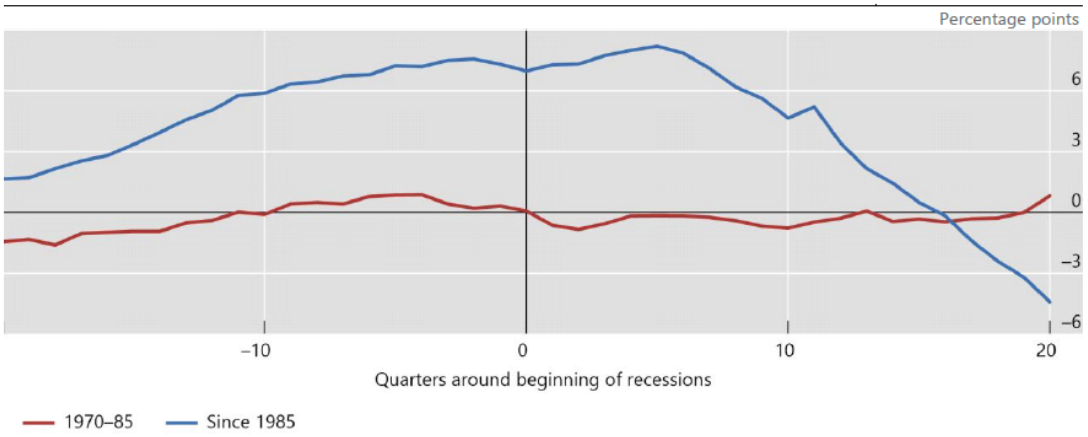
Rolling 20-year window estimates and confidence bands from a panel of G7 economies.

Source: Adapted from BIS, *87th Annual Report*, 2017.

The second major change is that financial factors have played an increasingly important role and have amplified business cycle fluctuations. This is illustrated in Graph 8, which shows the evolution of one indicator of the financial cycle – the credit-to GDP-gap or the difference between the credit-to-GDP ratio and its long-term trend – around turning points of the business cycle for both AEs and EMEs. Up to the mid-1980s, this indicator moved very little relative to economic activity. But the most recent period featured large increases, which often coincide with turning points of the business cycle.

Credit-to-GDP gaps and the business cycle

Graph 8



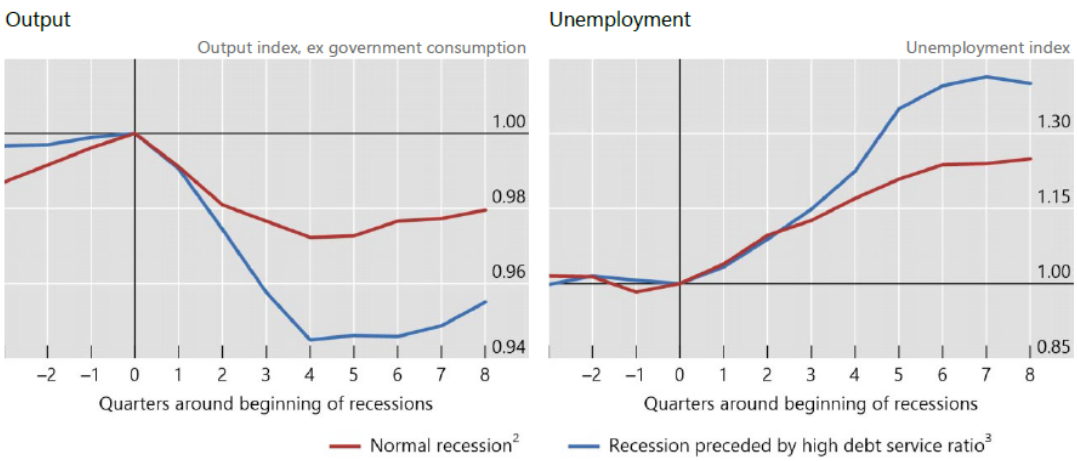
The horizontal axis denotes quarters around recessions in the business cycles, with the peak date set at zero (vertical lines). Lines show the median evolution across the advanced economies in our sample and events in the respective time period.

Sources: National data; BIS calculations.

Moreover, recessions in which financial factors play such a key role tend to be more severe, taking a larger toll on inequality. This is shown in Graph 9, which compares normal and financial recessions experienced in 17 countries (including four EMEs) since 1999. Here a recession is defined as "financial" if the debt-to-service ratio is unusually high before the start of each recession, which is normalised to time zero in the figure. Overall, the data panel covers 24 "normal" recessions, and 10 "financial" ones. Interestingly, eight quarters after the start of the recession the average output drop and unemployment increase are found to be, respectively, about 2.5% and 12% higher in financial recessions than in normal ones.

This suggests that by contributing to financial stability broadly defined – ie even when not involving a banking crisis – monetary policy can help limit the incidence, depth and duration of financial recessions. This fosters macroeconomic stability and, in turn, sustainable, inclusive and more equitable growth.

The long-term effects of recessions[1] Graph 9



[1] Based on the following countries: AT, AU, BE, CA, CH, CZ, DE, DK, ES, FI, FR, GB, HU, IE, IT, JP, KR, LU, NL, NO, NZ, PT, SE, US. Sample period: 1980–2020. [2] Recessions for which the preceding debt service ratio was below the country-specific average plus 2 points. [3] Recessions for which the preceding debt service ratio was at or above the country-specific average plus 2 points.

Sources: National data; BIS; BIS calculations.

Changes in the nature of the business cycle have magnified intertemporal trade-offs and complicated central bankers' job as they seek to deliver on their primary mandate.

On the one hand, inflation's low responsiveness to slack reduces the risk that labour market overheating takes inflation out of control. Hence running a "high-pressure economy" and reaping the inequality benefits of a more inclusive labour market entail lower risks for price stability and greater benefits for income distribution.

On the other hand, protracted periods of easy monetary policy may also fuel financial imbalances. This is challenging because, as it reacts little to the economic expansion, the behaviour of inflation conveys little information on whether the economy is operating above maximum capacity. It is also very difficult to gauge the accumulation of financial imbalances in real time. Such imbalances, in turn, may sow the seeds of a more severe recession, and possibly serious financial stress and even a financial crisis down the road. The resulting downturn with bouts of unemployment can leave long-lasting scars in terms of inequality.

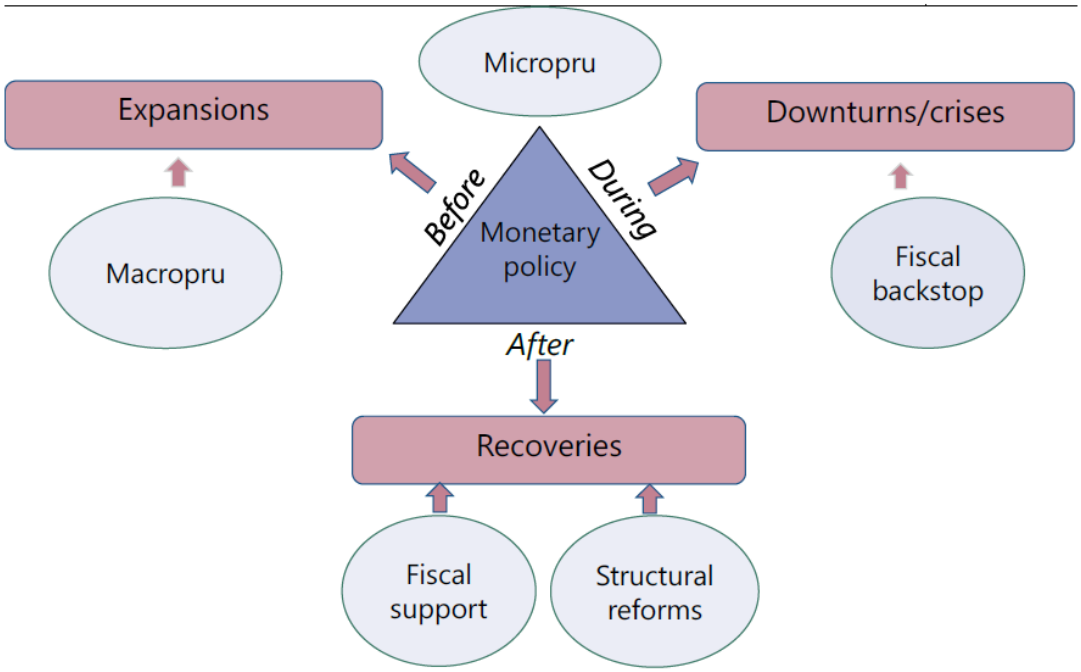
Another relevant trade-off arises after the recession strikes, when monetary policy seeks to stimulate and nurture the recovery. Because of the need to work off the debt overhang, the central bank has to cut interest rates more aggressively and keep them low for longer, possibly alongside large-scale asset purchases. This necessarily eases financial conditions and sustains asset prices, which can disproportionately boost the wealth of the rich, adding to inequality. This is a temporary side effect, necessary to ensure that employment is protected over time and income inequality is mitigated in the longer run. Let's not forget that the distributional outcome would most likely be more dramatic without such action. The temporary effects on wealth inequality have to be compared with the consequences of inaction in terms of employment and income inequality.

Monetary policy and financial recessions: managing trade-offs

What do these complex trade-offs mean for monetary policy? They mean that other policies need to play a complementary, supporting role to help foster sustainable growth. Monetary policy can do a lot to stabilise the economy, but it cannot do it alone.

Let me illustrate this with a very stylised representation of a business cycle amplified by financial factors, possibly including a financial crisis (Graph 10). During the expansion phase, if inflation remains low–and possibly even below target – a monetary policy focused on near-term price stability would naturally remain accommodative. During this phase, macroprudential measures can play a key complementary role: they can seek to slow down the financial expansion, especially in the sectors seen to raise the bigger risks for the financial system – often housing.

Monetary policy and financial recessions: managing trade-offs Graph 10



Source: BIS elaboration.

Once the downturn sets in, it is essential that banks be well capitalised in order to remain resilient, thereby containing the economic fallout. For that to be the case, microprudential policy must have done its job. This is precisely what the post-GFC major international prudential reforms did pre-Covid, not least Basel III. This allowed banks to be part of the solution, rather than of the problem, once the pandemic crisis struck.

Still, banks may not be strong enough. The unwinding of financial imbalances and downturn may be so large that a financial crisis follows – the GFC is just the most recent example. At this point, monetary policy enters crisis management mode, with central banks acting as lenders and, increasingly, as market- makers of last resort. But, here again, central banks cannot succeed on their own: fiscal backstops are essential to stabilise banks and the overall financial system, and thereby the economy. In addition, government intervention to help repair balance sheets is critical to resolve the crisis and set the basis for a healthy recovery. However, in the process, central banks may be criticised for supporting Wall Street atthe expense of Main Street. But this is a false dichotomy, as central banks target broader financial conditions as a channel to limit the impact of the crisis for the benefit of the entire economy.

The final phase is nursing the recovery, battling the headwinds of overhanging debt. A more balanced policy mix is called for to avoid some of the side effects of prolonged very low interest rates, through asset prices, on inequality and the economy more generally. This means more

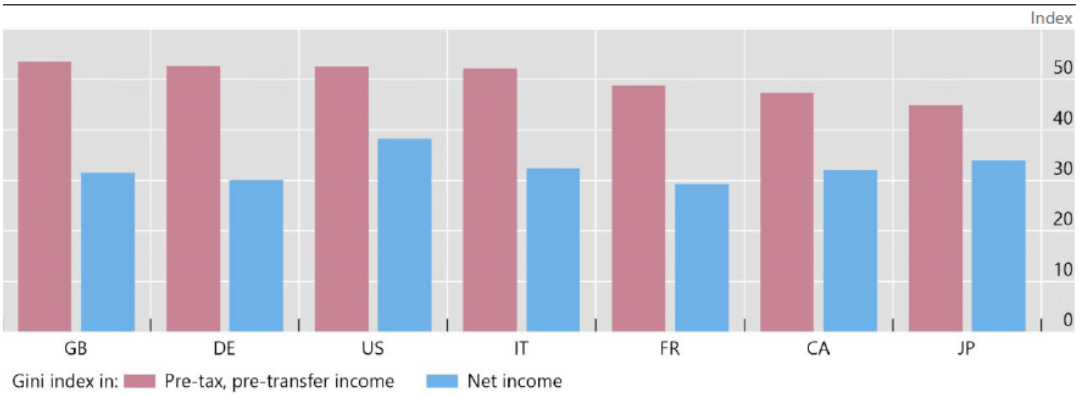
supportive fiscal policy and growth-friendly structural reforms to prevent central banks from becoming "the only game in town".

Beyond monetary policy

None of this, of course, addresses the longer-term forces driving trends in inequality. Fiscal and structural policies do. And we should not forget that central banks can also contribute to a more equitable society by performing a range of non-monetary functions attributed to them by law.

Fiscal policy is a good example of how powerful government policies can be, as it has the appropriate tools to mitigate inequality. The substantial impact of fiscal policy on income distribution is evident (Graph 11). For all AEs, inequality measured on post-tax income is lower than that measured on pre-tax income – for some substantially so. In Germany, a country with a relatively strong social safety net, the 2015 post-tax Gini coefficient is almost halved, falling to 30 from above 50.

Pre- and post-tax inequality in advanced economies — Graph 11



Time of data for countries: US (2016), GB (2017), JP (2015), DE (2015), FR (2017), IT (2014), CA (2013). Gross income data are unavailable for JP and FR.

Sources: Standardized World Income Inequality Database (SWIID); UNU-WIDER, World Income Inequality Database (WIID); BIS calculations.

Structural policies are equally important. They set the foundations for a more equitable society by tackling some of the root causes of inequality. Think of all the impediments that set back the most disadvantaged: poor education systems, lack of access to healthcare, lack of competition, inadequate consumer protection and poorly regulated labour markets.

Part of the impediments to opportunities that I have just mentioned pertain to the financial system, and in some countries fall within the realm of non-monetary functions attributed to central banks by law. Many central banks have prudential responsibilities and thus play an essential role in maintaining bank resilience and ensuring financial stability. Others promote financial inclusion that, particularly in poorer countries, can reduce income inequality by boosting self-employment and growth opportunities. Financial services consumer protection also shields the poor and more vulnerable from predatory lending and, together with policies supporting financial literacy, from excessive risk-taking. Efforts to develop efficient and competitive payment systems help reduce overall costs, not least for cross-border remittances. And finally, fostering financial development increases the menu of options available to households to hedge and diversify risks.

Conclusions

To conclude, inequality is not a monetary phenomenon over the long run. Yet central banks are fully aware of the consequences of their actions on income and wealth distribution over shorter horizons.

While they do not have the necessary tools to achieve targeted distributional outcomes on top of their mandated objectives, they can go a long way in contributing to an equitable society by fulfilling their mandates. This means seeking to keep the economy on an even keel, so that price, financial and macroeconomic stability prevail. High inflation and recessions can be extremely costly for inequality.

But keeping the economy on an even keel is not something monetary policy can do on its own. Moreover, changes in the nature of the business cycle, with financial factors playing a bigger role, have complicated the trade-offs monetary policy faces. In order to address these trade-offs, other policies must play their part, notably prudential, fiscal and structural. A balanced and comprehensive policy mix is needed.

IMI International Monetary Review

Reducing Reserves and Central Bank Balance Sheets*

By CHRIS PAPADOPOULLOS*

More than a decade of government bond purchases has put central banks firmly in the fiscal equation. Central banks have always had some impact on fiscal policy, but now it is more direct. To raise interest rates, they must pay interest on reserves. Selling the bonds they have bought may be difficult while government debts are high.

This threatens their independence, but there is a way out. Central banks could swap their bonds for shorter maturing debt and then sell that back to the market. As central bank reserves are like short term government debt securities, it should not have a noticeable economic impact. Easy in theory, tricky in practice.

A fall in demand for reserves by banks is needed though. Under Basel III banking rules, banks are required to hold a certain level of 'high quality liquid assets', which include reserves and short-term government bonds. The key to significantly reducing reserve levels is to create a system that allows banks to hold mostly Treasuries for their HQLA requirements in normal times and quickly convert these to bank reserves in a crisis.

To achieve this, two senior Federal Reserve economists, Jane Ihrig and David Andolfatto, have proposed a standing repurchase agreement facility that would allow banks to convert US Treasuries to central bank reserves. This would make it easier for central banks to reduce reserve levels in calm periods without generating upsets.

'I believe the repo tantrum in September 2019 could have been avoided if a standing repo/purchase facility was in place. Similarly, the events last March in the bond market may also been avoided,' Andolfatto told OMFIF. The Fed had started unwinding its purchases, by allowing bonds it held to mature rather than reinvesting the proceeds. Reserves held at the Fed by depository institutions fell gradually to $1.5tn before a range of factors caused a spike in overnight rates, despite reserves being over 30 times their pre-crisis level.

A standing repo facility could make the process of reducing reserves to lower levels much smoother, allowing one government liability, reserves held at the Fed, to be swapped for a similar liability, US Treasuries. Andolfatto said that reducing the level of reserves in normal times was 'not an economic issue, it's more of a political one. It makes a difference in terms of the optics.'

'If we can reduce the Fed's footprint at no economic cost, why not do it? Politically, it could help protect the Fed's independence.'

Other areas of regulation include a bias toward reserves over Treasuries for banks' liquid assets. 'One reason Jane and I argued for a standing repo facility is because it would motivate large banks to prefer US Treasuries over reserves for their living will arrangements and make regulators more willing to view US Treasuries as liquid assets for resolution purposes,' Andolfatto said.

The regulatory hurdles do not end there. Because of the way repos are treated by bank regulation, it may be necessary for a purchase facility to be included.

'I think the repo facility should probably be expanded to include a purchase facility,' he added.

'In principle, using a US Treasury as collateral for a loan and buying it outright should not matter much in terms of economic impact, but the borrow versus buy decision can interact in peculiar ways with existing regulations, including capital requirements. So, for example, an outright

*This article first appeared in OMFIF Commentary on April 16, 2021.

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purchase of securities from broker-dealers may have a more advantageous impact on their balance sheet relative to an equivalent repo transaction.'

This is an idea that has some history, with veteran central banking economist Charles Goodhart laying out his thoughts on the matter in a 2017 paper. He argued that the first quantitative easing round following the 2008 financial crisis was effective because it provided cash in a liquidity crisis. Later rounds of QE were more like Operation Twist and aimed at flattening the yield curve. This could be achieved without increasing reserves, but by having the monetary authorities coordinate to replace long-dated bonds with short ones.

Perhaps between them, Ihrig, Andolfatto, and Goodhart have created a way for central banks get back to smaller balance sheets.

IMI International Monetary Review

What Central Banks Do Next Is Vital for Global Economy*

By MOJMÍR HAMPL*

Central banks, their independence and their price stability mandates are the alpha and omega when it comes to answering the frequently asked question of whether we should be concerned about higher inflation after the pandemic. Central banks are helping the situation by correctly pursuing accommodative monetary policy. What they do next is vital for the global economy as it recovers from Covid-19.

Will central banks become an extended arm of over-indebted governments, leading to higher inflation? Or will they unflinchingly fight any excessive inflationary pressures like they have fought recent deflationary ones?

I believe that central bankers in the developed world will remain independent from the political cycle and determined to tame all excessive inflationary pressures. But their task might become much more difficult. As the current inflation debate shows, central banks may have to convince the general public about their intentions even before they start delivering on their goals.

Fears of inflation have been misplaced in the past. After the 2008 financial crisis, central banks used unconventional policies such as quantitative easing, zero or negative interest rates and foreign exchange interventions to bring down real interest rates and prevent deflation. This was because they were facing low demand and underused capacity, or a 'negative output gap', which was pushing prices down, not up.

By fuelling the monetary system, central banks were merely trying to make sure that commercial banks generated enough steam so the economy didn't stop. The media cliché of money printing was imprecise and misleading.

The situation now is not entirely the same as it was after the 2008 recession. The US can be seen as a proxy for what is going to happen sooner or later in many developed countries.

The total money stock may be rising faster, but the velocity of money is falling. Although we long ago stopped believing in the monetarist direct link between money and inflation, that link is inflation-neutral in the current situation anyway. If, due to an inability or unwillingness to buy, the larger quantity of money in the system is not being spent, there will be no effective demand and hence no inflation.

Many governments are now taking an active fiscal approach, running up huge debts in the process. Government debt to gross domestic product ratios in the developed world are hitting levels last seen during the second world war. This is fine so long as governments are only providing compensation for the impact of the pandemic. However, some of the fiscal programmes (such as President Joe Biden's $1.9tn American Rescue Plan) seem extravagant even to moderate mainstream economists. There is a danger that governments will not only overcompensate for the shortfall in demand, but directly overheat the economy and generate inflation pressures.

In a key paper, veteran of the economic community Charles Goodhart and his colleague Manoj Pradhan offered a profound structural argument for being concerned about inflation. They posit that the great moderation era of anti-inflationary and deflationary pressures is over. The supply of cheap labour in Asia and Eastern Europe is drying up and cannot be renewed. On top of that, in the developed world the pandemic has strengthened the tendency towards localisation – the desire

*This article first appeared in OMFIF Commentary on March 22, 2021.

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to bring production back home for reasons of security and resilience (however illusory that might be), and towards systemically more costly labour. Goodhart and Pradhan released a new book on this subject last year.

By contrast, the natural rate of interest –the interest rate consistent with stable inflation and economic equilibrium – is not rising in the developed world. This would suggest that the long-running downward pressure on inflation and interest rates is not over.

Pandemics tend to be followed by a period of 'consumer euphoria', which drives prices upwards. And consumer price indices have underestimated the true level of inflation for much of the pandemic. With many services unavailable and shops shut, people have been spending far more on basic foodstuffs – prices of which have been rising faster – and far less on clothing and footwear. The fixed weights of the CPI basket have been unable to take this into account. The IMF has made a quantitative estimate of this effect for the regions of the world.

So the question is whether the idea of 'average inflation' targeting, presented by the Fed at the 2020 Jackson Hole symposium, or the idea of redefining the objectives and mission of the European Central Bank (both of which might lead towards tolerating higher inflation) are coming at the right moment for the general public. There were more suitable times for central banks to consider tolerating higher inflation for good reasons, but not now.

To keep their credibility, and given the uncertainty, perhaps it is enough for central banks to stick with their current goals rather than start fiddling with incomprehensible redefinitions.

IMI International Monetary Review

Governments Look for New Roles for Central Banks*

By RAJEEV DE MELLO*

As most Asian central bank governors prepare for their upcoming monetary policy meetings in April, they must be bracing for agonising debates. While their committees will most likely keep policy rates unchanged in April, the rest of 2021 will require far more thought as inflation starts to rise. A graver and looming worry is the widening of central banks' mandates.

New Zealand, the birthplace of inflation targeting, has decided to move towards a broader mandate for its reserve bank by including house price inflation. Korean lawmakers are pushing for the Bank of Korea to broaden its inflation-targeting objective to include an employment component.

Over the last 12 months, Indonesia has twice tried to pass legislation to curtail its central bank's independence. Last year, Bank Indonesia was asked to commit to buying government debt in the primary market, and this could become a permanent feature of its toolkit under the new law.

More recent converts to inflation targeting such as the Reserve Bank of India must be growing concerned about the durability of their mandates.

In Asia, central banks' relative independence is a more recent phenomenon than in Germany or the US. Households and businesses have not had the time to anchor their inflation expectations fully.

Even the Federal Reserve has broadened the interpretation of its mandate by explicitly adding inclusivity into its employment target and moving to average inflation targeting six months ago. The European Central Bank had already broadened its mandate in 2011 to include doing 'whatever it takes' to keep the European Union intact. The Swiss National Bank reverted to exchange rate management in 2015 and never looked back.

Other central banks have added climate change to their objectives, while many policy banks also assumed the role of guardians of financial stability. The most recent foray by central banks has been to evaluate the issuance of their own digital currencies.

While new objectives are understandable in an environment where inflation is continuously low, as the economic cycle recovers, the multiplicity of objectives will reduce the role of inflation targeting to just another trade-off with all the others. For example, if a deluge of bond issuance fails to find buyers at yields below the growth rate, it will be tough for national central banks to resist their governments' calls to prioritise debt stability by increasing bond purchases further. 'Burden sharing', as it is called in Indonesia, might become widespread.

This creeping change in mission is accelerating as fears of inflation return. In Asia, economies will continue to benefit from the strong recovery in the US. With the $1.9tn fiscal package and the rise in Covid-19 vaccinations, expectations have increased for much more substantial US growth for the rest of the year. European economies will also see a recovery, even if it is milder and somewhat delayed. For Asia, exports will benefit from a recovery in these large markets that would follow China's v-shaped recovery in 2020.

On the domestic front, growth in Asia could be less impressive than what we expect to see in the US. North Asia managed the pandemic better than the rest of the world and recovered faster over the previous quarters. US growth will have a more significant impact on its service sector. Consumers' enthusiasm for Asian-produced electronics will probably be more moderate.

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*Rajeev De Mello is Managing Director, Deep Learning Investments.

For many countries in Asia, the sluggish rollout of vaccinations will slow the recovery in tourism and make it more challenging to flatten the periodic waves of Covid-19.

Policy-makers are already concerned about the rise in energy prices, which hits Asia more than other regions. Therefore, central banks are likely to keep interest rates unchanged while signaling that their next moves will likely be towards monetary tightening.

After the pandemic shock and the subsequent extraordinary fiscal and monetary stimulus, it would seem only natural that the economic and political waves continue to buffet economies for a few more years. In a more volatile environment, burdening central banks with a range of potentially conflicting objectives might lead to tremendous policy concerns.

The risk is that central banks might see their hard-earned inflation credentials erode rapidly. As we learned during the 1920s in Europe and in the 1970s worldwide, high and volatile inflation is terrible for workers and businesses and can have dramatic political implications. Perhaps keeping central banks focused on boring old inflation is most needed right now.

IMI International Monetary Review

Green Finance

Walk the Talk*

By HAN SEUNG-SOO*

Climate change is no longer a looming threat of the future but a destructive reality that is already happening and threatening all humanity.

The international community has paid growing attention to the climate change issues since the early 1990s by formulating and adopting various strategies, conventions and treaties to address the challenges. But we might have been simply too obsessed with formulating and joining international treaties with too ambitious goals as targets that have never been fully realized.

It is encouraging to note that an increasing number of countries and companies are making a commitment to the Net Zero 2050 initiative. But setting that ambitious target does not guarantee that the desirable outcomes will be achieved. To reach the targets we have set and make real changes, we must take real actions.

Our actions to tackle climate change have unfortunately taken a back seat to the pressing challenge of the COVID-19 pandemic. Now, it appears that the efforts are concentrated on addressing social and health issues and reviving economies that have been severely disrupted by the pandemic.

The challenges before us are unprecedented. Historically, economic policies have mainly focused on stimulating economic growth while controlling inflation and unemployment. This time, however, we have to revitalize the global economy while managing the massive social crisis triggered by the COVID-19 pandemic and also pursuing decarbonization.

The challenge we are facing now is, in fact, operationalizing the concept of sustainable development. The idea of sustainable development was adopted in 1992 at the Earth Summit in Rio de Janeiro, where the international community unanimously welcomed the idea of enhancing economic growth while protecting the environment as well as promoting social development.

But despite this, the climate crisis has been exacerbated. Social disparities have widened and income and wealth inequalities have been aggravated. The pandemic and climate crisis are wake-up calls that we do not have any more time to spend in formulating strategies and setting goals, we have to initiate immediate and practical actions to operationalize the concept of sustainable development.

Although countries are well aware of the needs for increasing investments in climate actions, they are still hesitant to decarbonizes their energy and industry, believing that it might damage their economies and might lead to job losses. It is a sheer manifestation that understanding of the

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sustainable development as well as the interactions among economy, social and environmental development still remain rudimentary and not well established.

But we can no longer remain timid and hesitant. Deep decarbonization of industry and transformation of the energy system toward renewable energy should be viewed as an opportunity to promote green economic growth and job creation, while increasing investment in public health systems and social protection schemes should be regarded as a foundation for dealing with the current challenges and building back better from the COVID-19 crisis.

Although we understand the need for investing in a green economic recovery, we are still seeking the best way to operationalize the concept into real actions. Previous theories and knowledge can offer a very limit insight on how to do this.

This is why we have to pool our wisdom and share best practices through international cooperation. Unprecedented challenges such as the climate crisis and the COVID-19 pandemic call for even stronger international collaboration and partnership.

Carbon neutrality is not just a matter of energy transformation. Realizing the Net Zero 2050 objective requires a drastic departure from the traditional economic system where the price of carbon emissions is neither considered nor paid. We have to rebuild our economies and industry by taking into account the price of the carbon we are emitting.

Carbon neutrality requires innovations in energy technologies and industrial policies. Among others, carbon pricing should be introduced in the energy market, industrial restructuring and tax reform. We can no longer depend on the conventional approach of exploiting cheap fossil fuel without paying the price of carbon for rapid economic development. Investments in renewable energy and transformation for decarbonization are the drivers for achieving green and sustainable economic growth.

The paradigm shift toward a post-pandemic green recovery based on renewable energy and deep decarbonization has to be pushed by concerted and collective actions among major economies of the world. Peer pressure and collaboration among major economies mean they can lead on climate change, as they correct the market distortions caused by fossil fuel exploitation, and thus construct more favorable conditions for our carbon neutral future.

Collaboration among major economies for green recovery and decarbonization is necessary but not sufficient. Substantial support for the many developing countries lacking the capacity for energy transformation and green recovery is essential. It has to be effectively institutionalized through the Green Climate Fund and the Paris Climate Agreement.

Many important issues have to be extensively addressed and agreed at the upcoming COP 26 in Glasgow to be held in November this year. The United Kingdom, the host country, has an ambitious goal of accelerating actions for the mitigation of carbon emissions and scaling up of finance and support for developing countries.

We have spent enough time since 1992 when the United Nations Framework Convention on Climate Change was first signed, and learned enough to know that setting ambitious targets and delivering real climate actions to reduce emissions are two different things. In this regard, I sincerely hope that the COP26 United Nations Climate Change Conference does not make the mistake of confusing enhanced National Determined Contributions targets with the real climate actions.

I have seen too many COPs wasted by simply being obsessed on haggling over the target numbers, but missing the core issues such as carbon pricing and fiscal reform for decarbonization and mitigation. It is very important that the Glasgow COP act as a platform to implement real actions for decarbonization and to deploy concerted global actions for mitigating carbon emissions as well as to provide financial support to climate actions of developing countries.

IMI International Monetary Review

Green Investment, An Integral Part of Belt and Road Initiative*

By YASEEN ANWAR*

The Belt Road Initiative (BRI) and the importance of Climate Risk embedded in Green Investment Principles (GIP) complement each other in supporting Infrastructure tha tin itself is critical for economic development. The strategic geographical location of Kazakhstan is the gateway between Europe, the Far East, and the Middle East via Pakistan's ports. To ensure Central Asia extracts value and achieves success in economic development, we must overcome the challenges of global uncertainty and volatility we face on a daily basis as well as the geopolitical tensions and upheavals that are a daily phenomena that impact us all. Such uncertainties do not bode well for financial markets and economic development. However, one long term constant retains its consistency in support of global economic growth & development for all participating countries and that is the Belt Road Initiative (BRI). Why, because it provides access to capital to developing countries on a scale never before available in history for their long term economic development.

As a former Central Banker, I would like to highlight two key themes: 1) The importance of BRI/Central Asia & Pakistan going forward for economic integration & development (I underscore integration & development) and 2) Climate Risk with Sustainability for the new Central Asia GIP Chapter, its role, and road map going forward to make this region a robust & vibrant one. One that sets a benchmark of success for others to follow.

Regional integration being critical for success, I would like to cite a successful analogy. As an integrated region, ASEAN countries have established RCEP (Regional Comprehensive Economic Partnership) comprising 16 countries as of 2020. RCEP countries together account for one third of global domestic product (GDP) and nearly half the world's population. Within RCEP, 10 countries comprise the ASEAN region.

To bring economic trade in perspective, Trade within the ASEAN countries comprises approximately 25% of their total trade. On the other hand, the European Economic Community (ECC) and NAFTA (North America Free Trade Agreement) comprises 63%. Corrective steps obviously need to be taken by ASEAN to achieve optimal intra-regional benefits.

Supply Chains are shifting in ASEAN as the region works on connectivity across SouthEast Asia and China and concurrently will hasten implementation of BRI as these countries' infrastructure will be enhanced with increased business activities and better Investment opportunities.Leading Logistics Firms in Singapore are rapidly shifting gears to adapt and adjust to serve Client needs in a cost effective manner.

Now why do I cite Singapore and ASEAN? Because of its success!

In contrast, Central Asia Republics & Pakistan is the least integrated region in the world and is exposed to exogenous shocks experienced globally from the 2008 GFC (Global Financial Crisis). Global and regional integration requires uniformity, equality, and common attributes in Financial Markets which we do not have. I should point out that Pakistan is the largest single recipient

*This is a keynote speech at the Central Asia Green Growth Forum (GIP) in Kazakhstan on July 2, 2021.

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country under BRI with $62 Billion and has already developed some of the largest infrastructure projects, particularly in Power. The country can be an important pivot between China, Central Asia, and Middle East/Africa.

The importance of Central Asia under BRI centers on two of the six economic corridors under construction that run through the region: 1) the China-Central Asia-West Asia Economic Corridor and 2) the New Eurasia Land Bridge.

These two Central Asian BRI economic corridors could merge and connect with the northern route of the China Pakistan Economic Corridor (CPEC) and enter China. The land locked countries would have access to the favored port of Gwadar, opening a wider corridor to the Middle East/Africa and vice versa. The current CPEC projects in Pakistan emphasize the projects that will benefit these economic corridors in Connectivity, Information network, Infrastructure, Energy, Industry & Industrial Parks, and Agricultural Development projects.

Trade currently within the Central Asian Republics& Pakistan is limited and the following areas have the potential to increase exponentially:

- Hydrocarbons (crude oil & natural gas) and metals are the leading items exported by the Central Asian states. Setting up of oil pipelines will allow for more efficient movement of these products.
- Pakistan's SEZs, once fully functional for the Industrial sector, will enhance the country's productive capacity and provide a major impetus for economic and social development through new Supply Chains.
- The Agriculture sector should be mechanized with technological advancement that would increase both productivity and quality of the output produced. Logistical hurdles once removed, will make regional trade within Central Asia and with M.E./Africa more economically feasible.
- Finally, cultural integration will open new tourism opportunities and expand this segment towards Socio-Economic growth.

In order for regional integration to succeed, Government Policies in conjunction with GIP can play an important role with well coordinated leadership to implement principles in support of BRI with over 100 countries that emphasize ESG standards. This in itself is GIP's strength as opposed to embarking on an individual and fragmented ad hoc approach. A testament of its strength is being an important part of this Forum.

However we are at the tip of the iceberg as we move forward to incorporate the projects already in the global pipeline under BRI. Investment consultants estimate the ESG market globally to comprise more than $40 Trillion. As such, we need to educate, elevate knowledge, monitor and influence the Urbanization of developing nations as well as the demographic trends to ensure ESG standards are met with sustainability.

This leads me into my second theme of Climate change that has become a risk that is too important to ignore. To Ravi Menon, Managing Director of the Monetary Authority of Singapore, "Climate change presents significant risks to the financial system. At the same time, the financial sector plays a key role in the fight against climate change. 1) Finance is key to unlocking a sustainable future and 2) It can support the transition to a less carbon intensive economy by channeling capital to green technologies and infrastructure".

The President of Kazakhstan reaffirmed in his recent address at the Climate Ambition Summit that Kazakhstan has taken a course for a deep decarbonization of the economy and the development of a circular economy, committing to become a carbon-neutral country by 2060. Uzbekistan intends to move to carbon-neutral electricity production by 2050. In 2018, Kyrgyzstan adopted a Concept on Green Economy aimed at significantly reducing risks to the environment, preserving the country's natural ecosystems and increasing natural capital. So, the countries in Central Asia have committed to transition to lower-carbon economies and are gradually working

out measures to reduce greenhouse gas emissions, develop renewable energy sources, and raise energy efficiency.

These commitments are commendable and AIFC in Kazakhstan, within its jurisdiction, is working on the development of a green capital market (taxonomy, Green bond rules, support of green bond issuers, proposals to Environmental code and subsidy schemes for green projects, etc). In order for effective implementation, it is imperative to align the entire financial system with sustainable development, involving the national financial regulators and all market participants. In fact, GIP can be instrumental in supporting the financial sector transition to a greener path.

Furthermore, the Central Bank and Regulator need to lead in strengthening the financial sector against environmental risk. We need to enhance environmental risk management in our financial institutions and also elevate sustainability related disclosures. In fact I am actively involved with the State Bank of Pakistan that has already embarked on this program by forming Working Groups, Steering Committee, and a road map for training programs over the next year.

As mentioned earlier, climate change has become a risk that is too important to ignore.

- The world needs to sharply reduce greenhouse gas emissions if we are to limit global warming to well below 2, and preferably 1.5 degree Celsius above pre-industrial levels as committed under the Paris Agreement.
- This implies a major transformation of economies and societies; affecting how we work and how we live.
- The National Academy of Sciences has forecasted that 1/3rd of the global population will need to relocate by 2070 due to climate change i.e. relocation due to unlivable conditions.
- The transition is not only about renewables and electric cars; Greening will have to take place across all industries: Steel, cement, mining, building, construction, maritime, agriculture, etc.

In addition Sustainable Investing is becoming a high priority:

- Interesting to note during the Covid-19 Pandemic, carbon emissions were down by approximately 17%.
- Blackrock, the largest Asset Manager, announced last year it has made sustainable investing a cornerstone of its long term objectives and currently has over $90 Billion in its ETFs that comply with ESG standards.
- Recently Temasek, the Singapore Sovereign Wealth Fund, took a 3.9% stake in Blackrock in support of sustainable investing. The Monetary Authority of Singapore (MAS) has established a dedicated office to promote ESG standards in its banking sector.
- ICBC Sg in 2019 launched a $2.2 Billion multicurrency BRBR bond in support of BRI related projects.
- HSBC recently announced a JV to form the world's largest natural capital manager targeting $3 Billion. This JV will be the first large-scale venture to mainstream natural capital as an Asset Class.
- G.E. last year announced it was exiting the Coal Fired power plant business.
- Both Public & Private Sector interest is positive and moving in concert to support Green Finance.

It is evident from the facts I have cited, that the world has recognized Climate Risk as a critical area and I would like to outline the key areas that GIP will focus on for the new Central Asia Chapter:

- The key role of the Central Asia Chapter is to engage more closely with local stakeholders, including financial institutions, regulators, MDBs and research institutions;

- The core function of the Chapter is to help disseminate GIP related knowledge of products and activities, build capacity for green and sustainable investment, as well as solve practical problems faced by investors and corporates who wish to make more green investments;
- The Chapter will also try and bridge the information gap on green projects by collecting project information by sharing with GIP members through its green project database;
- The Chapter will be encouraged to host its own activities focusing on regional needs, while connecting with other chapters and the GIP global secretariat.
- The Chair and Chapter will be available to answer questions to the GIP and could facilitate any prospective institutions in becoming GIP members.

In conclusion, I would like to underscore the huge opportunity we have in showing to the world how the Central Asia region can assimilate its knowledge base and resources to develop a clear long term path to carbon neutrality. The transition to a net zero economy is the greatest collective endeavour we must undertake going forward. How Capital is allocated to support this effort is a priority, and as Central Bankers, Regulators, and Financial Institutions, we have a responsibility to direct investments to activities that promote sustainable development. Let us all work together to achieve that goal for a better future.

IMI International Monetary Review

Carbon Neutral Green Finance: China May Take the Lead into a Post-Pandemic World

By PETER KOENIG*

How the pandemic will be reshaping the world, especially in terms of economic recovery and especially the western world, remains to be seen. So far, western economic, social and health restructuring policies are chaotic, disorganized and totally uncoordinated. Western countries are skipping from lockdowns to "opening up" back to lockdown, from the first covid-wave, to the second and the third and now approaching the fourth. Looks like there is no end in sight.

One could almost think they do it on purpose, to keep people confused and easily manipulated.

What happens in China is a different story. China is the only significant world economy – the second largest for now in absolute terms, and the largest in PPP (purchasing power parity terms) – that has put her economic and financial mechanism fully back onstream. Consequently, the Chinese supply chain – on which the rest of the world largely depends – i.e., on pharmaceuticals to 90% - works again in full force. It is rather western ports that are still – or again? – partially closed to receive cargo container ships, especially from China, causing dangerous supply shortages at home.

China is moving forward, always creating and leading initiatives, despite all odds, harassments, outright interferences and lie-based "sanctions" from the west. In this context and already looking into the future, into a post-covid future, China is displaying her Green Agenda, towards a carbon neutral – not only China – but world.

Following the idea of President Xi Jinping's, of promoting a New Era of Eco-civilization, the Eco Forum Global Guiyan, for short EFG, has been held successfully for 10 sessions since its inception in 2009.

As a side line – Guiyang, according to the Nature Index, is one of the top 500science cities in the world by scientific research outputs.

EFG is the only international high-profile forum in China themed on Eco-civilization at the state-level.

Let me venture saying, the Eco Forum Global Guiyang is, so far, the only international forum of such tenor and action that may and hopefully will expand into a global movement aiming at drastically reducing the world's carbon footprint – in short, accelerating the objective of making our civilization, our life on earth, carbon neutral – and, thereby, healthier.

To be clear, "Green Finance" is often confused, especially in the west. For example, investing in electric cars, when most of the electricity is made from not only unrenewable but also highly toxic CO2-producing hydrocarbon – is not a Green Investment. This is still predominantly the case in Europe and North America.

This does not even take into account the environment-unfriendly mining and often unhealthy work-conditions of exploiting and manufacturing lithium into car batteries.

The world's chief energy source, hydrocarbons, has hardly changed in importance in the last 30 years or so. It still amounts to about 85% of all energy used in the world. This just indicates that

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so-called “green investments”, especially in the west, are mostly “fake” green investments, a new mode of sheer profit-driven capitalism.

These “green” investments have not even come close to a zero-carbon balance. To the contrary. The production of “green investments” used generally hydrocarbon, which lowers the energy efficiency drastically. This is clearly demonstrated in the low energy efficiency of electric cars, on average 35% to 40%, versus cars using straight petrol or gas-based energy.

This is, of course, not to advocate the continuous use of hydrocarbons. Quite the opposite. But strongly suggests investing in research to come up with real novel carbon neutral, or even carbon negative sources of renewable energy. Such investments most likely do not yield “instant profit”, as is the key incentive and neoliberal investment motive, but such research investments are directed towards long-term societal benefits for all humanity.

Real Green Investments are for example, exploiting renewable and carbon-free sources of power, such as hydropower – wind, solar and tidal energy, with the latter taking advantage of the natural and eternal movements of the sea.

China will also continue being a world example of building “Green Cities”; investing in parks and “green housing” – housing units with plant façades – that absorb urban CO2 emissions from industry and transport.

These are Green Investments, as long as their dependence on hydrocarbon energy is way below the CO2output of the Green Investment itself.

The traditional, huge, costly, and maintenance-heavy hydropower dams ought to make way for a new generation of hydropower production: namely, small, localized, low-maintenance and even mobile hydropower plants. The latter for use in desertic and monsoon-type flash-flood prone areas. A prime example is Yemen, one of the world’s most arid countries, where floods come when it rains, but where perennial water flows are rare.

Finally, the real challenge is investing and researching in a new generation of exploiting solar energy…. the most efficient way of using solar energy –is by photo synthesis. This is what plants do to convert the energy of the sun. An estimated 95% energy efficiency might potentially be achieved, as compared to the current use of solar panels with a best-case of energy efficiency of 30% or less.

Imagine the energy freedom humanity would gain by exploiting solar energy by photo-synthesis! Almost unthinkable. But not impossible by any means. When sincere minds come together, impossible dreams become reality.

In addition, the production of solar panels which have a limited life, requires enormous quantities of energy – energy which is currently mostly produced by hydrocarbons. Plus, solar panels have an average life span of 25 – 30 years, after which they need to be destroyed – or recycled, both are energy-dependent and environmentally challenging.

President Xi Jinping in his address for the 100-year Anniversary said – “We must unite and lead the Chinese people in working ceaselessly for a better life.” And, further “We must uphold and develop socialism with Chinese characteristics.”

These words signal, creating a new model for human advancement that is leading the way into a Green China – a China where socioeconomic development meets the concept of carbon neutrality. This sounds like a challenging but terrific initiative – one of many – for China leading the way into a post-covid era.

President Xi further stated - “We must ensure and enhance public wellbeing in the course of development, promote harmony between humanity and nature, and take well-coordinated steps toward making our people prosperous, our nation strong, and our country beautiful.”

China may want to take this a step further. Using the Belt and Road Initiative through joint efforts, and joint ventures in Green Investments, inside, as well as outside Chinese borders, thereby providing the world with new opportunities towards improved and carbon-free standards of living. The focus always being on mutual benefits.

True to President Xi’s words: “We must continue working to promote the building of a human community with a shared future.”

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Climate Change—Our Most Global Challenge*

By ZHANG TAO*

I. Introduction

This past year-and-a-half has been filled with challenges, and at times, displays of unprecedented resilience. Each of us has been touched in one way or another by the pandemic and economic lockdowns. But if there's one silver lining to this dark cloud, it is that people now realize how fragile our existence on this planet can be. There is now renewed emphasis on the threat posed by climate change, as well as on the need to take urgent action.

In my remarks today, I want first to lay out what I will call a globalist view, emphasizing that climate change is our most global challenge. Then, I'll discuss different climate policy instruments that governments have at their disposal. And I'll conclude with a discussion of how domestic policy can be supported internationally.

II. A globalist view

Let me start with what we're facing globally today—namely, fighting the pandemic. As the IMF's Managing Director, Kristalina Georgieva, likes to say, the pandemic won't be over anywhere until it's over everywhere. The virus does not respect borders.

Borders are even more irrelevant, however, when it comes to climate change. The national origin of greenhouse gas emissions makes absolutely no difference in terms of their impact. We all share the same atmosphere. The externality here is perfect and complete.

So how should we address this most global challenge? I'd like to suggest a few principles.

First, we must work together. Of course, people already recognize this—that's why we had the Paris Agreement, which has given us a global architecture under which to move forward, and that's why we'll soon have COP26. Indeed, it is exactly the same reason why we're gathering in this conference.

But despite these important steps, we may need to go further to achieve a fully global outlook in our thinking. This means that we should collectively assess where and when it makes sense to abate emissions, and we should also collectively decide how to deal with any economic costs that this mitigation effort may bring.

Indeed, we may not have much of a choice in front of us—the entire world, after all, will need to get to net-zero emissions, and sooner rather than later. But to the extent that there are decisions to make, we should make them together.

Second, we must look for win-win opportunities—and we can succeed if we work together.

In decades and centuries past, of course, industrialization and development were unavoidably accompanied by greenhouse gas emissions. But if we infer from this that reducing emissions today will inexorably lead to economic contraction, we are taking far too narrow a view. In the 21st century, we are not condemned to tread the same path and make the same mistakes that our predecessors did, and we must lean forward to achieve win-win-opportunities. Indeed, good mitigation policy can often largely pay for itself, and combating climate change may actually further development, rather than hindering it. The evidence is quite strong that the tradeoff between the economy and climate is much smaller than people think.

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*This speech was given at BIS/BdF/IMF/NGFS "Green Swan" Conference.

*Zhang Tao, Deputy Managing Director, IMF

Why is this?

First, we have modern technologies and an economic structure more tilted toward services that make production less dependent on fossil fuels. Furthermore, to the extent that we introduce climate policies, these themselves will induce additional technological change into clean-energy sectors of the future, with major positive spillovers to growth.

Second, cutting coal, diesel, and other fossil-fuel usage often yields substantial local co-benefits such as less air pollution and improved health, and these directly boost economic outcomes, as well as other, broader measures of welfare. These co-benefits are particularly important in developing countries, and especially among the poor in these economies.

Third, carbon pricing can yield substantial revenues, and these can be used to reduce other, more distortionary taxes, to finance productive investment—including green investment—and also to support individuals adversely affected by climate policies.

In our World Economic Outlook report last October, we showed that a policy package including a rising carbon tax and a frontloaded green investment stimulus could actually boost growth and create millions of jobs over the medium term, all while effectively reducing emissions and protecting the vulnerable.

Does this picture look too rosy? Well, we shouldn't take win-win opportunities for granted. Achieving them in practice will take a lot of smart thinking and adept implementation. Along the way, some countries and population groups may face a wide range of economic costs.

This then leads to my third point, which is that we must be fair in order to succeed.

To start with, defining what's fair is often very tricky, and it's easy for people to end up pointing fingers at one another. Some observers look at today's large emitters and say that they need to shoulder much of the responsibility for global mitigation. Others focus instead on cumulative historical emissions and identify another set of countries as the main culprits. In the same way, while much of the debate centers on total emissions (whether historical, current, or prospective), others emphasize emissions per dollar of GDP. Yet others focus on emissions per capita, reflecting, perhaps, a view on each individual's intrinsic rights to use nature's resources.

I don't want to wade into this debate. But I do believe that we need to acknowledge these different perspectives—they were all represented at the Paris negotiating table, and they continue to inform the ongoing debate.

Nonetheless, we must recognize that poorer countries want—indeed, demand—the right to pursue their own development trajectories. We also have to factor the need to protect the poor and vulnerable—wherever they are—into any global solutions we come up with.

I strongly believe that, as we move forward, we need to respect these principles—working together, looking for win-wins, and being fair. Fortunately, the Paris agreement already gives us a framework to deal with these issues: advanced countries are expected to pledge more stringent near-term mitigation, accompanied by a commitment to provide $100 billion per year to support climate action in developing economies.

III. Choice of policy instruments

So let's now move to the role of national policies and how to choose policy instruments to combat climate change.

Let me begin by emphasizing that in choosing policy instruments, there is no one-size-fits-all solution, or silver bullet. The journey in front us is unprecedented, and we must be humble. We have already seen countries pursue different policy approaches, reflecting their specific circumstances and preferences.

This conference is focused on the financial sector, and rightly so. The financial sector certainly has an important role to play, both in mobilizing the green finance that the world will need, and in

making itself resilient to the physical and transition risks from climate change. Many speakers today have already shared their insights on these important issues, and many others will do so during the rest of the conference. For example, there are important steps that regulators and supervisors need to take, in terms of improving the availability of data, developing common taxonomies, improving the disclosure of climate information, and developing methodologies to quantify climate risks.

But let me be perhaps slightly provocative and say that none of this will work effectively unless the government creates an enabling environment. Without the fundamental incentives in place that only governments can introduce, people and firms—including those in the financial sector—simply will not fundamentally change their behavior and move away from carbon-intensive activities.

When economists think about which government policies can most effectively enable a pro-climate orientation, carbon pricing immediately comes to mind. Regulatory approaches certainly have their place—though economic theory would tell us they are less flexible and less efficient than market-based approaches. Sectoral policies, feebates, and a host of other tools also have a role. But charges on carbon content are believed to be the most effective and efficient instrument, providing incentives to reduce energy use, as well as to shift to cleaner fuels and to direct investment toward clean technologies, all while generating much-needed revenues.

Carbon pricing can be implemented in different ways. One possibility, of course, is a carbon tax, which can provide more certainty over emissions prices and thus help to mobilize investment. Carbon taxes are also relatively straightforward to administer—they can be built into existing road and fuel taxes, and similar charges can be applied to other petroleum products, coal, and natural gas. Carbon tax revenues also accrue directly to finance ministries, which are used to handling these flows as well as the budget.

Emission trading systems are another example. They can mimic the advantages of carbon taxes. But allowances would need to be auctioned (in order to generate revenues), price stability mechanisms like price floors would be needed, and in general, the administrative requirements may be more onerous than with a tax. Trading systems have been implemented in, for example, the European Union and Korea, although so far they have focused on the power and industrial sectors. And China will launch a nationwide scheme this month, based on a tradable performance standard.

IV. Role of the international community

So we see a wide range of policy instruments are on the table. But no matter what policy instruments are chosen, it can be difficult for any one nation to aggressively decarbonize on its own. The international community can play an important role in helping to coordinate governments' actions globally. Here I'd like to emphasize three aspects in particular.

First, we at the IMF believe that a differentiated international carbon price floor could complement and reinforce the Paris agreement. This would cover all emissions and could begin with, for example, the G20 and the European Union. Simultaneous action to scale up carbon pricing would be the most effective way to address countries' concerns about industrial competitiveness, which could arise if they were to act unilaterally. The price floor could be differentiated to account for countries' different levels of development, and it could be designed to also accommodate ambitious regulatory approaches that may not impose an explicit price on carbon but do imply a shadow price.

We believe the price floor would reduce the need for unilaterally imposed border carbon adjustments, which only price emissions in trade flows—typically a small proportion of total emissions. Border adjustments also need careful design to contain administrative costs—for

example, by limiting their coverage to energy intensive, trade exposed industries. And they need to navigate legal risks under the rules of the World Trade Organization.

The international community can play a second critical role by mobilizing climate finance and technology transfers. These can incentivize increased climate ambition among recipient countries and reduce the need for either differentiated price floors or border carbon adjustments.

Of course, climate finance can take a number of forms.

Perhaps the simplest and most straightforward mechanism would be outright grant and loan assistance, as well as technology transfers. I want to emphasize that this is not a matter of charity. The $100 billion commitment was a critical part of the Paris agreement—a way of allowing the world to take advantage of its least-cost mitigation opportunities, many of which exist in developing economies, and an important tool to ensure equitable burden-sharing. The question now is whether the world will step up and meet this commitment.

Offsetting is another proposed vehicle for climate finance. With voluntary corporate offsets, those with cheap mitigation opportunities exercise them, and those without can pay instead. Offsetting applied at the level of the sovereign may also have a role to play. Verifying the additionality of abatement paid for by offsets could be a challenge, but it is one that many are working to address.

Debt-for-climate swaps are yet another possible form of climate finance and something that we are collaborating on with the World Bank, though it remains to be seen how large a role they will play.

These are just a few examples, but whatever the precise modality, the transfer of both financial resources and needed technologies from richer countries to poorer is of critical importance in the fight against climate change.

Finally, let me mention the contribution that international organizations can make. Through their analysis, policy advice, and technical assistance, these organizations can elevate the effectiveness of their member countries' policies to fight climate change, harness momentum for climate action, and further raise awareness of climate issues. And through their convening power, they can also help to promote policy coordination across countries.

At the IMF, we are representing our near-universal membership to ensure solutions work for all countries. We are mainstreaming climate issues into our surveillance and other operational activities, while remaining true to our mandate, and we are leveraging external expertise through our close collaboration with other institutions, including the World Bank, BIS, and others. We are also exploring whether members with strong external positions would consider channeling a portion of their potential new allocation of Special Drawing Rights, or "SDRs," to members with financing needs, including for green purposes.

V. Conclusion

So let me conclude by saying that we are at a critical moment. Actions we take during the next 5 or 10 years will determine whether we will succeed in keeping global temperatures from rising more than 2 degrees. I am actually quite optimistic, as there are ways to decarbonize that should also be good for growth and jobs, if we do things right.

Each of us has our role to play—governments, the international community, and the private and financial sectors too. But we need to play those roles together, in a complementary fashion. Now more than ever, we need to join together to address climate change, our most global challenge.

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From Market Neutrality to Market Efficiency*

By ISABEL SCHNABEL*

On behalf of the European Central Bank (ECB) and the co-organizers – the Centre for Economic Policy Research (CEPR) and the European Bank for Reconstruction and Development (EBRD) – I am pleased to welcome you to the Symposium "Climate Change, Finance and Green Growth". While all of us would certainly have preferred to convene in person, the event's virtual format does at least have the welcome side effect of lowering our carbon footprint.

The programme of the Symposium is highly topical: it features six state-of-the-art academic papers and a moderated discussion focusing on the interaction between climate policies, financial markets and sustainable development.

The Symposium underscores the ECB's commitment to better understand the consequences of climate change for output and inflation, to explore the role that central banks can play in fostering the transition to a low-carbon economy, and to support high-quality academic research on climate change.

In view of the Symposium's agenda, my opening remarks will focus on the scope for the ECB to contribute to the global fight against climate change. While this topic is also an important element of the ECB's ongoing monetary policy strategy review, my remarks should not be seen as an indication of its eventual outcome.

A global challenge for everybody

There can be no doubt that broad-based action is urgently needed to mitigate climate change and its consequences.

The primary responsibility for climate change policies clearly lies with governments. Under the European Green Deal, the EU has recently adopted a broad range of initiatives to accelerate the transition to a green economy.

But although governments have to lead the charge against climate change, the global and all-encompassing nature of this historic challenge means that everybody has to consider how they can contribute. This applies in particular to policymakers, including central banks.

Global carbon pricing alone, while being seen by many economists as the key tool in addressing climate change, will not be sufficient to ensure a swift transition to a carbon-free economy.

Financial markets play an essential part in funding this transition. This was one of the main messages of President Lagarde's recent speech on a "green capital markets union". Recent evidence points to the crucial role of banks in funding energy-efficient investment projects. Empirical studies also suggest that high equity investment underpins the transition by flexibly allocating funding to low-carbon sectors, as well as by supporting green innovation in carbon-intensive sectors. Finally, research indicates that green bond issuance by companies may be associated with an improvement in their environmental performance.

However, environmental externalities due to missing or insufficient carbon pricing mechanisms continue to distort the pricing of climate risks by financial markets, thus decelerating the green transition. Since climate change is partially irreversible, such delays could prove detrimental.

*This speech was given at the ECB DG-Research Symposium "Climate change, financial markets and green growth" on 14 June 2021.

*Isabel Schnabel, Member of the Executive Board of the ECB

In fact, the preliminary results of the ECB's ongoing economy-wide climate stress test illustrate that the magnitude of long-term physical climate change risks by far exceeds the short-term transition costs associated with more stringent mitigation policies, as described by Vice President de Guindos in a recent blog post. Other research corroborates the finding that an early and orderly transition is likely to reduce the extent of economic disruption associated with climate change.

Central banks can act as a catalyst to facilitate an orderly transition towards a greener economy. Although central banks' leeway to address climate risks within the remit of their mandate is still subject to debate, there are an increasing number of commentators who argue that central banks should take the implications of climate change into account.

First, central banks should ensure that climate risks are adequately incorporated both in their own risk management and in that of the financial institutions they supervise. Second, central banks can have an important role in fostering climate-related information disclosure by firms and financial institutions. Finally, central banks have an array of potential instruments at their disposal to incentivise the issuance of green financial products.

However, we need to proceed with caution: as a European institution with statutory independence, the ECB is strictly bound by the provisions of the Union's legal framework.

Before considering specific avenues to address the implications of climate change, we therefore need to thoroughly explore whether the Treaties provide a sound legal basis for the ECB to support society's collective effort to combat climate change.

The legal basis for ECB policy action

Both our primary and our secondary mandate provide potential legal foundations for the ECB to consider its role in addressing the challenges arising from climate change.

In fact, as I have argued previously, our primary mandate requires us to take climate change into account if its consequences pose a threat to price stability in the euro area. Emerging evidence suggests that climate change may indeed hamper the transmission of monetary policy to the real economy, affect potential growth as well as the equilibrium real interest rate, and increase macroeconomic volatility.

If climate change does pose a danger to price stability, the provisions of the Union's legal framework dictate that the ECB would need to take – possibly pre-emptive – action to safeguard the continued fulfilment of our primary mandate.

Our secondary mandate could provide an additional justification for taking climate change into consideration in our monetary policy decisions: it obliges the ECB to ensure that our measures support the general economic policies in the EU, with the important restriction that our actions must not prejudice our price stability objective. Our supporting role means, however, that we neither have the primary responsibility for these policies nor the power for autonomous policy-making to address climate change.

The high priority that European policymakers have attached to climate policies can guide the ECB when carrying out its supportive role and help justify the incorporation of climate change considerations into our monetary policy framework under our secondary mandate.

These considerations imply that the Treaties provide a solid legal basis to explore the ECB's leeway for policy action under the primary and secondary mandates. But even a favourable legal assessment would still beg the question of how the ECB should operationalise its policy support to accelerate the green transition.

What could the ECB do?

A growing number of policy proposals suggest that the ECB should modify its monetary policy framework in order to more explicitly address climate considerations. The public debate has largely focused on our asset purchases.

However, the implementation of our asset purchase programmes is only one potential lever the ECB could use to address climate change. There is a wide spectrum of other possible avenues that the ECB and other central banks could pursue to contribute to the global fight against climate change.

It is widely acknowledged that the ECB should adapt its macroeconomic models to better integrate climate change-related risks into our monetary policy decisions. Such an adjustment of our models will, for example, improve our theoretical and empirical understanding of how climate risks affect the monetary policy transmission mechanism.

Any climate change policy hinges on the availability of reliable data. The ECB can contribute to developing statistical indicators at granular and aggregated levels. The availability of better data could, in turn, underpin harmonised climate-related disclosures. There is substantial scope for progress on these fronts and the ECB could lend crucial support to initiatives in these areas.

For example, we have already committed to enhancing our own climate-related disclosures by measuring greenhouse gas emissions and other sustainability metrics of our activities, starting with our non-monetary policy portfolios. This endeavour builds on the extensive work that has already been conducted by the Network for Greening the Financial System (NGFS), chaired by my colleague Frank Elderson, and the Task Force on Climate-related Financial Disclosures (TCFD).

Furthermore, we could amend our collateral framework, for example by including innovative financial products as eligible collateral, as we have recently done with the acceptance of sustainability-linked bonds, or by linking the eligibility as collateral to more comprehensive disclosures, reflecting European legislation such as the Corporate Sustainability Reporting Directive (CSRD). Such a step could support the development of consistent disclosure practices across Europe.

There is also scope to incorporate climate risks into our stress tests, both in our own risk management practices and in our supervisory activities. The ECB is currently conducting a comprehensive top-down stress test to evaluate the risks associated with economy-wide climate exposures. In 2022, the ECB will complement this work by carrying out a separate supervisory climate stress test of individual banks.

Finally, central banks can contribute to cutting-edge academic research on the macroeconomic ramifications of climate change. The ECB's research department is working on an ambitious climate change research agenda and aims at further intensifying the exchange with other central banks and with the academic community. This Symposium is an example of institutional collaboration that advances the current frontier of knowledge.

These considerations have three important implications for the ECB.

First, central banks have a range of instruments at their disposal. While our mandate imposes certain restrictions on our ability to act, combining some or all of these instruments could serve as a powerful contribution to accelerating the green transition.

Second, despite the variety of the instruments in the toolkit, they all have one thing in common: they show that central banks can act as a catalyst and thought leader by prompting other financial market participants to pre-emptively enhance their analysis of and resilience to climate risks.

Third, the array of possible tools suggests that central banks should employ an all-encompassing approach in adjusting their instruments and monetary policy framework to enhance climate protection, within the remit of their respective mandate.

This includes scrutinising well-established conceptual frameworks that have previously guided the implementation of our monetary policy.

In the context of the ECB's asset purchases, the shortcomings of the market neutrality principle illustrate the need to reconsider the merit of previous practices that may be at odds with fostering the transition to a carbon-neutral economy.

From market neutrality to market efficiency

So far, the market neutrality principle has guided the implementation of our private sector asset purchase programmes. Other central banks have followed similar principles to reduce price distortions from their asset purchases.

While the concept of market neutrality is related to the Treaty principle of "an open market economy with free competition, favouring an efficient allocation of resources", it is not per se a rule in primary law.

The ECB already now deviates from market neutrality in several instances. For example, the application of eligibility criteria for purchases implies that the ECB's bond holdings are not necessarily proportional to market capitalisation. Furthermore, under the public sector purchase programme (PSPP) and the pandemic emergency purchase programme (PEPP), sovereign bond purchases are guided by the ECB's capital key rather than market capitalisation.

As I have argued before, the existence of climate externalities implies that we have to reconsider the notion of market neutrality. In the presence of market failures, adhering to the market neutrality principle may reinforce pre-existing inefficiencies that give rise to a suboptimal allocation of resources.

The Treaty clearly stipulates that the ECB should pursue its mandate by favouring an efficient allocation of resources. If the market misprices the risks associated with climate change, adhering to the market neutrality principle may instead support a market structure that hampers an efficient allocation of resources.

In view of such market failures, it seems appropriate to replace the market neutrality principle by a market efficiency principle.

Such a principle would explicitly recognise that a supposedly "neutral" market allocation may be suboptimal in the presence of externalities. It would allow us to acknowledge that market failures may drive a wedge between market prices on the one hand and efficient asset values that internalise externalities on the other.

Nevertheless, in line with the provisions of the Treaties, considering climate externalities under the market efficiency principle would need to be consistent with maintaining a functioning price discovery mechanism. Furthermore, monetary policy implementation in line with the market efficiency principle would need to remain without prejudice to our primary mandate of safeguarding price stability.

One possible objection to the market efficiency principle is that efforts to mitigate environmental externalities could be counterproductive, as they might simply amplify other types of market failures.

However, this objection cannot provide a justification for refraining from action altogether. A classic finding in the economic literature – the theory of second best – illustrates that, in the presence of many market failures, leaving one failure unaddressed is suboptimal. Conversely, addressing a particular market failure has the potential to improve the overall allocation of resources, even if it worsens some other market failure.

Nevertheless, transitioning from the market neutrality principle to the market efficiency principle would entail implementation challenges.

Implementation considerations

The application of the market neutrality principle implies that our corporate sector purchase programme (CSPP) currently exhibits an inherent bias towards large firms in carbon-intensive industries. This emission bias appears to be driven by firms' underlying issuance behaviour: large firms in carbon-intensive sectors are more likely to enter the bond market, which results in the ECB's CSPP portfolio having a relatively high emission intensity.

In greening its asset portfolio, the ECB could pursue several alternative strategies. Some have argued that we should implement outright exclusion policies – also known as negative screening policies – by stopping purchases of bonds issued by polluting sectors. Such policies have the drawback that they would eliminate incentives for firms in carbon-intensive sectors to reduce their greenhouse gas emissions.

Another possibility would be to pursue a more sophisticated "tilting strategy" under which the ECB could adjust its monetary policy operations more gradually in line with sustainability considerations. The operational implementation of such a tilting strategy also faces hurdles, for both our private and our public sector purchases.

For our private sector asset purchases, a tilting of the ECB's purchases could, in principle, reduce potential mispricing. Given the still nascent state of the green bond market, tilting towards this particular market may, however, adversely affect market liquidity or unduly influence the price discovery mechanism. Therefore, one could consider tilting strategies that also favour issuers that have a clear path and commitment to reducing their greenhouse gas emissions. Tilting strategies could be performed at the level of sectors, firms or bonds.

Considering climate-related criteria in our public sector purchases poses even bigger challenges. First, our public sector purchases are typically guided by the capital key, thus limiting the scope for tilting strategies. Second, green bonds currently account for only a negligible share of public sector issuance in the euro area. Third, the availability of comparable climate-related data for sovereign issuers is limited.

These and other considerations are key elements of our ongoing strategy review. In line with a recent NGFS publication, we will carefully evaluate potential implementation strategies based on their potential contributions to mitigating climate change, their operational feasibility, their capacity to reduce our own risk exposure, and their consequences for monetary policy effectiveness.

Despite these implementation challenges, it is imperative that central banks ambitiously explore the scope for adjusting their monetary policy operations to take climate change into account within the limits of their legal mandate.

Conclusion

Let me conclude.

Even though governments should assume the leading role in the global fight against climate change, central banks cannot remain idle. As part of society's collective effort to combat global warming, we have a responsibility to explore our capacity to act.

Financial markets play a pivotal role in funding green innovation. Central banks, in turn, can help guide the actions of market participants. By providing early indications of our planned policy measures and setting an example for other financial market participants, we can act as a catalyst to help accelerate society's transition to a carbon-neutral economy in line with our mandate.

Our ongoing strategy review provides an opportunity to reflect on the adequacy of concepts such as the market neutrality principle and to explore ideas for other benchmarks that could guide the implementation of our asset purchases. A transition from the market neutrality principle to the

market efficiency principle would be an important step in acknowledging the presence of climate externalities.

However, the consequences of any potential policy initiatives need to be thoroughly evaluated against the limitations stipulated by the Treaties. Our measures must always remain without prejudice to our primary mandate of safeguarding price stability.

The joint ECB/CEPR/EBRD Symposium offers a timely opportunity to discuss the immense challenges posed by climate change. We look forward to hearing your views on how all of us – academics and policymakers alike – can contribute to understanding and tackling one of the greatest challenges of our time.

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Transparency and Market Integrity in Green Finance*

By AGUSTÍN CARSTENS*

As General Manager of the Bank for International Settlements (BIS), let me welcome all of you to this conference. I would like to acknowledge the effective partnership with the Bank of France, the International Monetary Fund (IMF), and the Network for Greening the Financial System (NGFS) in organising this impressive event. The enthusiastic response from all of you – coming from a wide spectrum of sectors and regions – is a testament to the fact that the topic of climate change is of critical relevance.

As Minouche Shafik mentioned in her brilliant introductory remarks, it has been seven years since Mark Carney gave his seminal speech at Lloyd's of London where he argued that climate change posed serious financial stability risks.Since then, central banks have increasingly improved their ability to recognise climate related issues, while also being mindful of the scope of their roles and mandates.

While the climate crisis is not the sole or the primary responsibility of central banks and financial authorities to solve, given the nature of the problem itself, the central banking community increasingly recognises that taking action against climate change is paramount, and that doing so requires a significant amount of coordination across and within jurisdictions and sectors. There is no "silver bullet", and no single country or organisation can be successful alone. Climate-related financial risks are both local and global; they require countries to work together, especially now that over one hundred Governments expressed commitment to a net zero (carbon) approach.

To address the key financial aspects related to a potential solution for the climate crisis, the essential players are:

- Treasuries, because they have primary responsibility for carbon pricing, their role as investors in green infrastructure and the support they provide to research on sustainable policies;
- International institutions like the IMF – and here Kristalina Georgieva has delivered a powerful message of commitment;
- Development banks, because they can leverage financing costs for transition and mitigation;
- Firms, commercial banks, insurance companies, regulators, standard-setters, and ratings agencies to ensure consistency with net zero commitments;
- And of course central banks and supervisors, at the individual level and as a group, as they work together through the NGFS.

The BIS has been doing its part.

We used the Black Swan image of the 2007-09 Great Financial Crisis to coin a new Green Swan concept: a series of severe climate events that are bound to happen because they are the result of our greenhouse emissions warming the globe's average temperature. We are seeing these events with greater frequency. Therefore, addressing these risks as soon as possible and in a coordinated fashion is the best way to preserve financial stability.

In addition:

- We have contributed to developing a green bond database for the NGFS to monitor market developments.
- Like many of you, we are incorporating sustainability criteria into our pension fund and other investments.

*This speech was given at the Green Swan Conference - Coordinating finance on climate, Basel, 2 June 2021

*Agustín Carstens, General Manager, Bank for International Settlements

• We are offering green bond funds to central banks to facilitate diversification of their international reserves.

• We are working with other central banks in our BIS Innovation Hub on how to use new financial technology to foster "green finance". For example, we are developing a prototype for the introduction of tokenised green bonds in small denominations, giving greater access to retail investors. This project integrates real-time tracking and disclosure of green output for investors, showcasing technologies that can be used to reduce greenwashing and increase transparency.

• And the BIS will deliver a dedicated portal, run by our Financial Stability Institute, for training on climate risks in partnership with the 26th United Nations Climate Change Conference of the Parties (COP26) work. I am pleased that the BIS will soon launch the Climate Training Alliance with the NGFS, the International Association of Insurance Supervisors and the Sustainable Insurance Forum.

Not least, the BIS is actively involved in the widely recognised work of the NGFS, working together with the central banking and supervisory community on a wide range of relevant climate change related issues. Working with the Bank of France, one of our contributions has been to help frame climate-change issues for the central banking community as a new systemic risk issue. The severe physical and transition risks of global warming fall squarely within the financial stability mandate of most central banks.

At the same time, we should be hard-nosed about what we are trying to achieve, and not get swept up by the sense of enthusiasm. Minouche asked each of us what we are expecting from this conference. Looking at the impressive agenda, we will hear about:

• Development of new macro models, new risk metrics, new climate-related stress tests, and new scenarios for 1.5 degrees Celsius (potential future temperature increase) for the real and the financial sectors;

• Elaboration of the scope and the role of macroprudential tools and how to achieve the right balance with monetary policy;

• Advancements in financial knowledge to accelerate adaptation and transition toward a net zero goal;

• Improvements to disclosure and accounting standards; and

• Progress in the taxonomy of green investments.

All of this is excellent. But we will need to be able to go from general approaches to specific solutions. For me, the last points on disclosure and taxonomy are particularly urgent in order to strengthen the integrity of markets which are being created around green finance.

Let me explain.

Investors are increasingly looking for investments with environmental benefits, and financial markets have responded by offering new products. The amount of outstanding bonds with a green label has surpassed the $1 trillion mark and stood at nearly $1.2 trillion at end-2020a. Investments in funds with Environmental, Social and Governance (ESG) mandates have reached $38 trillion on one measure – a quarter of the global total.

Yet, green labels and ESG ratings are often not sufficiently clear on the promised environmental benefits, and offer little assurance that benefits will materialise. Part of the problem derives from the fact that these labels are based on inputs, which are easy to verify, rather than how well they are aligned with outputs or concrete outcomes, which are harder to verify. Further, such labels and ratings are seldom aligned with high-level policy goals such as the transition to a low-carbon economy. BIS research has shown that labelling bonds as "green" does not necessarily imply that issuers are carbon efficient or reduce emissions over time. ESG ratings have fairly low correlations across different providers, reflecting the variety of different inputs that providers use to arrive at their ESG ratings. Similar results on the potential confusion around ESG ratings are shown by the

work of the Organisation for Economic Co-operation and Development, the IMF and academics, which opens up the possibility of greenwashing.

Financial markets can make an important contribution to help the transition to a low carbon economy and protect our planet. Policymakers need to enable investors by enhancing market transparency and deter green-washing in three ways:

- Develop taxonomies for climate transition and align them with high-level goals such as the Paris Agreement;
- Develop standards that enable investors to understand exactly which environmental benefits can be delivered by assets labelled as "green";
- Develop certification and verification processes that confirm that promised environmental benefits are actually achieved.

A structural change in financial markets is underway and is happening fast. Thus we urgently need to ensure market transparency and integrity in this transition. If we want to avoid a green bubble, we need to act now.

IMI International Monetary Review

Hawks, Doves and Green Swans*

By DANAE KYRIAKOPOULOU*

Central bankers have long been associated with birds, traditionally divided between inflation-worried hawks or employment-leaning doves. More recently a third species, the 'green swan', has entered the conversation. Here, central bankers are increasingly united.

'Green swan' was coined by authors at the Bank for International Settlements in January 2020 to characterise the new type of systemic risks from climate change. The term is inspired by Nassim Nicholas Taleb's concept of 'black swan' during the 2008 financial crisis to connote rare, catastrophic and unpredictable events. However, the main difference between the concepts is that a green swan will not be a rare event in the face of inaction, it will be a certainty.

In the central banks and climate change agenda, a year is a long time. Since the publication of the BIS paper, central bankers have made over 50 speeches where climate change has been the main focus. In the last two years, the Central Banks and Supervisors Network for Greening the Financial System have published 17 new reports. And there have been numerous conferences and roundtables, many organised by OMFIF's Sustainable Policy Institute, established in September 2020.

These culminated in the Green Swan conference last week, with a total of 35 sessions over three days. Discussions ranged from the role of central banks in addressing climate change to biodiversity, the just transition and smart cities. The world's leading central bankers took the stage, including the heads of the Federal Reserve, People's Bank of China and European Central Bank. Many used the opportunity to showcase measures they've already taken and reiterate their commitment to act within their mandate to address climate change. But for moving the needle forward, two developments stood out.

First, discussions revealed a growing consensus for moving on from the fixation with market neutrality. The concept has so far held back central banks such as the ECB from addressing carbon bias in their portfolios. Most notable was the speech by Bundesbank President Jens Weidmann. He repeated statements voiced in November 2020 and February this year that the ECB 'should consider only purchasing bonds… if their issuers meet certain climate-related reporting requirements' and that it 'could examine whether we should use only those ratings that appropriately include climate-related financial risks'.

But in contrast to his earlier position that 'It is not up to us to correct market distortions and political actions or omissions', he accepted that 'If no adequate solution can be found here, the Eurosystem would have to adopt alternative measures to properly incorporate climate-related financial risks into its risk management, for example by limiting the maturities or the amount of corporate bonds of certain sectors and issuers in the Eurosystem's monetary policy portfolio.'

His remarks were an olive branch from the Bundesbank to the rest of the Eurosystem and reflect the gradual evolution in Weidmann's thinking. Central bank officials have been pushing for a rethink of the concept over the past year, including governors of the central banks of France and the Netherlands and ECB Executive Board members (see figure).

Second, the Green Swan conference highlighted a consensus among central bankers for making disclosures of climate-related risks mandatory. PBoC Governor Yi Gang revealed plans for

*This article first appeared in OMFIF Commentary on June 9, 2021.

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mandatory disclosure of climate-related information in China and suggested that countries should agree on reporting standards by the end of the year. His remarks were echoed by other senior central bankers, most vocally by Banque de France Governor François Villeroy de Galhau.

Fed Chair Jay Powell and ECB President Christine Lagarde, while acknowledging the limits of a private-led voluntary system of disclosures based on the Task Force on Climate-related Financial Disclosures, were more cautious about the role of central banks in mandating reporting. A day later on 5 June, G7 finance ministers stated their support for 'moving towards mandatory climate-related financial disclosures' in their joint communique.

The ECB will have the opportunity to clarify its thinking on market neutrality and its broader climate strategy at its monetary policy meeting tomorrow and at its strategy review later this year. The G7 leaders' meeting in Cornwall, UK, later this week will provide a further opportunity for countries to turn the finance ministers' recommendation for mandatory disclosures into a firmer commitment.

Their work shouldn't stop there. Progress on disclosures is a much-needed first step. But it can only get us so far. First, mandating institutions to disclose on climate risks exposures is very different from expecting them to address them. For the new measures to succeed, they must put pressure on companies to also disclose credible commitments and plans to reduce their carbon emissions.

Second, fears of risks to financial stability from a disorderly transition have at times been exploited by 'dirty' sector incumbents to slow much-needed action on climate.

Third, overreliance on mandatory disclosures as a silver bullet ignores the pragmatic challenges of implementing them consistently across the board. Mandatory disclosures have huge regulatory compliance costs, making them more challenging for small and medium-sized enterprises or corporates from emerging markets. It is important that the framework adopted does not leave anyone behind.

Even in advanced economies, the challenges can be greater than initially expected. On Tuesday the Bank of England scaled back the scope of its inaugural climate stress tests from 80% of counterparties to top-100 counterparties, because of companies' concerns about the magnitude of the challenge. A more constructive way forward may be to boost a direct measurement alternative to disclosures. A report by OMFIF and Refinitiv published last year concluded that developments in geospatial data collection and other technologies could provide a promising way forward as a complement to disclosures.

Market neutrality – an evolution in thinking

Eurosystem central bankers selected statements 2019-present

'In the framework of our current policy, we are neutral regarding the market's structure which leads us to buy bonds from corporations whose carbon footprints are not good.'
Benoit Coeure, ECB Executive Board Member, May 2019

'In the presence of market failures, market neutrality may not be the appropriate benchmark for a central bank when the market by itself is not achieving efficient outcomes.'
Isabel Schnabel, ECB Executive Board Member, September 2020

'In the face of what I call the market failures, we have to ask whether market neutrality should be the actual principle that drives our monetary-policy portfolio management.'
Christine Lagarde, ECB President, October 2020

'It is not the task of the Eurosystem to penalise or promote certain industries. It is not up to us to correct market distortions and political actions or omissions. Our primary objective is price stability.'
Jens Weidmann, Bundesbank President, November 2020

'The ECB balance sheet is "exposed" to climate risk through the securities it purchases and the assets pledged as collateral by banks, to an extent that is insufficiently taken into account'. [..] 'Market operations are conducted in a neutral manner as long as they comply with the central banks' risk control rules. And yet, climate risk is precisely a financial risk that is currently insufficiently measured by markets.'
Francois Villeroy de Galhau, Banque de France Governor, February 2021

'The relative price of carbon emissions is distorted.'[..] 'Central banks could explore how, within the boundaries of their mandates, they can redesign monetary policy instruments to prevent such biases from occurring, and instead contribute to unlocking more green investments.'
Klaas Knot, De Nederlandsche Bank Governor, February 2021

If you look in the Treaty, there is just nowhere where you can find market neutrality. It's just not a legal concept. There is something similar in the Treaty, because it says that we should adhere to the principle of "an open market economy with free competition favouring an efficient allocation of resources". It doesn't say 'market neutrality'. Now, if we came to the conclusion that maybe the market is not pricing in everything that needs to be priced in (there may be externalities), then just blindly following the market might be market neutral but may not be in line with the principle of "an open market economy with free competition favouring an efficient allocation of resources". And that in the end is what needs to be our guiding principle.
Frank Elderson, ECB Executive Board Member, May 2021

'Conceptually this is very clear: we should move from a principle of 'market neutrality', to a principle of 'market efficiency'. And this would be exactly in line with the Treaty.'
Isabel Schnabel, ECB Executive Board Member, May 2021

'In my view, we should consider only purchasing bonds or accepting them as collateral for monetary policy purposes if their issuers meet certain climate-related reporting requirements. In addition, we could examine whether we should use only those ratings that appropriately include climate-related financial risks.'
Jens Weidmann, Bundesbank President, June 2021

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Walking the Tightrope to Net Zero*

By DIMITRI DEMEKAS*

In adapting their policies to the challenges of climate change and the transition to a low-carbon economy, central banks and financial regulators need to weigh potential pitfalls carefully.

These fall broadly into two groups: unintended consequences policies may have on markets and the financial system; and failure to achieve policy objectives owing to poor design or lack of coordination with other policy-makers. In both cases, there could be repercussions for the credibility and reputation of central bankers and regulators. It could also impact their ability to achieve not just their climate-related but all of their policy goals.

One potential consequence of regulators favouring 'green' or penalising 'brown' assets and activities is that they could inadvertently exacerbate financial market volatility. Although market volatility is not a concern per se for financial policy and regulation, it can trigger financial instability and have broader repercussions.

There is already some evidence of a green bubble, particularly in energy. The MSCI Global Alternative Energy Index has more than doubled and now has a market cap of around 14% of the global energy sector, up from 6.4% in 2010. Alternative energy equity exchange-traded funds have shown a similar growth.

This phenomenon could reflect normal market dynamics at this stage. As awareness of climate-related risks grows, and these risks are slowly priced in due to data gaps, cognitive lags or other reasons, stocks of green companies should initially have a return advantage over brown stocks. As environmental, social and governance investing becomes more widely adopted and these risks are gradually priced in, brown stocks would decline relative to green until they have a higher expected return that compensates for their higher environmental risk. Some evidence suggests that the market is currently in this initial period.

Nonetheless, a green bubble could amplify a new commodity super-cycle. The technology required for the transition to a low-carbon economy depends on the supply of minerals used in energy storage such as graphite, lithium, nickel and cobalt, palladium for hydrogen fuel cells and molybdenum for wind turbines.

Because clean energy technologies are much more material-intensive than fossil fuel-based electricity generation, the World Bank has estimated that demand for minerals will quadruple by 2050 if we are to meet the goals of the Paris agreement. And these estimates do not include the demand from additional infrastructure needed to support the deployment of these technologies, such as new transmission lines or electric vehicles. Prices of minerals have already started reflecting these trends, which some see as the start of a new commodity super-cycle.

In addition, since many of the green companies in sectors such as renewables or energy storage tend to be more capital- and technology-intensive, their stock prices are potentially more volatile. For a gas-fired power plant, for example, a large part of the operating cost over its lifetime is the cost of fuel, while for a solar or wind power plant almost all costs are fixed and borne upfront. Such long-duration stocks, whose valuations are based on high expected earnings in the future, are more sensitive than other stocks to changes in the cost of finance.

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In such a complex and highly volatile environment, central banks and financial regulators have to tread a fine line. While they should not necessarily aim to dampen market volatility or prevent overstretched valuations in the green sector (which are arguably natural at this stage), measures that unintentionally amplify volatility can be destabilising. Excessive volatility of green asset prices could also temporarily dampen investment flows into the sector and delay urgently needed progress towards decarbonisation.

Financial policy and regulation cannot deliver the transition to a low-carbon economy by itself. Broader policy efforts and investments are needed for real economies to meet climate and environmental objectives. Most of these, however, are in the hands of governments.

If central banks and regulators move ahead on their own but governments fail to follow, these efforts will prove fruitless and could have negative repercussions. Financial firms could end up incurring losses if they move – in anticipation of or prompted by regulators – towards 'green finance' but governments fail to follow through with changes in carbon pricing. This could prevent the change in relative prices needed to sustain the transition.

Asset managers and pension funds could be seen as compromising their fiduciary responsibilities as currently defined – a risk that is acknowledged even by advocates of a more active role for financial policy and regulation. And the inevitable backlash would be directed towards central banks and financial regulators.

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Asia Pacific Working to Narrow ESG Gaps*

By DAEL WILSON*

For regional banks and asset managers, the key challenges in the integration of environmental, social and governance data are the lack of comparable, quality and timely data and a limited understanding of how to draw out meaningful insights. Globally, this extends to the absence of a standardised ESG reporting methodology for collecting and analysing structured data.

Regional ESG disclosure frameworks in Asia Pacific are not as well-established as those in the European Union and the US. In addition, the number of global ESG standards, frameworks and initiatives causes confusion on which ESG data points are material and regionally relevant. However, Asia Pacific can benefit from evolving dynamics elsewhere and learn from issues relating to unverified ESG data.

Within the region there is disparity in data points collected across the different ESG factors. In Asia, governance datasets are perceived to be more established. Despite ESG data disclosure being largely voluntary, the number of disparate methods used by corporates is likely to reduce as understanding grows around data capture standards and frameworks are developed.

Within financial institutions, evolving market dynamics have identified a need for investment grade or validated and verified data, alongside the need for a global view of ESG metrics. This stems from the need to collect data to determine material ESG exposure and risk at loan/bond, sector and organisation level.

International investor demand has helped drive awareness and uptake of ESG disclosures in Asia Pacific, although large data gaps still exist. As the Asian market matures and regulatory pressure builds there will be an increasing need for ESG data standardisation, collection, verification and disclosure.

Technological innovation is advancing the availability and quality of ESG data in the region. Application programming interfaces, geospatial technology, artificial intelligence, machine learning and natural language processes are being used globally to collect and interpret data. Technology platforms can provide a range of functions for ESG reporting, including the ability to create an auditable record of scalable sustainable financing and responsible investments.

Data gaps were recently highlighted in the EU, given differing disclosure time frames for the EU Taxonomy and Sustainable Finance Disclosure Regulation. Under this regulation, asset managers are required to disclose sustainability measures periodically from 1 January 2022, whereas under the non-financial reporting directive companies are only required to disclose alignment to the taxonomy in annual reports published in 2023. Market participants have had difficulty mapping assets to the taxonomy and there have been criticisms of leniency in some sectors and strictness in others.

In an interview in January, Chief Responsible Investment Officer at the United Nations-backed Principles for Responsible Investment Nathan Fabian stated, 'The No. 1 challenge that investors report is that they are not sure if they are going to have sufficient data on their underlying holding'. CEO of Climate Bond Initiative Sean Kidney added that there is 'a lot of extra data work to be done' regarding the taxonomy.

Globally there is a lack of historical ESG data and wide variance in the level of coverage. Data coverage is improving in Asia Pacific but it will take a few years to develop the dataset required

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for quality ESG insights. Reporting guidance is needed as we see a shift from voluntary to mandatory disclosures to ensure the market digests quality data. The lack of transparent ESG data coverage is even more apparent in unlisted and alternatives given the nature of these asset classes.

Many financial institutions have difficulty understanding the data and have limited capacity to draw insights from it. There have been efforts to build both internal capabilities and market-wide infrastructure for standardised reporting. One of the key collection difficulties is the time it takes to upskill resources on operational risk across the numerous industries and regions. Financial institutions are also undertaking data usability and gap analysis to build more robust risk management.

ESG data disclosure is still largely seen as a box-ticking compliance exercise. However, we have seen an evolving trend in corporate culture towards more long-term views on sustainable business practices as studies show the positive correlation between financial return and sustainability. On the public side there is a build-up of data to support the shift, but this is a different story on the private equity side with limited disclosure on ESG metrics and impacts.

This dynamic will be fascinating to watch as the business community focuses on goals aligned to the UN sustainable development goals and the Paris agreement.

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Digital Economy

Regulating Fintech: Is an Activity-based Approach the Solution?*

By FERNANDO RESTOY*

Introduction

It is a pleasure to return to the European Parliament's Fintech Working group. It is also an honour to share with MEPs and other distinguished participants part of our work at the FSI and the BIS on fintech and big tech regulation.

The emergence of fintechs and big techs represents a major source of disruption in the market for financial services. Regulators are gradually adjusting their policy frameworks in order to cope with the risks that the new products and players pose, but without jeopardising the benefits they bring in terms of competition, efficiency and financial inclusion.

Still, there is a sense that we need a more comprehensive policy overhaul, in particular with regard to big tech platforms that offer a large variety of financial and non-financial services. Among other things, that comprehensive framework should aim at reducing competitive distortions that could penalise either incumbents or new players.

In this connection, the slogan of same activity-same regulation is often heard as the possible basis for regulatory reform.

This phrase basically suggests moving from a framework for entities with a specific license or charter (entity-based regulation) to a system of rules on specific activities, which would be applied uniformly to all types of entity involved in a specific activity (activity-based regulation).

Same activity-same regulation was first proposed by the industry, but it has also been publicly discussed by regulators and has even been mentioned in reports published by international standard-setting bodies. Of course, there are diverse motivations behind the support from different stakeholders.

When the banking industry uses this phrase, they are underlining the need to prevent big techs from wielding a competitive advantage due to their lighter regulatory burden vis-à-vis commercial banks. In particular, the industry is concerned that bank subsidiaries performing a specific activity (say payment services) are typically subject to rules (essentially prudential ones) that do not apply to non-banks performing the same activity.

When regulators consider the merits of an activity-based regulatory approach, they stress the need to reduce the scope for regulatory arbitrage. In other words, the aim is to prevent entities lying outside their regulatory perimeter from conducting regulated activities.

*The speech was given to the fintech working group at the European Parliament virtually on 16 June 2021.

*Fernando Restoy, Chairman, Financial Stability Institute, Bank for International Settlements

However, the current entity-based rules (such as banks' prudential requirements) have a rationale based on socially crucial policy objectives, such as financial stability. Therefore, any departure from the current framework must also support those primary policy goals. Against that framework, a relevant question is how far can we go in implementing an activity-based regulatory framework without jeopardising social objectives? Are there sufficient policy grounds to eliminate or substantially reduce different rules affecting different types of firm performing a specific activity?

Let me try to address those questions in the context of the ongoing discussion on how to regulate new fintech and big tech players.

The current setup

First, a few words on the current setup. We know that fintechs and, in particular, big techs, are expanding their activities. These now include the provision of financial services; in particular payments, credit underwriting and asset management (Frost et al (2019)). As they do so, they leverage data analytics, exploiting the information they gather to provide their customers with a wide array of services. This in turn creates large network externalities that generate further user activity. This is what we at the BIS call a data network activities (DNA) loop, that allows big tech to quickly scale up in market segments, such as financial services, which were originally outside their core business (BIS (2020)).

To offer regulated financial services, big techs hold licences such as the ones required to provide payment services, conduct wealth management and, in some jurisdictions, lend to firms or households. Main big techs in the European Union and the United States, however, do not typically hold banking licenses, although they partner with established banks to perform some banking activities (Crisanto et al (2021)). The situation in Asia is different, as big techs such as Ant or Tencent typically do hold participations in credit institutions. Moreover, big techs are also subject to cross-sectoral regulation in the areas of competition, data protection and so on.

Therefore, contrary to what is sometimes claimed, big techs offering financial services do need to satisfy regulatory requirements which are aligned, in principle, with those imposed on other market participants. The question is, of course, whether this suffices to curb the risks posed by the techs and to mitigate competitive distortions in the relevant markets.

Can regulatory asymmetries be justified?

Before addressing that question, I need to refer to a few general considerations.

Achieving a level playing field for market participants is certainly a key aim for authorities, but it is not the overriding one. To ensure adequate market functioning and, more generally, to protect the public interest, public authorities sometimes need to treat different players differently, even if that affects their relative competitive position.

Indeed, the risks generated by different entities performing a similar activity are not necessarily the same. For instance, different firms performing credit underwriting do generate different risks for the financial system. This depends on whether their activity is funded by their own resources, market leverage or deposits taken from the public. As a consequence, different entities with different funding options may need to be subject to different rules in order to properly address the specific risks they generate and, hence, safeguard financial stability. More concretely, the risk transformation business of banks requires a specific (prudential) regulatory treatment that is not necessary for credit providers that cannot accept deposits (Restoy (2019)).

Those regulatory discrepancies across entities may also be warranted in the area of competition. Here, firms that are more likely to indulge in anticompetitive practices may need specific constraints. This is, for example, the case for firms offering different but complementary goods (such as eg operating systems and browsers) or with vertically integrated business models.

However, in other policy areas, such as consumer protection or anti-money laundering/counter financing of terrorism (AML/CFT), there would seem to be no reason (based on primary policy objectives) for discriminating between providers of any particular financial service.

In general, entity-based rules are required when risks emerge not only from the provision of a particular service, but also from the combination of activities (such as deposit-taking, risky investment or payment services) that entities perform. This regulatory approach requires requirements and obligations at the group (consolidated) level regardless of the distribution of activities across different subsidiaries.

In sum, regulatory asymmetries between banks and big techs can sometimes be justified on policy grounds. That is the case in policy areas (such as financial stability or competition) where an entity-based approach should be pursued. Discrepancies would not be warranted, however, in other areas (such as consumer protection or AML/CFT), where an activity-based approach would be preferred.

Moreover, in entity-based policy areas, differences in regulatory requirements would be justified only if they address the specific risks posed by different types of entity. Failure to apply the rules required for some classes of entity while imposing entity-based rules on others would conflict with primary policy objectives and lead to unwarranted competitive distortions.

Do we see unwarranted regulatory asymmetries?

Let's now explore what happens in practice in the case of banks and big techs.

Focusing first on policy areas such as AML/CFT or consumer protection it is hard to find discrepancies in the requirements imposed on commercial banks as compared with the ones for other providers of financial services (Restoy (2021)).

By holding licenses to provide payment services, credit underwriting or wealth management, all players are subject to AML/CFT rules (such as those of the US Bank Secrecy Act or the EU AML Directive). Those derive largely from the international FATF standards, which are designed to cover essentially all financial service providers.

In a similar vein, consumer protection rules in the areas where big techs are active apply to all authorised financial service providers, regardless of the type of license they hold. In Europe, the Payment Service Directive (PSD2) or the market conduct rules contained in the Market in Financial Instruments Directive (MiFID) exemplify the broad scope of application of activity-based legislation.

Yet it can be argued that the implementation, supervision and enforcement mechanisms of activity-based rules for different types of entity are not always identical. In particular, there is a sense that supervisors apply more stringent consumer protection and, more importantly, AML/CFT standards to credit institutions than to other players. This may be partially due to the application of the proportionality principle, given the normally larger scale of banks' activities as compared with those of their competitors. But such discrepancies may also arise from the fragmentation of the oversight regime across different sectoral supervisors. Certainly, a functional (eg a twin-peaks model) rather than a sectoral organisation of supervision would help to deliver a more uniform application of activity-based rules across different entities, thereby contributing to a more level playing field.

A more important source of competitive distortion arising from regulation may be in the entity-based policy area. In particular, there may not be adequate rules to address the risks posed by big techs when operating its DNA business model (Carstens (2021), Restoy (2021)).

Take operational resilience, for example. Huge disruption could arise from a big tech's failure to ensure business continuity. To safeguard their resilience, a comprehensive approach may be warranted for big tech groups encompassing all their activities, as is currently the case for banks.

This could be particularly critical for big techs that offer key services (such as cloud computing) to financial institutions. Quite possibly, the concept of systemicity – the criteria by which institutions are judged to be systemic and the controls that are applied to them – may need to be adjusted if they are to meet the new challenges posed by big techs in finance.

In addition, there would seem to be a strong case for adjusting competition rules to the potential damage that big techs could create by imposing specific entity-based requirements on them.

At present, competition-related policy measures rely very much on case law emerging from the ex post application of high-level principles to the specific activities of market players. A more forceful approach would be to introduce ex ante constraints on big tech practices concerning data use and data-sharing, service-bundling, admission criteria or any other source of potential discrimination across actual or potential participants in the platforms they run. That strategy would mitigate the risk that measures taken by competition authorities could come too late to prevent irreversible damage to a competitive marketplace.

Emerging entity-based regulatory initiatives

Some initiatives in different parts of the world do seem consistent with the development of new entity-based rules for big tech platforms.

In the area of competition, the US House of Representatives issued a set of recommendations last year that would require big techs to avoid specific practices that could work against free and fair competition. More recently, the Senate has started discussing a Competition and Antitrust Law Enforcement Reform Act that builds on some of the recommendations of the House report.

In China, the State Administration for Market Regulation has issued guidelines which effectively ban some of the practices seen at what they call internet companies. Similarly, the People's Bank of China has recently issued draft rules for non-bank payment service providers.

Finally, as you all know, the European Commission proposed last December a Digital Markets Act for the European Union. This aims at barring anti-competitive practices by large big tech platforms that act as gatekeepers, to use the EC's terminology.

In other policy areas, there has also been some action. In China, the authorities have introduced a number of specific constraints on big tech activities in relation to client balances on payment platforms and the originate-to-distribute credit underwriting model. Importantly, they have updated the regulation of financial conglomerates and have pushed Ant Group and Tencent to become a financial holding company. This constitutes a bold move towards applying a comprehensive regulatory regime to big techs active in the financial services market.

In the European Union, the Digital Services Act (DSA) contains entity-based provisions for big techs. These aim at, among other things, ensuring adequate management of the different operational risks that big techs generate. As such, they include requirements for governance, risk management and audit. Importantly, the DSA also envisages a specific supervisory regime for large tech platforms. This is, in my view, a very welcome development.

Concluding remarks

To conclude, I believe that we need a determined policy response to the disruption created by the emergence of fintech and big techs. The aim will be to uphold primary policy goals such as financial stability, market integrity, consumer protection and fair competition. Unwarranted regulatory and supervisory asymmetries between different players, should also be eliminated, although only as far as this is compatible with overarching policy priorities.

Yet, contrary to what is often argued, I do not believe that it would be a promising strategy to move in the direction of replacing entity-based rules by an activity-based regulatory approach. Two considerations lead me to this conclusion.

First, most fintechs and big techs that are active in financial services are already subject to activity-based rules in the policy areas (such as consumer protection or AML/CFT) for which an activity-based approach is warranted.

Second, replacing entity-based by activity-based rules in other areas, such as prudential regulation, may severely jeopardise primary policy objectives, such as financial stability. In these policy areas, rules need to address risks stemming from the combination of all the activities that entities perform and they must focus, therefore, on the consolidated balance sheets.

There is, in fact, a strong case for relying more rather than less on entity-based rules to properly regulate big techs. Their unique business model calls for entity-specific safeguards, such as the ones being developed in several jurisdictions, including the European Union, in areas such as competition and operational resilience. This will help not only to safeguard primary policy objectives but also to address the competitive distortions emerging from insufficient regulation of big techs as compared with that applied to banks.

References

Bank for International Settlements (2020): Annual Economic Report, Chapter 3, June.

Carstens, A (2021): "Public policy for big techs in finance", introductory remarks at the Asia School of Business Conversations on Central Banking webinar, "Finance as information", January.

Crisanto, J C, J Ehrentraud and M Fabian (2021): "Big techs in finance: regulatory approaches and policy options", FSI Briefs, no12, March.

Frost, J, L Gambacorta, Y Huang, H S Shin and P Zaiden (2019): "Big tech and the changing structure of financial intermediation"; Economic Policy, vol 34, no 100, pp 761–99.

Restoy, F (2019): "Regulating fintech: what is going on and where are the challenges?", speech at the ASBA-BID-FELABAN XVI Banking public-private sector regional policy dialogue on Challenges and opportunities in the new financial ecosystem, Washington DC, 16 October.

--- (2021): "Fintech regulation: how to achieve a level playing field", FSI Occasional Papers, no 17, February.

IMI International Monetary Review

BigTech in Financial Services*

By TOBIAS ADRIAN*

It's a pleasure to explore some of the key regulatory challenges that are now posed by BigTech.

At the IMF, as we discuss potential regulatory approaches that can be helpful in addressing risks, we need to keep in mind the nuanced circumstances of different jurisdictions in our membership.

The Challenges of BigTech

There is no doubt technology is has a profound impact on the financial services industry globally.

When we think of BigTech, we think of large technology conglomerates with extensive customer networks with core businesses in social media, telecommunications, internet search and e-commerce. They are present in all continents and in most – if not all - of our member jurisdictions.

The business model of BigTechs leverages three factors: the data they already have on consumers, aiding BigTechs to understand customer needs better; the advanced analytics they use to deepen this understanding further; and the reliance on strong networks effects, from leveraging their large consumer base. Their expansion into financial services can happen very quickly, as network effects drive interaction, user activity and the generation of ever greater amounts of data.

It is interesting to see that BigTech expansion into financial services happens in a different direction than what we would normally see in fintech start-ups. The new technologies that allowed fintech start-ups to unbundle financial services, offering partial financial services or aggregation and customer interface services, are used by BigTech to "reverse" the unbundling. Based on their large global user base of non-financial products, they benefit from cross-subsidization and economies of scale and scope. That makes them well positioned to capture a significant market share of financial services once they start providing them.

There are some potential benefits in this "rebundling". BigTechs can use their knowledge of consumer preferences obtained through their other business areas, such as consumer spending habits and credit worthiness, to offer financial services to customers who may be underserved by traditional lenders. The economic and social benefits of financial deepening can be compelling.

So, why should financial regulators be concerned with BigTech?

The provision of cloud services is a good example of how BigTech non-financial services could have broader implications. The cloud is the virtual delivery of computing services that powers the operations of diverse entities across all financial services. These range from the largest bank to investment managers and smallest start-ups.

The range is wide, yet there is a strong dependency on only a few critical providers. The Bank of England, in a 2020 survey, estimated that more than 70 percent of banks and 80 percent of insurers rely on just two cloud providers for IaaS (Infrastructure as a service). [2] Globally, 52 percent of cloud services are provided by just two BigTech entities, while more than two-thirds of services are provided by four BigTechs. [3]

This concentration highlights the reliance of the financial sector on the services provided by BigTech. Ultimately, failure of even one of these firms, or failure of a service could create a significant event in financial services, with a negative impact on markets, consumers, and financial

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stability. The importance of these services means that in some respects, BigTechs may be already 'too-critical-to-fail' in some.

Fintech firms in general are not yet systemically significant, because their market share of financial services in most jurisdictions is not yet material. But BigTech creates different regulatory challenges. The Financial Stability Board (FSB), in its reports on the potential financial stability implications of BigTech, [4] discussed that BigTech could potentially affect financial stability in three ways: (1) even if their isolated financial activities might not be systemic, they could but cumulatively generate significant financial risk, especially because these could be scaled-up very rapidly, (2) risks could be magnified by their interlinkages with regulated financial entities, such as partnerships to originate and distribute financial products, and (2) they could generate risks as they carry out a systemically important activity ancillary to financial services, such as cloud services.

These characteristics bring very particular challenges to regulators.

The regulators' response to these potential risks varies, depending not only on the actual business of the BigTechs in a given country, but also on the institutional architecture and mandates of regulators.

In the example of the non-financial service mentioned before, some jurisdictions seek to mitigate the excessive concentration of cloud service providers by imposing requirements through their regulated entities. For other jurisdictions, however, applying and enforcing existing outsourcing and third-party providers regulations to cloud services can be very difficult. The FSB's report on the financial-stability implications of cloud services emphasizes the issue of "lock-in risk," as well as risks related to data governance and access. [5]

Similarly, other existing regulatory frameworks which would generally be applicable to BigTech focus on their financial activities and seek to regulate them directly or through regulated entities. However, while the principle of "same activity, same risk, same regulations" may seem a reasonable approach, it may not be sufficient in addressing the potential stability implications of BigTech .

Financial services offered by BigTechs may be subject to some activity-based regulations, but BigTechs themselves are not normally subject to comprehensive group regulations or oversight. This could provide BigTechs with a competitive advantage - not through innovation and better products, but through the benefit they can gain from a less comprehensive regulatory framework. In that case, the "same activity, same risk" approach can create an uneven playing field between financial incumbents and BigTechs, and can create room for arbitrage. Many existing regulatory frameworks (like Open Banking), that aim to facilitate competition, may have unintended consequences. They could create a one-way flow of data that allows BigTechs to capture a larger market share.

BigTechs also defy the fragmented international regulatory framework applicable to data governance, operational resilience, and group-wide risks. There is plenty of room for regulatory arbitrage, policy gaps and a build-up of financial stability risks across borders.

The regulatory response to BigTech expansion in financial services is not an easy one. Much depends on the role of BigTech within a jurisdiction and on the institutional architecture for regulation in each country. But the international community needs to ensure that BigTech's potential benefits are matched by regulatory protections and mitigation against new risks.

We're all just beginning our journey to understanding the impact of BigTech on financial services. But let me share some initial thoughts — and a path we're aiming to explore.

Regulating entities, regulating activities

Within the international regulatory community, discussions on the challenges for regulation are under way in several fora. In addition to the work of the FSB, other standard-setters are reviewing

their existing standards and guidelines to understand how they can be applicable to BigTech. The underlying framework for sectoral regulation, however, may simply not work in this case. The underlying framework for sectoral regulation, however, may simply not work in this case. The BIS and FSI [6] have recently re-ignited the discussion on activity vs entity-based regulations and their adequacy to deal with BigTechs. I would like to explore these ideas a little further.

Consider the entity-based approach — in which regulations are applied to licensed entities, or to groups that engage in regulated activities. Requirements are imposed at the entity level and may include governance, prudential and conduct requirements. The entity-based approach can be built on principle-based regulations that allow more flexibility, as it can rely on expectations of governance and risk management of the entities and groups. Most important: There is a continuous engagement between supervised firms and supervisors, allow for the monitoring of the buildup of risks and the evolution of business models. Implementation is supported by supervisory activities (such as off-site monitoring and on-site inspections). Supervisors usually have a range of early steps that can be taken to modify firms' behavior that could lead to excessive risk-taking and instability.

By comparison, consider the activity-based approach — in which regulations are applied to any entity (or individual) that engages in certain regulated activities. Those regulations are typically used for market conduct purposes. They are generally prescriptive, and compliance is ensured by fines and other enforcement actions. Most BigTech firms are already subject to such activity-based regulations in many countries, such as AML/CFT and consumer protection rules.

In some ways, the activity-based approach may encourage competition by requiring that only relevant regulatory permissions are needed to carry out certain activities. In theory, this "levels the playing field" by applying the same rules to the same activities, whoever is doing them. However, there are some important caveats. The approach must define activities very precisely, which is likely to create regulatory arbitrage opportunities, as it may not be able to capture rapidly changing and hard to define fintech activities. There is less room for supervisors to take actions before proceeding to enforcement. Because of this heavy reliance on enforcement, the activity-based approach is generally not suitable for early supervisory action to modify risky behavior. It is also not very effective for cross-border activities, unless global regulators adopt consistent regulations and unless international agreements allow for cross-country enforcement actions.

Therefore, where firms have a potentially systemic approach and have a business model that involves various inter-related risks, a more hybrid type of regulation makes sense. Since our Global Financial Stability Report of 2014, [7] the IMF has advocated for a mixed approach to address systemic risks posed by shadow banking. There are some similarities in the regulatory challenges between those from shadow banking and BigTech. For example, both have grown outside the regulatory perimeters to have potential systemic implications. While each individual entity and service may not pose systemic issues, the combination of the entities and services, provided as bank-like financial services, also creates systemic risks. Some entities and functions of both shadow banking and the BigTech ecosystem can easily relocate their headquarters and main activities to other jurisdictions where regulations are less robust.

So, since 2014, we have been recommending that monitoring and risk identification should focus primarily on economic functions andactivities — but that regulation and supervision should focus on entities. A mixed approach could be based on the entity-based approach, but the requirements would be tailored to the activities that the specific entity or group is engaging in. No two BigTechs, after all, are the same. As in the entity-based approach, entities may be subject to licensing and other requirements. Supervisors would thus have a number of supervisory tools to monitor risk and, ultimately, to implement and enforce the requirements.

In the ideal world, if BigTechs are identified as systemic, it is more likely that home supervisors will need an entity-based approach. There may be a bespoke regulatory framework for BigTechs. Depending on the country and the BigTech, perhaps the principal regulator would not be the financial regulator. Whatever the regulatory agency is, it should work in close partnership with sectoral regulators, and agencies that oversee data, privacy, competition, consumer protection and financial integrity. International cooperation and information-sharing arrangements would be needed address the many cross-border aspects of BigTech.

In this less-than-ideal world, however, we observe that the combination of the activities-based approach and the entity-based approach seems to be linked to the position of jurisdictions as "home" or "host" authorities; the characteristics of the business of each BigTech in each jurisdiction; and the existing powers and mandate of supervisors.

For example, when we look at the evolution of China's approach to BigTech, and to the developments in Europe, we see that the Chinese authorities, as home supervisors of BigTech, are gradually moving to an entity-based approach — which brings BigTech into the supervisory perimeter within a framework applicable to financial conglomerates. In the EU, on the other hand, we can observe a "host" jurisdiction stance, taking steps to mitigate the risks that arise from BigTech's presence within financial markets. The Digital Services Act and Digital Markets Act contain targeted powers to leverage against platform providers and online gatekeepers, which would cover many BigTech entities. Both acts include measures to mitigate abusive market practices, improving disclosures and provisions around complaints handling, mitigating risks from combing end-user data from different sources without consent, no self-preferencing, data portability, and interoperability of ancillary services.

Realism and Pragmatism

When we look at the IMF's broad and diverse membership, however, we can see that not all home jurisdictions will have the breadth of mandate to rein in BigTech, as the Chinese authorities are doing. And not all host jurisdictions will have the (economic and political) leverage to apply requirements to foreign BigTechs, as the EU is doing.

In the longer-term, the regulatory framework, in practice, will need to consider the role of home and host jurisdictions in the regulation of BigTech — although it may be challenging to identify the home supervisor, in some cases

We think most "host" jurisdictions could consider activity-based regulations, supplemented by group-wide supervision, tailored to a BigTech's entity-specific risks. This can probably be built within their existing regulatory frameworks and can be implemented with fewer additional resources. Depending on the circumstances, supplementary group supervision can help impose prudential requirements across a BigTech group's financial activity.

Again, for such an approach to work successfully, the optimal architecture would depend on home supervisors implementing robust regulations. In this sense, we are not very optimistic on what can be achieved in the very short term.

Realistically, the biggest challenge for home supervisors would probably be the designation of BigTech as systemically important groups. Nonbank Systemically Important Financial Institution ("SIFI") designation (to large asset managers and insurers) has become stranded by strong industry pushback. It may take substantial time to enact any designation (which may be necessary for a home supervisor to implement entity-based regulations in some countries) of BigTech as systemically important entities or infrastructure.

So, being pragmatic, we have been discussing, with some of our members, what could be done as a short-term fix. For many countries, what can be done in the short term — in addition to applying activity-based regulations to the extent possible — is to engage with BigTech firms to better understand their activities in the country. Encouraging the development of codes of conduct

and disclosure requirements — akin to those applicable to securities markets — can be particularly helpful. They could help identify and monitor risks; help improve governance and oversight; and help regulators build understanding using minimum resources.

Easier Said Than Done

In 2018, along with the World Bank, the IMF jointly developed the Bali Fintech Agenda to provide a framework for jurisdictions to harness the benefits of financial innovation, while mitigating the risks. It provides a framework for authorities to consider their approach to fintech. Since then, we have seen that — when it comes to BigTech — this is much easier said than done.

The rapid expansion of BigTech into financial services is happening on a cross-border and a cross-sectoral basis. Such expansion is significant in some emerging economies, where it may be creating significant risks, including to financial stability. But it also affects advanced economies in various ways, including the intensification of concentration risk.

To achieve effective implementation, and the multiple objectives of regulatory authorities, we believe a mix of entity- and activity-based approaches — probably based on a home/host supervisor split — is the way forward in the longer term.

The mixed approach would thus need to rely on a robust entity-based regulatory framework implemented by the home regulator. We recognize, however, that (in practice) it is likely to take several years before this can be achieved.

In the meantime, we think most countries, as host supervisors, will do what is possible: They should actively use all of their existing regulatory powers — such as indirect supervision through regulated entities; activity-based regulations when feasible; and the development of codes of conduct and disclosure to pave the way to a better understanding of business models and risks.

In this sense, we welcome the G7's call for further discussions on ways to mitigate the risk of regulatory fragmentation and to facilitate coherency of emerging technology ecosystems. We look forward to policies to promote international consistency in Big Tech operations across borders. These efforts would be helpful to address the concerns of our broader membership.

This is a wide-ranging and complex area for the future of effective financial regulation — with enormous implications for financial stability. If we approach these concerns with flexibility — tailoring our approaches realistically to what is achievable in the short run, as well as what is ideal for the long run — we can help create an effective, evolving approach to regulation and supervision.

[1] With contributions from Parma Bains, Arif Ismail, Fabiana Melo, Nobuyasu Sugimoto, and Christopher Wilson.

[2] How reliant are banks and insurers on cloud outsourcing? | Bank of England

[3] • Chart: Amazon Leads $130-Billion Cloud Market | Statista

[4] BigTech in finance: Market developments and potential financial stability implications - Financial Stability Board (fsb.org)

[5] FSB reports consider financial stability implications of BigTech in finance and third party dependencies in cloud services - Financial Stability Board

[6] Big techs in finance: regulatory approaches and policy options (bis.org)

[7] IMF Global Financial Stability Report: Risk Taking, Liquidity, and Shadow Banking: Curbing Excess While Promoting Growth

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Five Trends Shaping the Future of Digital Currencies*

By PHILIP MIDDLETON*

In times of crisis, topics and people who had lurked unrecognised suddenly become the centre of attention and the subject of debate. In the 2008 financial crisis, it was central bankers who emerged, blinking, into the spotlight of unaccustomed publicity. In the pandemic, alongside the indispensable health professionals and epidemiologists, we have seen digital payment and central bank digital currency specialists take centre stage.

Last month's OMFIF Digital Monetary Institute Symposium convened over 1,700 participants from 120 countries, including senior central bankers and public officials on the one hand, chief executive officers of pioneering digital economy companies on the other and pretty much every other profession with an interest in financial services. Two years ago, we could just about have held the colloquium in a phone box. In two days of discussion, debate and often heated argument, we identified five major trends that will shape the future of digital money.

Global transformation

Against the tragedy of the pandemic, we have seen a rapid acceleration of the move from a physical economy towards a digital one. Nowhere has this been more apparent than in financial services and payment methods, with a marked decline in the use of cash. Both financial markets and the real economy will digitalise further, driven by a combination of new technologies, public policy and entrepreneurial zeal. Not all incumbents will survive. Not all innovators will succeed. Managing the balance between stability and innovation will be tricky.

CBDC not if but when

A digital economy requires digital payment instruments. Entrepreneurs are willing and able to provide them. We are already seeing the birth of retail central bank digital currencies in the Bahamas and China, with more to follow. Experiments with stablecoins and tokens are taking place in capital markets and will become more widespread. There are many valid policy reasons for central banks and governments to introduce a CBDC, but none more compelling than the risk of losing financial and political sovereignty to either the private sector or to other sovereign actors. Major economies will be wary of the potential threats to financial stability and fractional reserve banking posed by some varieties of CBDC, but will be persuaded, sooner rather than later, to juggle competing interests.

Abundant private currencies

A tapestry of currencies will soon cover the world. These will be both quasi-fiat (such as stablecoins) and private, with many occupying the space in the middle. Money will be dumb, smart, local, international, private, public and all things in between. It will be principally digital in form, although there will also be physical representations, particularly of sovereign currencies. Cryptocurrencies will continue to bloom and perish with equal rapidity. Some will become institutionalised investment assets, though probably not widely accepted payment instruments. Physical cash will continue to exist for the foreseeable future, even if usage declines.

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Cross-border currency competition

Just as there will be intensifying competition within national boundaries between public and private payment instruments, so too will there be growing competition between nation states and currency areas. Whether this will be waged by private sector proxies or by central banks as an extension of national policy remains to be seen. This competitive arena will extend to regulation, governance and technology with universal agreement about the benefits of co-operation and interoperability and fierce disagreement about who should have the whip hand.

Arm's length public-private partnerships

The private sector is realising that, whatever utopian dreams some have, it is not going to be allowed an unopposed takeover of a fiat financial infrastructure, which sovereign states have spent several centuries building. Central banks appreciate that, whatever their manifold capabilities, they have neither the appetite nor the capacity to launch and run accounts for millions of citizens. In designing, piloting, launching and running CBDCs, there will have to be a degree of partnership and co-operation between private and public sectors. The balance of power, activities and functions between the two will vary widely between countries. Partnerships will range from the enthusiastic to the wary, but going it alone is unlikely to be seen as a viable long term option, except in a narrow range of circumstances.

'I never make predictions, especially about the future' has been attributed to a number of seers. I am confident that of these five predictions, not all will be correct. I am just not sure about which ones. I am certain that we shall be hotly debating the subject at the next annual DMI Symposium.

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Working Paper

Corporate Financial Asset Holdings under Economic Policy Uncertainty: Precautionary Saving or Speculating?*

By HUANG JIALIN, LUO YU, AND PENG YUCHAO*

Abstract: *Non-financial corporations invest heavily in financial assets nowadays, raising questions about the traditional boundaries of non-financial firms. We investigate how economic policy uncertainty affects firms' holdings of non-currency financial assets and portfolios in China. We find that economic policy uncertainty has a negative effect on firms' non-currency financial asset allocation, especially for less financially constrained firms. This result implies that other than precautionary saving, speculation is the underlying motive that drives firms to increase their non-currency financial asset holdings. Furthermore, economic policy uncertainty has a negative but weaker impact on financial asset holdings for firms in industries/regions with intensive competition.*

Keywords: Economic policy uncertainty; Financial asset; Financial constraint; Speculation; Precautionary saving

1. Introduction

In the literature on corporate cash holdings, financial assets are usually regarded as important components of cash equivalents in managing liquidity.[17] In other words, corporate financial assets allow firms to cut the transaction costs of raising funds compared to liquidating assets, and to seize future investment opportunities when other sources of funding are not available or are excessively costly (Opler, Pinkowitz, Stulz, & Williamson, 1999). However, recent studies document that cash equivalents provide conditional liquidity and fail to fulfill the same precautionary role as cash (Lins, Servaes, & Tufano, 2010; Sufi, 2007; Yun, 2009). Moreover, Duchin, Gilbert, Harford, and Hrdlicka (2017) propose that large numbers of firms, including Google and Apple, now hold financial assets for improving returns on their money, which they now manage conservatively. Although non-financial corporations are increasingly involved in financial markets worldwide, little evidence has been provided for the property of corporate financial assets so far. Do firms treat non-currency financial assets as a part of liquidity management? Or do they increase their financial asset holdings in order to improve stockholders' earnings? This study contributes to the

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[17]An incomplete list of studies examining corporate financial assets as liquidity management includes Allen and Phillips (2000), Gorton, Lewellen, and Metrick (2012), Jeffers and Kwon (1969), Miller and Orr (1966, 1968), and Selden (1961).

literature on cash holdings by documenting the real attributes of corporate financial asset holdings in China, which are considered crucial components of corporate cash equivalents.

According to the literature, economic policy uncertainty (EPU) has a great impact on the environment in which firms operate and hence, on their behavior. Previous studies have found a negative relationship between EPU and corporate investment owing to investment irreversibility and the option value of waiting to invest. Therefore, EPU may be one of the main reasons for the sluggish recovery following the 2007–2008 global financial crisis (An, Chen, Luo, & Zhang, 2016; Bloom, 2009; Gulen & Ion, 2016; Julio & Yook, 2012; Wang, Chen, & Huang, 2014). We contribute to this debate by presenting evidence to show how policy-related uncertainty impacts firms' specific reversible assets, that is, firms' financial asset holdings and portfolios of such assets in China, rather than corporate investment generally.

Recent studies have documented that some financial assets, including financial derivatives, are a means for corporations to manage risks and generate yields (e.g., Guay & Kothari, 2003; Jin & Jorion, 2006). However, such speculative properties of the entire range of corporate financial assets have rarely been examined in a transition economy. This study attempts to fill the gap by presenting new evidence to show that corporates hold financial assets for speculation (Campbell & Kracaw, 1990; Ljungqvist, 1994). Specifically, we examine the relationship between EPU and firms' non-currency financial asset holdings in China.

When governments introduce new series of economic policies to stimulate the macroeconomy, which result in great uncertainty for the real economy, corporations may change their holding positions of financial assets for different reasons. On the one hand, firms with the precautionary saving motive hold more financial assets when EPU increases. As the liquidity of financial assets is higher than that of fixed assets, firms seek to hold financial assets in order to mitigate corporate liquidity crisis and to help enterprises seize investment opportunities at times of unexpected shocks and funding shortages (Duchin, 2010). EPU is positively associated with the possibility of liquidity crisis in the future, and consequently, firms invest more in financial assets to hedge unexpected risk induced by economic policy in response to an increase in EPU.

On the other hand, firms with the speculative motive seek to invest less in financial assets when EPU increases. As Ljungqvist (1994) mentions, managers with private information speculate on financial assets to manipulate stock prices in order to maximize stockholders' interests, on condition that the stock price is a convex function of profits. When EPU increases, future profit is expected to be more volatile, and thus, the link between stock prices and profits weakens. Therefore, managers speculate less on financial assets in response to an increase in EPU.

Previous empirical work suggests that there is general consensus about the negative effects of EPU on corporate investment in both developed and developing countries. However, little evidence has been provided on the impact of EPU on corporate financial asset holdings. Our study attempts to fill the gap by investigating whether corporations hold financial assets for the precautionary saving or the speculative motive.

To disentangle these effects, we use data from China, for the following reasons. First, the Chinese government is regarded as an active authority that plays a crucial role in promoting economic development (e.g., Maskin, Qian, & Xu, 2000; Piotroski & Zhang, 2014). After the outbreak of the 2007–2008 global financial crisis in particular, the Chinese government launched important economic policies to combat economic recession, including an RMB 4 trillion stimulus plan. These policies resulted in great uncertainty for the real economy. Therefore, China provides an ideal setting to study the issue of non-financial corporations' involvement in financial markets. In addition, as China is the largest emerging economy, an examination of the impact of China's EPU on corporate financial asset holdings would produce interesting results with important implications for other transition economies. Second, it has become more common for Chinese corporations to invest in financial assets (Acharya, Qian, & Yang, 2019; Allen, Qian, Tu, & Yu,

2016; Du, Li, & Wang, 2017). Therefore, it is important to understand the main motivation for Chinese corporations to invest in financial assets, that is, the precautionary saving motive or the speculative motive.

We use an aggregate index proposed by Baker, Bloom, and Davis (2016) to measure EPU and examine firm-quarter panel data of Chinese listed firms during the period 2007–2015. We measure firms' financial assets comprised of (1) firms' total marketable non-currency short-term assets, which include the balance sheet accounts "financial assets held for trading," "available-for-sale financial investments," and "held-to-maturity financial investments," and (2) one additional long-term financial asset reported as "investment property."

We further investigate the mechanism through which EPU affects corporate financial asset holdings. First, we investigate the effect of EPU on corporate cash holdings to show that firms have an alternative way to meet the needs of precautionary saving when EPU increases. Second, we explore the heterogeneous impact of EPU on financial asset holdings for firms that are subject to financial constraints.

Our study's contribution to the literature is summarized in the following three points. First, this study has noticeable implications for the literature on corporate cash holdings, as financial assets are perceived as important components of corporate cash equivalents. The study shows that Chinese firms increase their financial asset holdings in order to improve stockholders' interests and not to mitigate corporate liquidity crisis, which challenges the dominance of the precautionary savings motive for corporate financial asset holdings. Second, this study complements the recent literature that EPU has a negative effect on corporate investment owing to irreversibility and the option value of waiting to invest. This study shows that although corporate financial assets are reversible, uncertainty still incentivizes firms to delay financial asset holdings for speculation. Third, we contribute to the literature on the speculative motive of corporate financial assets. Studies generally have documented the speculative motive of specific financial assets, including financial derivatives. This study provides support for the existence of such speculative properties for the entire corporate financial assets in a transition economy.

The remainder of the paper proceeds as follows. Section 2 develops testable hypotheses. Section 3 describes the data and variables. Section 4 presents the empirical results. Section 5 examines the underlying mechanisms and cross-sectional heterogeneity. Section 6 concludes.

2. Background and hypothesis development

2.1. China's financial system and firms' financial investment

China's financial system is commonly regarded as less developed and discriminatory against privately owned enterprises and small firms (Allen, Qian, & Qian, 2005; Brandt & Li, 2003). This is the essential financial distortion in China, which became more intense after the outbreak of the 2007–2008 global financial crisis. The allocation of financial resources became more concentrated, and larger firms or state-owned enterprises (SOEs) gained greater access to bank loans than small firms or privately owned enterprises did (Beuselinck, Deloof, & Xia, 2017). In November 2008, the Chinese government officially announced an economic stimulus package of RMB 4 trillion to increase bank credit supply and investment spending. However, the government simultaneously announced detailed information of capital distribution, whereby it would supply capital concentrated in favored industries, including transportation and power infrastructure, rural village infrastructure, and culture industries. Under these circumstances, firms in favored industries or with political connections have better access to formal finance than others do.

The Chinese financial market introduced several highly structured financial products after the global financial crisis. According to the previous literature, owing to strict bank regulations, Chinese banks significantly increased the issuance of wealth management products, which are a major component of China's shadow-banking sector (Acharya et al., 2019). Allen et al. (2016)

argue that entrusted loans,[18] an important type of shadow banking tool in China, increased drastically after the global financial crisis. In the face of respectable profitability of shadow banking activities, firms with fewer financial constraints and lower productivity are actively involved in these investments. Furthermore, Du et al. (2017) find that numerous non-financial enterprises participate in re-lending activities in China, and act like financial intermediaries if they have poor growth prospects and good access to formal finance.

Besides the above mentioned kinds of financial assets, nowadays, a large number of corporations with adequate capital also seek to hold real estate in order to earn rent or capital appreciation, which is dubbed touzixing fangdichan ("investment property") in China's Financial Report Standard (Third Edition). Moreover, owing to the high return rate and price volatility of investment properties, large numbers of Chinese firms use them as the main alternative financial asset to bank deposits or (risky) stock.

Based on this unique situation, we argue that Chinese credit distortion, limited investment opportunities for the real economy, and the low level of development of the Chinese financial market have driven Chinese firms to invest actively in financial assets.

2.2. Chinese economic policy uncertainty

The Chinese government is generally considered an active authority that intervenes frequently in economic development. Since the outbreak of the 2007–2008 global financial crisis, the Chinese government has launched a series of economic policies to mitigate economic recession. Even though these policies have contributed significantly to the recovery of the Chinese economy, they have also resulted in great uncertainty for the real economy. Moreover, China experienced a huge political transition in 2012. Generally, new leaders launch different economic policies, which are difficult to anticipate by firms and households. After Chinese President Xi Jinping took over China's leadership in 2012, the Central Committee of the Communist Party of China announced a strong anti-corruption campaign, which also has a significant influence on economic policy making (Pan & Tian, 2017).

Recent studies have shown that Chinese EPU has great impacts on the real economy and corporate behavior (e.g., Liu, Shu, & Wei, 2017; Piotroski & Zhang, 2014; Wang et al., 2014; Xu, Chen, Xu, & Chan, 2016). In particular, the previous literature has found that Chinese political uncertainty has negative impacts on future asset prices and dampens corporate investment. However, little is known about the impact of EPU on corporate financial asset holdings, which is the main concern of this study.

2.3. Hypothesis development

Research on corporate cash holdings generally argues that firms hold cash and cash equivalents as liquidity management tools for the precautionary saving motive (e.g., Frazer, 1958; Jeffers & Kwon, 1969; Opler et al., 1999). Cash equivalents include bank deposits, treasuries, and non-cash financial assets. These financial assets are regarded as safe assets as they are information insensitive, suggesting that investors do not require private information about the issuer. However, besides cash and non-cash safe assets, a growing number of firms hold a certain share of risky financial assets in their portfolios, including corporate debt, equity, and asset-backed securities. For instance, risky financial assets represent 40% of the financial portfolios of U.S. firms. Moreover, the share of risky financial assets in financial asset portfolios is found to be positively associated with the size of the portfolio (Duchin et al., 2017).

When EPU increases, firms with the precautionary saving motive prefer to hold more liquidity through two different channels. First, EPU increases the cost of firms' external financing and the

[18]Entrusted loans are loans made to a party by a non-bank party (e.g., industrial firm, entity sponsored by a local government, or private equity fund), using a bank as a servicing agent.

unpredictability of firms' cash demand, which increase the value of liquidity. Thus, firms are incentivized to hold more liquidity when EPU increases. Second, cash holdings enable firms to use liquid assets to finance their future investment opportunities, and uncertainty increases the value of the real option of waiting to invest in fixed assets (Bloom, Bond, & Van Reenen, 2007; Gulen & Ion, 2016). Therefore, firms choose to hold more liquid assets so as to wait for the best chance to invest. As an important substitute for cash, an increase in EPU is assumed to encourage firms to hold more financial assets.

However, another strand of literature considers corporate financial assets an object of speculation. The classic theory of Tobin (1965) emphasizes that investors wish to invest in financial assets when rates of return on the real sector are too unattractive for investment, which means there is substitutability of real and financial assets in portfolio balances. Increasing the availability and accessibility of investment opportunities in financial markets can help firms in the real sector sustain profit margins despite market rigidities, increasing goods market competition, or higher levels of risks (Demir, 2009). Indeed, a growing number of corporate managers are searching for yield when investing in financial market (Becker & Ivashina, 2015; Rajan, 2010).

When EPU increases, firms with the speculative motive prefer to decrease financial asset holdings for two reasons. First, uncertainty raises the heterogeneity of investors' beliefs in future market prices, and hence, increases the price volatility of financial markets (Pastor & Veronesi, 2012, 2013). Firms hold fewer risky financial assets to prevent loss owing to fear of a sharp drop of financial asset prices. Second, uncertainty makes it more difficult to forecast future returns, and firms' preferences for heterogeneous financial assets in terms of expected returns may alter rapidly, which gives firms incentives to delay financial investment. Therefore, managers are less motivated to speculate on financial assets when EPU increases. Based on the above mentioned predications, we empirically test the following two competing hypotheses.

Hypothesis 1-a. (Precautionary saving view): EPU is positively associated with firms' financial asset holdings.

Hypothesis 1-b. (Speculative view): EPU is negatively related to firms' financial asset holdings.

2.3.1. Financial constraints and the effect of economic policy uncertainty

To explore the motive for firms to hold financial assets further, we investigate the heterogeneous effect of EPU on firms with different extent of financial constraints.

According to the precautionary saving view, the function of financial assets is likely to be liquidity, such as cash and cash equivalents, and thus, more financially constrained firms are assumed to hold more liquidity. When EPU increases, financial intermediation frictions increase, firms have more difficulty raising external financing, and the price of external financing rises (Gungoraydinoglu, Colak, & Oztekin, 2017). Therefore, firms with more financial constraints increase liquidity more when uncertainty is higher (Han & Qiu, 2007). Thus, for financially constrained firms, holdings of financial assets are assumed to increase substantially in response to an increase in EPU.

By contrast, from the speculative view, financial assets are more likely to be an investment, like fixed assets. Firms with fewer financial constraints have more financial investment opportunities, and can supply relatively sufficient capital to fund their financial and fixed investment projects. When EPU increases, higher price volatility of financial markets and more fixed and financial investment opportunities drive firms with fewer financial constraints to have higher value on the option of waiting; thus, firms with fewer financial constraints reduce financial asset holdings more. In other words, the negative effect of EPU on financial asset speculation mainly derives from firms with fewer financial constraints (Xie, 2009). These arguments lead to the following competing hypotheses.

Hypothesis 2-a. (Precautionary saving view): The positive effect of EPU on firms' non-currency financial asset holdings is more pronounced for more financially constrained firms.

Hypothesis 2-b. (Speculative view): The negative effect of EPU on firms' non-currency financial asset holdings is more pronounced for less financially constrained firms.

3. Empirical research design

Our sample includes all Chinese domestic companies listed on the Shanghai and Shenzhen Stock Exchanges, and the sample spans 2007 to 2015. We start our analysis in 2007 because the China Securities Regulatory Commission (CSRC) required listed firms to disclose detailed information about their financial assets only from 2007. The data on quarterly financial statements and capital market information are obtained from the China Stock Market and Accounting Research Database. We measure Chinese EPU using an aggregate index developed by Baker et al. (2016).

Our sample selection process is as follows. (1) We exclude stocks in the financial and real estate industries according to the classification standard of the CSRC. (2) We drop stocks that were in special treatment (ST, *ST, suspended and delisted firms) to avoid survivorship bias. (3) We delete observations with missing values of variables. Our final sample consists of 51,225 firm-quarter observations for 2122 firms.

3.1. Measures of financial asset holdings

In our empirical analysis, we focus on firms' financial asset holdings. According to the "Chinese Accounting Standards for Business Enterprises No. 22—Recognition and Measurement of Financial Instruments," the standard measure of Chinese corporate financial assets includes the balance sheet accounts "financial assets held for trading," "available-for-sale financial investments," and "held-to- maturity financial investments." Following Duchin et al. (2017), we include one additional long-term financial asset reported as "investment property."[19] We divide total financial assets into two parts: traditional financial assets and investment property. Traditional financial assets are short term and liquid, while investment property is long term and illiquid.[20] The definitions of these variables are listed in Appendix 1.

3.2. Chinese economic policy uncertainty

We measure Chinese EPU using the policy uncertainty index developed by Baker et al. (2016) (henceforth, BBD index). The Chinese BBD index quantifies the volume of news discussing policy-related economic uncertainty.[21] To convert the monthly data into quarterly data, this study uses the mean method, that is, the Chinese quarterly EPU index equals the arithmetic average of the BBD index in the 3 months of the quarter.

[19]With regard to the composition of financial assets held by non-financial firms, Duchin et al. (2017) include "equity investment" in their measures of financial assets. However, firms' equity investment may include the securities of companies related to their own industrial chain, and it should belong to firms' operating assets, other than financial assets. Unfortunately, it is practically impossible to make a distinction between strategic equity investment and other equity investment, because such detailed information is not reported in Chinese quarterly financial reports. Meanwhile, it is difficult to define the standard for distinguishing firms' equity investment. As a robustness check, we follow Duchin et al. (2017) and include "equity investment" in our measures of financial assets. The basic results are presented in Appendix Table A1. It turns out that our major results barely change, which increases our confidence that the results are consistent and unaffected by such adjustment.

[20]One may be concerned that "long-term debt investments," other liquid assets, like financial products investment, and trust investment should be included in firms' financial assets. Actually, these investments are all included in "traditional financial assets." In China's new accounting standards adopted in 2006, the balance sheet item "long-term debt investment" was cancelled and replaced with "held-to-maturity financial investments," which refers to non-derivative financial assets with fixed maturity and fixed or determinable payments that managers have the intention and ability to hold to maturity. "Financial products investment" now belongs to the item "financial assets held for trading," which is trading financial assets at fair value, including bonds, stocks, and funds held by the enterprise for trading. Moreover, if the purpose of having "trust investment" is not for long- term holding, it should be classified as "financial assets held for trading." If it is prepared for long-term holding until maturity and the trust products are guaranteed products, it should be "hold-to-maturity investment." If the holding period and purpose is not clear or the product is not a guaranteed product, then the investment is classified as "available-for-sale financial assets" account.

[21]Unlike the construction of the U.S. EPU index, the Chinese EPU index is the same as the news-based indexes of EPU for the United States and other countries. Gulen and Ion (2016) find that the correlation coefficient with the overall BBD index and the news-based index is very high (0.887), and their empirical findings are similar for these two indexes.

3.3. Other control variables

Following the previous literature, we control a vector of firm characteristics that may affect corporate financial asset allocation. The control variables include firm size, cash flow, firm growth, Tobin's Q, leverage ratio, return on assets (ROA), margin profit, SOE dummy, and GDP growth. These factors, their relationship with financial asset holdings, and their measures are discussed as follows.

Firm size. A larger firm, which can secure more resources from external markets, invests more in financial assets. Therefore, firm size is expected to be positively correlated with financial asset holdings. We use the natural logarithm of total assets (denominated in yuan) to measure firm size.

Cash flow. According to Duchin et al. (2017), cash flow shocks are expected to be positively associated with firms' financial asset holdings. The reason is that profits of holding financial assets are substantially higher than holding currency assets. In addition, the costs of adjusting them are significantly lower than real investments or shareholder distributions. Therefore, firms with more cash flow tend to hold more financial assets for relatively higher profit with low risks. We use net operating cash flow scaled by total asset to measure cash flow.

Firm growth. Theoretically, the relationship between growth opportunities and financial assets allocation should be negative. Rapid business expansion requires a large amount of funds, which easily squeeze out financial asset holdings. Therefore, high-growth firms tend to have less financial asset allocation. We define the annual growth rate of total sales (sales growth) as a firm's growth opportunity.

Tobin's Q. Firms with higher market value have easier access to resources, and hence, have fewer financial constraints. Therefore, we expect that Tobin's Q is positively related to financial asset holdings. We define Tobin's Q as the ratio of the sum of market value of traded and non-traded shares and total debt to total assets.

Leverage ratio. A higher leverage ratio means fewer external funds. Therefore, firms with more debt hold fewer financial assets. Leverage ratio is the ratio of total debt to total assets.

ROA. Following Demir (2009), lower profitability incentivizes firms to invest in reversible financial assets rather than irreversible long-term fixed investments. Therefore, a firm's profitability is expected to be negatively related to financial asset allocation. We use net profits scaled by total assets (ROA) to measure a firm's profitability.

Margin profit. To control the impacts of return gap between financial investments and fixed ones, we include margin profit in our model. Higher margin profit encourages more investment in short-term financial assets than long-term ones with fixed returns. Margin profit is measured by revenues of financial assets divided by operating revenue.

SOE dummy. The relationship between SOE dummy and corporate financial asset holdings is unclear. On the one hand, SOEs are believed to suffer more policy burden and care less about corporate profitability, and thus, private firms hold more financial assets for improving net income. On the other hand, previous literature (e.g., Brandt & Li, 2003; Li, Yue, & Zhao, 2009) suggests that state ownership is a significant determinant of Chinese firms' financial constraints. It is generally found that SOEs face fewer financial constraints, and thus, SOE dummy may be positively related to financial asset allocation. SOE dummy equals one if the firm is ultimately controlled by the state, and otherwise zero.

GDP growth. This is meant to alleviate endogeneity concerns stemming from the fact that uncertainty tends to be countercyclical and therefore, could capture the effect of poor economic prospects (Gulen & Ion, 2016). We expect that a decline of the real economy decreases a firm's real investment and increases its financial asset allocation, as financial asset holdings are important substitutes for real investment. GDP growth is calculated as the quarterly growth rate of GDP.

3.4. Empirical model

Following Duchin et al. (2017) and Gulen and Ion (2016), we estimate the effect of EPU on financial asset holdings using the following empirical model:

$$Financial\ Assets_{i,t} = \alpha + \beta EPU_t + \gamma' X_{i,t} + Quarter_t + \mu_i + \varepsilon_{i,t} (1)$$

where subscripts i and t are indexes for firm and quarter, respectively. The dependent variable, Financial Assets i,t is firms' holdings of financial assets scaled by total assets. EPU is the Chinese BBD index. X represents a vector of control variables, including firm size, cash flow, growth, Tobin's Q, leverage, ROA, profit margin, SOE, and GDP growth. The definitions of these control variables are listed in Appendix 1. We include quarter dummies (Quarter) to account for the seasonal trends of the macroeconomy. We include a firm fixed effect (μ) to capture the time-persistent differences in financial assets across firms. Standard errors are adjusted for clustering at the firm level.

As many firms do not hold certain financial assets, the dependent variables contain a large number of zero values, and obviously have the characteristic of left-censoring distribution. To avoid biased estimation caused by the distribution of the dependent variable, the Tobit model with fixed effects proposed by Honore (1992) is used in the baseline estimation. The Tobit model is set as follows:

$$Financial\ Assets_{i,t} *= \alpha + \beta EPU_t + \gamma' X_{i,t} + Quarter_t + \mu_i + \varepsilon_{i,t} (2)$$

$$Financial\ Assets_{i,t} = \max\{0, Financial\ Assets_{i,t} *\}$$

We first estimate Models (1) and (2) for the full sample using ordinary least squares (OLS) and the Tobit model. To address the endogeneity problem, we then estimate the models using two-stage least squares (2SLS). The endogeneity problem is discussed in further detail in Subsection 5.1.

3.5. Summary statistics

Panel A of Table 1 presents the summary statistics for our sample by firm-quarter. All firm-level financial variables are winsorized at the 1% level in both tails. The ratio of financial assets to total assets is 2.216% on average. After decomposing the financial asset holdings, we reveal that traditional financial asset holdings play an important role in corporate financial asset allocation. In Table 1 (Panel A), the traditional financial asset holdings are on average 1.248%, yet account for about 56% of the total financial asset portfolio. Moreover, the mean of investment property ratio is 0.854%.

The mean of our key variable, "economic policy uncertainty," is about 1.68, ranging widely from 0.64 to 5.52.[22] On average, the cash flow and leverage are about 1.78% and 41%, respectively. The quarterly sales growth rate is on average 37.24%, indicating that Chinese listed firms grew rapidly from 2007 to 2015. The mean values of firm size and Tobin's Q are about 21.58 and 2.23, respectively. We observe that corporate profitability is quite low, averaging 3.019%. The average profit margin between financial and fixed investments is about 9.1%, and 45.1% of firm-quarters were SOEs. The mean of GDP growth rate is 3.64%.

To preview the connection between EPU and corporate financial asset allocation, we compare the mean values of all the variables between low- and high-EPU periods in Table 1 (Panel B). The low-EPU group is composed of observations whose EPU index does not exceed the median value, and the high-EPU group is composed of those whose EPU index exceed the median value. In Table 1 (Panel B), the mean values of total financial asset holdings in the high-EPU group are significantly different (at the 1% level) from those in the low- EPU group. Specifically, the total financial asset holdings in the low-EPU group are 0.198% higher than those in the other group.

[22]Higher EPU indicates greater uncertainty. Three time points with the largest EPU are the third quarter of 2011 (5.52), the third quarter of 2009 (3.57), and the last quarter of 2011 (3.09). The election in 2012 may have contributed substantially to the jump in uncertainty in 2011, and the global financial crisis may be the main reason for the large EPU index in 2009.

We find that the difference of total financial asset holdings between these two groups is mainly from traditional financial asset holdings. Moreover, traditional financial asset holdings in the low-EPU group are 0.192% more than those in the other group, accounting for about 14.68% (0.192/1.308) of the average ratio in the low-EPU group.

Table 1. Summary statistics

Panel A. Summary statistics

Variables	No. of obs.	Mean	S.D.	Min	Median	Max
Total financial asset holdings	51225	2.216	5.282	0.000	0.085	31.590
Traditional financial asset holdings	51225	1.248	3.787	0.000	0.000	24.879
Investment property ratio	51225	0.854	2.602	0.000	0.000	17.657
Economic policy uncertainty	51225	1.684	0.996	0.644	1.440	5.522
Firm size	51225	21.586	1.192	19.568	21.410	25.326
Cash flow	51225	1.782	6.103	-14.924	1.451	19.663
Growth	51225	37.243	75.190	-87.278	46.854	235.975
Tobin's Q	51225	2.234	1.808	0.235	1.723	10.021
Leverage ratio	51225	41.022	20.474	3.761	41.227	83.423
ROA	51225	3.019	3.371	-4.219	2.170	15.601
Profit margin	51225	0.091	0.420	-1.395	0.000	2.682
SOE	51225	0.451	0.498	0.000	0.000	1.000
GDP growth	51225	3.639	10.684	-16.666	7.592	14.507

Panel B. Summary statistics in high vs. low economic policy uncertainty periods

	Low EPU		High EPU		Diff
	Mean	S.D.	Mean	S.D.	
Total financial asset holdings	2.279	5.339	2.081	5.154	-0.198***
Traditional financial asset holdings	1.308	3.867	1.117	3.604	-0.192***
Equity investment ratio	0.854	2.586	0.853	2.636	-0.001
Investment property ratio	1.142	0.290	2.851	0.977	1.708***
Economic policy uncertainty	17.967	14.758	19.985	15.821	2.018***
Firm size	21.608	1.187	21.540	1.203	-0.069***
Cash flow	1.621	5.926	2.129	6.454	0.508***
Growth	37.532	81.476	36.621	59.431	-0.910
Tobin's Q	2.446	1.940	1.777	1.376	-0.669***
Leverage ratio	41.319	20.272	40.381	20.890	-0.939***
ROA	2.829	3.249	3.430	3.585	0.602***
Profit margin	0.096	0.424	0.081	0.409	-0.015***
SOE	0.452	0.498	0.451	0.498	-0.001
GDP growth	3.587	11.496	3.751	8.679	0.164
No. of obs.	34982		16243		51225

Notes: Panel A presents the summary statistics of all variables used in this study. Panel B reports the summary statistics grouped by economic policy uncertainty. The variables are defined in Table 1.

Table A2 in the Appendix provides the Pearson correlation coefficients among the key variables. As expected, EPU is negatively correlated with all corporate financial asset holdings. The correlation coefficients between all control variables are less than 0.7 (the threshold of the multicollinearity problem), and thus, we are confident that multicollinearity is not a concern in our sample. It is also evident that corporate total financial asset holdings exhibit positive correlations with firm size, leverage ratio, profit margin, SOE dummy, and GDP growth, but are negatively correlated with the other variables.

4. Empirical results

4.1. Baseline regression estimates

Table 2 presents the estimation results of the baseline regressions. Columns 1 and 2 are estimated with the OLS model. In Column 1, EPU is included as the only independent variable. Column 2 includes all control variables. In both cases, the coefficients on EPU are negative and significant at the 10% level, and indicate that for a one standard deviation increase in EPU, the corresponding decrease in total financial asset holdings is 0.1% after controlling for other variables. Columns 3 and 4 repeat Columns 1 and 2 by using the Tobit model. The magnitudes of coefficient on EPU increase dramatically, and they remain significant at the 10% level. If EPU increases by one standard deviation, total financial asset holdings decrease by 0.26% (compared to 2.216% of average total financial asset holdings). Therefore, the baseline estimation results indicate that EPU negatively influences corporate total financial asset holdings, and this effect is more influential after taking into account the left-censoring distribution of the dependent variable. This finding is consistent with the prediction of Hypothesis 1b that firms hold financial assets for the speculative motive rather than the precautionary saving motive.[23]

For the control variables, the coefficient of firm size is significantly positive, which suggests that firms of larger size hold more financial assets to seek profits. Tobin's Q is found to be positively associated with financial asset holdings, while leverage is negatively correlated. These results show that firms with higher market value and lower leverage face fewer financial constraints, and thus, can hold more financial assets. We also find that the firm's profitability effect is significantly negative, while the coefficient on the profit margin is positive. This result shows that lower real profitability and a higher return gap between financial and fixed investments encourage firms to invest in reversible financial assets rather than irreversible long-term fixed investments. Notably, the SOE dummy is negatively associated with financial asset holdings, which means that private enterprises have more financial asset holdings to improve net income. The coefficient of GDP growth is negative, confirming that the increase of the real economy depresses firms' financial asset allocations.

Table 2. Economic policy uncertainty and corporate financial asset holdings: basic approach

Specification	(1)OLS Without control	(2)OLS With control	(3)Tobit Without control	(4) Tobit With control
Economic policy uncertainty	-0.025**	-0.019*	-0.052**	-0.049*
	(-2.36)	(-1.71)	(-2.27)	(-1.72)
Firm size		0.507***		1.224***
		(4.89)		(3.89)
Cash flow		0.000		0.002
		(0.09)		(0.22)
Growth		-0.000		-0.002
		(-0.94)		(-1.61)
Tobin's Q		0.175***		0.430***
		(8.55)		(7.08)
Leverage ratio		-0.018***		-0.041***
		(-4.53)		(-4.20)

[23]To show that firms have an alternative way to meet the needs of precautionary saving when EPU increases, we further investigate the effect of EPU on corporate cash holdings, shown in Appendix Table A3. We use $Cash\ holding_{i,t} = \alpha + \beta EPU_t + \gamma' X_{i,t} + Quarter_t + \mu_i + \varepsilon_{i,t}$ as the model. EPU is positively associated with corporate cash holdings. We conclude that Chinese firms have incentive to hold liquidity as precautionary saving while they prefer cash to financial assets.

ROA		-0.040***		-0.095***
		(-4.22)		(-4.26)
Profit margin		0.343***		0.536***
		(6.58)		(6.09)
SOE		-0.504**		-1.080**
		(-2.53)		(-2.12)
GDP growth		-0.081***		-0.160***
		(-6.51)		(-5.52)
Quarter dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
No. of obs.	51225	51225	51225	51225
Adjusted R^2	0.655	0.665		

Notes: This table reports the estimation of the effect of economic policy uncertainty on corporate financial asset holdings based on the multivariate regression. The variables are defined in Appendix A. The dependent variable is total financial asset holdings. Columns 1 and 2 show the estimation of OLS regressions. Column 1 includes only economic policy uncertainty as the independent variable. Column 2 includes all control variables. For both regressions, standard errors are clustered at the firm level. Columns 3 and 4 repeat Columns 1 and 2 by using the Tobit model as regressions. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Different types of corporate financial investment

We proceed to examine whether EPU has an impact on the structure of corporate financial asset holdings. We predict that if corporations hold financial assets for the precautionary saving motive, then the increase of EPU drives firms to hold more financial assets, especially short-term financial assets. However, the speculative motive makes firms hold fewer financial assets, including short-term and long-term financial assets.

In Table 3, we estimate the effect of EPU on different types of financial asset holdings. We find that the effects on traditional financial asset holdings and the investment property ratio are both negative and significant at the 10% level when using the Tobit model. Their magnitudes indicate that a one standard deviation increase in EPU leads to a 0.29% decrease in traditional financial asset holdings and a 0.06% decrease in the investment property ratio. Therefore, we conclude that Chinese corporations invest financial assets more for the speculative motive than the precautionary saving motive.

Table 3. Economic policy uncertainty and different types of corporate financial asset holdings

	Traditional financial asset holdings		Investment property ratio	
Dependent variable	(1) OLS	(2) Tobit	(3) OLS	(4) Tobit
Economic policy uncertainty	-0.021*	-0.075**	-0.005	-0.023*
	(-1.67)	(-2.38)	(-0.75)	(-1.92)
Firm size	0.949***	2.185***	-0.281***	-0.400***
	(7.48)	(7.86)	(-3.56)	(-2.70)
Cash flow	-0.003	0.002	0.001	0.001
	(-0.72)	(0.22)	(0.48)	(0.42)
Growth	-0.000	-0.001	-0.000	-0.000
	(-0.15)	(-1.04)	(-0.32)	(-0.97)
Tobin's Q	0.201***	0.507***	0.023	0.092***
	(8.34)	(10.30)	(1.45)	(3.34)
Leverage ratio	-0.034***	-0.054***	0.001	0.009**

	(-6.85)	(-6.65)	(0.46)	(2.09)
ROA	-0.033***	-0.086***	-0.013	-0.022**
	(-2.96)	(-4.42)	(-1.60)	(-2.16)
Profit margin	0.369***	0.463***	0.050	0.071*
	(5.89)	(7.18)	(1.23)	(1.65)
SOE	-0.515*	-0.542	-0.257**	-0.674**
	(-1.77)	(-1.28)	(-2.21)	(-2.46)
GDP growth	-0.062***	-0.148***	-0.037***	-0.088***
	(-4.29)	(-5.13)	(-3.68)	(-6.23)
Quarter dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
No. of obs.	51225	51225	51225	51225
Adjusted R^2	0.575		0.785	

Notes: This table estimates the effect of economic policy uncertainty on heterogeneous corporate financial asset holdings. The variables are defined in Appendix A. Columns 1 and 2 use traditional financial asset holdings as the dependent variable. OLS regression results are shown in Column 1. Column 2 uses Tobit regression. Columns 3 and 4 repeat Columns 1and 2 by using investment property ratio as the dependent variable. For OLS regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The empirical evidence suggests that EPU is negatively associated with firms' financial asset holdings. As discussed, firms' financial asset holdings may be driven by either the precautionary saving motive or the speculative motive. To verify the main motivation, we next examine the heterogeneous effects of EPU on corporate financial asset holdings for firms with and without financial constraints. While the speculative motive posits that the effect is strengthened for less financially constrained firms, the precautionary saving motive predicts the opposite.

4.3. Mechanism of the impact of economic policy uncertainty on corporate financial asset holdings

We examine the heterogeneous effect of EPU on financial asset holdings with different extent of financial constraints. We use the KZ index developed by Kaplan and Zingales (1997) and firm size to measure financial constraints. These are commonly used in the literature to measure a firm's financial constraints (Acharya, Almeida, & Campello, 2007; Almeida, Campello, & Weisbach, 2004). To test whether firms' financial constraints have a significant impact on the relationship between EPU and corporate financial assets, we re-estimate the baseline model for groups with different financial constraints. The high financial constraint group is composed of observations whose KZ index (firm size) exceeds (is less than) the median value. Otherwise, the firms are defined as having fewer financial constraints. Table 4 reports the results. In either case, the negative EPU effect for firms with fewer financial constraints is significant while the effect for firms with high constraints is insignificant; the magnitude is also higher for firms with fewer financial constraints (0.41 vs. 0.018/0.099 vs. 0.039/0.031 vs. 0.013/0.067 vs. 0.013). We also report the F-test for the coefficient difference in Table 4. The results show that the differences in the two coefficients are both significant at the 5% level (besides when we measure financial constraints by firm size and use the Tobit model for the regression). This finding indicates that the negative effect of EPU on financial assets is narrowed for firms with stringent financial constraints. These results suggest that firms mainly hold financial assets for speculation in China, and that they reduce their holdings when EPU increases. This further strengthens our conclusion drawn from the baseline model.

Table 4. The mechanism of the impact of economic policy uncertainty on corporate financial asset holdings

	KZ dummy				Firm size			
	Low financial constraint OLS	High financial constraint OLS	Low financial constraint Tobit	High financial constraint Tobit	Low financial constraint OLS	High financial constraint OLS	Low financial constraint Tobit	High financial constraint Tobit
Economic policy uncertainty	-0.041***	0.018	-0.099**	0.039	-0.032**	0.013	-0.067**	0.013
	(-2.62)	(1.14)	(-2.57)	(0.98)	(-2.20)	(0.71)	(-2.19)	(0.25)
Firm size	0.546***	0.427***	1.214***	1.062***	0.532***	0.910***	1.073***	2.334***
	(3.70)	(3.64)	(3.02)	(2.86)	(3.59)	(4.47)	(2.92)	(3.90)
Cash flow	-0.010**	0.003	-0.021**	0.009	0.004	-0.001	0.009	-0.000
	(-2.09)	(0.69)	(-1.99)	(0.80)	(1.05)	(-0.30)	(1.08)	(-0.04)
Growth	-0.000	-0.001	-0.000	-0.002*	-0.000	-0.000	-0.001	-0.001
	(-0.07)	(-1.21)	(-0.35)	(-1.77)	(-0.86)	(-0.26)	(-1.34)	(-0.74)
Tobin's Q	0.308***	0.167***	0.664***	0.405***	0.155***	0.182***	0.290***	0.498***
	(7.26)	(7.47)	(6.32)	(6.39)	(3.68)	(7.51)	(2.98)	(6.47)
Leverage ratio	-0.016***	-0.011**	-0.034***	-0.028**	-0.014**	-0.020***	-0.032**	-0.044***
	(-3.08)	(-2.31)	(-2.96)	(-2.24)	(-2.57)	(-3.36)	(-2.48)	(-2.89)
ROA	-0.042***	-0.029***	-0.090***	-0.072***	-0.033***	-0.038***	-0.067***	-0.095***
	(-3.28)	(-2.58)	(-3.37)	(-2.60)	(-2.84)	(-3.08)	(-2.92)	(-3.03)
Profit margin	0.344***	0.309***	0.496***	0.499***	0.277***	0.355***	0.411***	0.536***
	(6.36)	(4.00)	(5.81)	(3.74)	(4.04)	(4.69)	(3.60)	(4.57)
SOE	-0.596*	-0.438*	-1.273*	-0.926	-0.278	-0.847**	-0.725	-1.392
	(-1.81)	(-1.82)	(-1.76)	(-1.49)	(-1.42)	(-2.01)	(-1.46)	(-1.42)
GDP growth	-0.110***	-0.059***	-0.213***	-0.119***	-0.040***	-0.095***	-0.064**	-0.220***
	(-7.05)	(-3.85)	(-6.04)	(-3.31)	(-2.60)	(-5.17)	(-2.04)	(-4.72)
Quarter dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coefficient test for EPU F-statistic (P value)	13.7(0.0002)		11.88(0.0006)		6.29(0.0122)		2.23(0.1357)	
No. of obs.	25444	25613	25444	25613	25528	25697	25528	25697
Adjusted R^2	0.705	0.660			0.701	0.682		

Notes: This table examines whether firms with strong/weak financial constraints are affected differently by economic policy uncertainty on corporate financial asset holdings. The variables are defined in Appendix A. Columns 1 to 4 divide the sample based on whether a firm's KZ index is below or above the median. The results of OLS regressions are presented in Columns 1 and 2 and those of Tobit regression are presented in Columns 3 and 4. Columns 5 and 8 repeat Columns 1 to 4 by dividing the sample based on whether firm size is below or above the median. For all OLS regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. We test the difference of coefficients of EPU between the two groups. The null hypothesis is that the coefficients of EPU between the two groups are equal.

To further examine whether the interaction effect of EPU and the extent of corporate financial constraint exists for financial assets with different extent of liquidity, we repeat the regressions from Table 4 in Table 5 by using different types of financial asset holdings as the dependent variable. We observe that, just as in the baseline regression, the coefficients of EPU are significant (insignificant) and have higher (lower) magnitude among low (high) financial constraints on traditional financial asset holdings. In addition, the F-tests for the coefficient difference are all significant at the 10% level (besides when we measure financial constraints by firm size and use the Tobit model for the regression), indicating that corporations may take them as substitutes for

real investment. Moreover, with regard to the investment property ratio, the interaction effect of financial constraint and EPU exists only when using the Tobit specification. In these cases, the negative EPU effect on firms with fewer financial constraints is significant while the effect on firms with high constraints is insignificant. However, the F-tests for the coefficient difference on investment property ratio are all insignificant. Therefore, the investment attribute for this kind of financial assets is not obvious.

Table 5. The impact of economic policy uncertainty on financial asset holding heterogeneity by financial constraints

	KZ dummy				Firm size			
	Low financial constraint OLS	High financial constraint OLS	Low financial constraint Tobit	High financial constraint Tobit	Low financial constraint OLS	High financial constraint OLS	Low financial constraint Tobit	High financial constraint Tobit
Panel A: Traditional financial asset holdings								
Economic policy uncertainty	-0.055***	0.025	-0.117***	0.025	-0.034**	0.015	-0.084**	-0.018
	(-2.93)	(1.35)	(-2.77)	(0.54)	(-2.07)	(0.77)	(-2.42)	(-0.31)
Coefficient test for EPU F-statistic (P value)	18.28(0.000)		5.62(0.0178)		9.35(0.0023)		1.25(0.2628)	
No. of obs.	25444	25613	25444	25613	25528	25697	25528	25697
Adjusted R^2	0.641	0.523			0.641	0.557		
Panel B: Investment property ratio								
Economic policy uncertainty	-0.009	-0.002	-0.030**	-0.015	-0.005	-0.006	-0.023*	-0.025
	(-1.14)	(-0.17)	(-2.02)	(-0.91)	(-0.78)	(-0.44)	(-1.78)	(-1.13)
Coefficient test for EPU F-statistic (P value)	0.47(0.492)		0.15(0.7025)		0.01(0.9179)		0.01(0.9197)	
No. of obs.	25444	25613	25444	25613	25528	25697	25528	25697
Adjusted R^2	0.821	0.785			0.858	0.785		
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table examines whether firms with strong/weak financial constraints are affected differently by economic policy uncertainty on heterogeneous corporate financial asset holdings. The variables are defined in Appendix A. Columns 1 to 4 divide the sample based on whether a firm's KZ index is below or above the median. OLS regressions are estimated in Columns 1 and 2. The results in Columns 3 and 4 are of Tobit regressions. Columns 5 and 8 repeat Columns 1 to 4 by dividing the sample based on whether firm size is below or above the median. Panel A uses traditional financial asset holdings as the dependent variable. The dependent variable for Panel B is investment property ratio. For all OLS regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. We test the difference of coefficients of EPU between the two groups. The null hypothesis is that the coefficients of EPU between the two groups are equal.

5. Robustness tests

5.1. Controlling for endogeneity

Even though we include firm fixed effects to control the heterogeneity of cross-firm financial asset holdings in Section 4, endogeneity problems may still exist if there are unobserved variables correlated with both EPU and corporate financial assets, such as other sources of economic uncertainty. The classic approach used in the literature to address endogeneity concerns is the use of instrumental variables. First, we use EPU lagged by one period as the instrumental variable, based on a method commonly used in the previous literature. Second, we use EPU_7 foreign countries as our instrumental variable, which is calculated by a weighted average of the EPU index for China's seven largest international trade partners, using a weight of the total trade amount between China and these countries divided by China's total international trade amount. The economic rationale behind the instrumental variable is as follows. On the one hand, the extensive international trade activities between the seven foreign countries and China have created tight links between these economies. For this reason, we expect many of the shocks that affect general economic uncertainty in these economies also to affect general economic uncertainty in China. On the other hand, the EPU of the seven foreign countries is not affected by Chinese corporate financial investments, and affects the dependent variable through Chinese EPU. Furthermore, we use global EPU as our third instrumental variable.[24]

Table 6 presents the results from the instrumental variable method; the results are similar to those in Table 2. We make the following observations. First, for all the first-stage estimations (Columns 1, 3, and 5), the coefficients on the instrumental variables are positive and significant at the 1% level, which is consistent with our expectation that the instrumental variables have positive effects on current Chinese EPU. We conduct an endogeneity test (D-W-H chi-sq test) to examine whether the OLS estimates are different from the 2SLS estimates. The test statistic indicates that the 2SLS estimates are significantly different from the OLS estimates, implying that there is endogeneity in the OLS model. Then, we perform the weak instrumental variable test to determine whether the instrument is sufficiently correlated with the endogenous regressor. In all three cases, the Kleibergen–Paaprk Wald F statistic is above the critical value at the 10% significance level, indicating that our instrumental variables are valid and effective.

The second-stage estimations (Columns 2, 4, and 6) show that higher EPU is associated with significantly fewer corporate financial assets. In summary, considering the direct impact of Chinese EPU on corporate financial assets and the possible endogeneity problem, we obtain consistent results that a rising level of uncertainty in economic policy causes a company to reduce financial assets.[25]

Table 6. Analysis of the impact of economic policy uncertainty on corporate financial asset holdings (instrumental variable)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	IV=Last period EPU		IV=EPU_7 foreign countries		IV=EPU_global	
	1st-stage	2nd-stage	1st-stage	2nd-stage	1st-stage	2nd-stage
Last period EPU	0.338***					
	(271.64)					
EPU_7 foreign countries			0.021***			
			(284.53)			

[24]The global EPU index, which is released by Baker et al. (2016), is a GDP-weighted average of national EPU indexes for 18 countries from January 1997 to the present. The 18 countries are Australia, Brazil, Canada, Chile, China, France, Germany, India, Ireland, Italy, Japan, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States.

[25]Since IV-Tobit disallows controlling for firm fixed effects, we consider that using IV-OLS fits our research purpose better than IV-Tobit does. Doing so helps verify that the IV result is not driven by excluding firm dummies. In the robustness check, we use IV-Tobit by controlling industry fixed effects to address endogeneity concerns. The results are reported in Appendix Table A4. It turns out that our major results barely change.

EPU_global					0.024***	
					(342.52)	
Economic policy uncertainty		-0.144***		-0.169***		-0.052**
		(-4.79)		(-6.04)		(-2.40)
Firm size	-0.164***	0.482***	0.037***	0.475***	-0.082***	0.500***
	(-17.44)	(4.58)	(5.31)	(4.66)	(-14.53)	(4.90)
Cash flow	-0.009***	-0.001	-0.001	-0.001	0.000	-0.000
	(-9.27)	(-0.33)	(-0.98)	(-0.37)	(0.60)	(-0.01)
Growth	0.000	-0.000	0.000***	-0.000	0.001***	-0.000
	(0.23)	(-0.99)	(2.98)	(-0.98)	(7.25)	(-0.96)
Tobin's Q	-0.090***	0.159***	0.011***	0.155***	0.033***	0.171***
	(-28.20)	(7.60)	(4.21)	(7.76)	(14.77)	(8.38)
Leverage ratio	-0.002***	-0.019***	0.001	-0.018***	0.002***	-0.018***
	(-4.97)	(-4.81)	(1.50)	(-4.80)	(4.93)	(-4.68)
ROA	0.021***	-0.036***	-0.003**	-0.035***	0.001	-0.039***
	(11.43)	(-3.87)	(-2.26)	(-3.84)	(0.63)	(-4.21)
Margin profit	-0.016*	0.303***	0.037***	0.340***	0.036***	0.343***
	(-1.70)	(6.26)	(4.96)	(6.68)	(5.19)	(6.72)
SOE	0.032	-0.512**	0.073***	-0.499**	0.123***	-0.503**
	(0.83)	(-2.55)	(3.39)	(-2.56)	(5.80)	(-2.58)
GDP growth	-0.079***	-0.088***	-0.044***	-0.102***	0.048***	-0.085***
	(-77.79)	(-6.26)	(-44.03)	(-7.81)	(54.89)	(-7.10)
Quarter dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paaprk Wald F statistic	77173.2		84453.9		1.2e+05	
D-W-H chi-sq test (P value)	28.569(0.000)		52.578(0.000)		5.842(0.0156)	
No. of obs.	48240	48117	51225	51220	51225	51220
Adjusted R-squared	0.321	-0.017	0.577	-0.015	0.663	-0.011

Notes: This table presents estimates from the instrumental variable estimator regressions of the effect of economic policy uncertainty on corporate financial asset holdings. The variables are defined in Appendix A. Columns 1 and 2 use one-period-lagged Chinese economic policy uncertainty as the instrumental variable and the average economic policy uncertainty of seven foreign countries in Columns 3 and 4. In Columns 5 and 6, we use global economic policy uncertainty as the instrumental variable. For all regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.2. Dynamic impact of economic policy uncertainty on corporate financial investment

Following the previous literature (Gulen & Ion, 2016; Wang et al., 2014), which finds that EPU exerts a negative impact on corporate investment with a longer delay, we further examine whether this applies to the effect on corporate financial assets if corporations increase financial assets for an investment motive. The results of the multi-period-lagged EPU on current financial assets are presented in Table 7. Consistent with the original results in Table 2, we find that EPU is significant at 1%, and negatively related to corporate financial assets for the next four lags. Moreover, when

we include all four lags in the model, the coefficients for all lags of EPU are still significant at least at 5%. This is consistent with the notion that uncertainty causes delays in financial asset holdings. Specifically, the coefficient on EPUt1 in Column 1 remains negative and significant at the 1% level, and its magnitude indicates that a one standard deviation increase in the last-period EPU decreases corporate financial asset holdings by 0.64% after controlling for other variables.

Table 7. The dynamic impact of economic policy uncertainty on corporate financial asset holdings

	(1) Lagged one period Tobit	(2) Lagged two periods Tobit	(3) Lagged three periods Tobit	(4) Lagged four periods Tobit	(5) With all four lags Tobit
EPUt-1	-0.120***				-0.058***
	(-4.49)				(-2.61)
EPUt-2		-0.134***			-0.040**
		(-4.84)			(-2.21)
EPUt-3			-0.165***		-0.052***
			(-5.69)		(-2.85)
EPUt-4				-0.238***	-0.202***
				(-8.06)	(-8.28)
Firm size	1.185***	1.137***	1.065***	1.054***	1.022***
	(3.75)	(3.53)	(3.23)	(3.11)	(3.01)
Cash flow	0.001	0.003	0.004	0.005	0.006
	(0.08)	(0.38)	(0.55)	(0.69)	(0.74)
Growth	-0.002	-0.002*	-0.002**	-0.002**	-0.002**
	(-1.58)	(-1.83)	(-2.20)	(-2.12)	(-2.11)
Tobin's Q	0.419***	0.411***	0.446***	0.443***	0.425***
	(6.70)	(6.28)	(6.17)	(5.86)	(5.59)
Leverage ratio	-0.043***	-0.045***	-0.045***	-0.045***	-0.046***
	(-4.23)	(-4.28)	(-4.16)	(-4.10)	(-4.16)
ROA	-0.092***	-0.098***	-0.111***	-0.113***	-0.113***
	(-4.16)	(-4.41)	(-4.85)	(-4.74)	(-4.72)
Profit margin	0.462***	0.404***	0.357***	0.291***	0.290***
	(5.70)	(5.30)	(4.94)	(4.24)	(4.23)
SOE	-1.110**	-1.169**	-1.253**	-1.404**	-1.408**
	(-2.16)	(-2.28)	(-2.33)	(-2.44)	(-2.45)
GDP growth	-0.148***	-0.114***	-0.103***	-0.099***	-0.108***
	(-4.83)	(-3.98)	(-3.60)	(-3.59)	(-3.73)
Quarter dummies	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
No. of obs.	48240	45497	43003	40683	40683

Notes: This table estimates the dynamic effects of economic policy uncertainty on corporate financial asset holdings. The variables are defined in Appendix A. Columns 1 and 2 use the one-period-lagged

and two-period-lagged economic policy uncertainty index as independent variables, respectively. For Columns 3 and 4, the independent variables are the three-period-lagged and four-period-lagged economic policy uncertainty indexes, respectively. Column 5 uses all four lagged economic policy uncertainty indexes as the independent variable. For all regressions, Tobit regression are estimated. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.3. Impact of EPU on corporate financial investment in different periods

We then analyze whether the effect of EPU on corporate financial asset holdings changes over time. Since the global financial crisis of 2007–2008 exerted a strong exogenous shock on the Chinese economy, which would have affected government policy and increased EPU, we consider whether this might have influenced the effect on corporate financial assets. According to economic data published by the National Bureau of Statistics of China, China's export revenue declined sharply after the third quarter of 2008; thus, we define the financial crisis dummy as one when the sample period is after the third quarter of 2008, and otherwise zero. In Table 8, we rerun the baseline regression for the sub-periods before and after the financial crisis. Columns 1 and 2 are estimated with the OLS model and Columns 3 and 4 repeat Columns 1 and 2 by using the Tobit model. The results show that the coefficient for the period before the financial crisis turns positive and significant at the 5% level; however, the coefficient for the period after the financial crisis remains negative and significant at the 1% level, suggesting that before the financial crisis, firms mainly take corporate financial assets as liquidity management tools, owing to the low risk and high liquidity attributes of financial assets; thus, firms increase their financial asset holdings as EPU increases. However, after the start of global financial crisis, firms have begun to consider the riskiness of financial assets more, as a result of which corporations take these assets as a substitute for real investment; then, EPU has a negative effect onfinancial asset holdings.

Table 8. Economic policy uncertainty and corporate financial asset holding by period

	(1) Before financial crisis OLS	(2) After financial crisis OLS	(3) Before financial crisis Tobit	(4) After financial crisis Tobit
Panel A. Total financial asset holdings				
Economic policy uncertainty	0.315**	-0.036***	0.684**	-0.098***
	(2.33)	(-3.32)	(2.25)	(-3.47)
No. of obs.	5337	45888	5337	45888
Adjusted R^2	0.804	0.692		
Panel B. Traditional financial asset holdings				
Economic policy uncertainty	0.213**	-0.024***	0.808***	-0.116***
	(2.37)	(-3.21)	(2.68)	(-3.57)
No. of obs.	5337	45888	5337	45888
Adjusted R^2	0.724	0.569		
Panel C. Investment property ratio				
Economic policy uncertainty	0.068	-0.013***	0.204	-0.045***
	(1.48)	(-3.93)	(1.56)	(-3.97)
No. of obs.	5337	45888	5337	45888
Adjusted R^2	0.894	0.811		
Control variables	Yes	Yes	Yes	Yes

Quarter dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes

Notes: This table estimates the effect of economic policy uncertainty on corporate financial asset holdings by different periods. The variables are defined in Appendix A. Panel A uses the total financial investment ratio as the dependent variable. The dependent variables for Panels B and C are traditional financial asset holdings and investment property ratio, respectively. OLS regressions are estimated in Columns 1 and 2. The results in Columns 3 and 4 are of Tobit regressions. For both OLS regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Panels B to C of Table 8, we repeat the regressions by using different types of financial asset holdings as the dependent variable.

Our findings among firms in different periods are robust to traditional financial asset holdings and investment property holdings.

5.4. Cross-sectional heterogeneity

5.4.1. Impact of marketization

We further investigate the impact of marketization on the relationship between EPU and corporate financial asset holdings. Table 9 reports the empirical results on the heterogeneous effects of EPU among firms in different degrees of regional marketization. We rerun the Tobit regression for firms in the eastern, central, and western regions. In Column 1 of Panel A, we observe that the coefficient on EPU for firms in the eastern region is negative and significant at the 1% level. Column 2 restricts the sample to firms in the central region; the coefficient on EPU is no longer significant and smaller than that for firms in the eastern region (0.060 vs. 0.088, respectively). In Column 3, which restricts the sample to firms in the western region, the coefficient is also insignificant. We use the marketization index of China's provinces developed by Fan, Wang, and Zhang (2001) to measure the degree of regional marketization. If a company is in a province/region with a marketization index equal to or above the median value in a certain year, the company falls into the high marketization group; otherwise, it belongs to the low marketization group. The results are reported in Columns 4 and 5 in Panel A of Table 9. The significant and negative effect of EPU persists among firms in high marketization regions. Its magnitude is also higher than firms in low marketization regions.

These results suggest that the effect of EPU is more pronounced among firms in higher marketization regions. Firms in regions with higher degrees of marketization should be subject to more market discipline and profit maximization; thus, they are more sensitive to the uncertainty arising from economic policies, and eventually, their non-currency financial asset holdings are more impacted by the increase of EPU. This conjecture confirms the results of previous research (Calomiris, Love, & Martínez Pería, 2012; Wang et al., 2014).

Table 9. The impact of economic policy uncertainty on corporate financial asset holding: the impact of marketization.

	(1) Eastern	(2) Central	(3) Western	(4) Low Marketization	(5) High Marketization
	Tobit	Tobit	Tobit	Tobit	Tobit
Panel A. Total financial asset holdings					
Economic policy uncertainty	-0.088**	-0.060	-0.040	-0.025	-0.145***
	(-2.37)	(-1.09)	(-0.41)	(-0.66)	(-2.85)

Coefficient test for EPU F-statistic (P value)		0.27(0.6047)	0.24(0.6276)	5.54(0.0185)	
No. of obs.	35151	9934	6140	31607	19618
Panel B. Traditional financial asset holdings					
Economic policy Uncertainty	-0.079** (-2.12)	-0.006 (-0.09)	-0.174 (-1.62)	-0.021 (-0.48)	-0.172*** (-3.25)
Coefficient test for EPU F-statistic (P value)		1.41(0.2355)	0.64(0.4238)	7.72(0.0055)	
No. of obs.	35151	9934	6140	31607	19618
Panel C. Investment property ratio					
Economic policy Uncertainty	-0.013 (-0.93)	-0.039 (-1.09)	-0.055 (-1.42)	-0.021 (-1.32)	-0.021 (-1.01)
Coefficient test for EPU F statistic (P value)		1.91(0.1670)	0.75(0.3866)	0.04(0.84)	
No. of obs.	35151	9934	6140	31607	19618
Control variables	Yes	Yes	Yes	Yes	Yes
Quarter dummies	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: This table estimates the effect of economic policy uncertainty on corporate financial asset holdings by group. The variables are defined in Appendix A. We divide the sample based on the locations of firms, and the impact of marketization on the relationship between economic policy uncertainty and corporate financial asset holdings. Panel A uses total financial asset holdings as the dependent variable. The dependent variables for Panels B and C are traditional financial asset holdings and investment property ratio, respectively. For all regressions, we use Tobit regression. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. We test the difference of coefficients of EPU between the groups. The null hypothesis is that the coefficients of EPU between the groups are equal.

In Panels B to C of Table 9, we repeat the regressions by using different types of financial asset holdings as the dependent variable. We observe that our findings among firms for different degrees of regional marketization are robust to traditional financial asset holdings.

5.4.2. Impact of industrial competition

We then investigate the different effects of EPU on corporate financial asset holdings across industries. First, we calculate the sales- based Herfindahl–Hirschman index (HHI), that is, the sum of squared sales shares of all firms in a certain industry, where the sales share of a firm is defined as its sales over the sum of all firms' sales of the industry. The second proxy we use is the asset-based HHI, which is calculated similarly to the sales-based HHI. Finally, we partition our sample into regulated and non-regulated industries.[26] Table 10 reports the results. In Panel A, the coefficients on EPU for highly competitive and non-regulated industries are significantly negative, while the coefficients on EPU among industries with little competition are insignificant and turn positive. The coefficient on EPU for regulated industries is less significant and its magnitude is smaller than that for non-regulated industries (0.001 vs. 0.076, respectively). These results show that the effect of EPU on financial asset holdings is more pronounced for firms in highly

[26]We define regulated industries as those including mining, gas and chemicals, metal, energy supply, transportation, information technology, and entertainment; otherwise, the industry is defined as unregulated.

competitive industries. From Panels B and C, we observe that our findings are robust to traditional financial asset holdings and the investment property ratio.

Table 10. The impact of economic policy uncertainty: high vs. low competitive industries

	(1) Low competitive (by sale) Tobit	(2) High competitive Tobit	(3) Low competitive (by asset) Tobit	(4) High competitive Tobit	(5) Regulated Tobit	(6) No-Regulated Tobit
Panel A. Total financial asset holdings						
Economic policy uncertainty	0.089	-0.071**	0.084	-0.077**	-0.001	-0.076**
	(1.17)	(-2.24)	(1.11)	(-2.47)	(-0.01)	(-2.08)
Coefficient test for EPU F-statistic (P value)	25.53(0.000)		26.84(0.000)		4.22(0.04)	
No. of obs.	7943	43282	8511	42714	20097	31128
Panel B. Traditional financial asset holdings						
Economic policy uncertainty	0.023	-0.088***	0.032	-0.098***	-0.049	-0.091**
	(0.25)	(-2.59)	(0.36)	(-2.88)	(-0.98)	(-2.23)
Coefficient test for EPU F-statistic (P value)	10.69(0.0011)		14.57(0.0001)		1.06(0.3028)	
No. of obs.	7943	43282	8511	42714	20097	31128
Panel C. Investment property ratio						
Economic policy uncertainty	0.051	-0.040***	0.061**	-0.040***	0.017	-0.045***
	(1.60)	(-2.98)	(2.30)	(-2.93)	(0.92)	(-2.94)
Coefficient test for EPU F-statistic (P value)	45.52(0.000)		54.79(0.000)		16.53(0.000)	
No. of obs.	7943	43282	8511	42714	20097	31128
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Quarter dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table estimates the effect of economic policy uncertainty on corporate financial asset holdings by group. The variables are defined in Appendix A. We divide the sample based on whether the firm is in competitive industries or not. Panel A uses total financial asset holdings as the dependent variable. Columns 1 and 2 are split according to the HHI index of firm sales. Columns 3 and 4 are split according to the HHI index of firm size. Columns 5 and 6 are divided based on whether the industry is regulated. Panels B and C repeat Panel A by using traditional financial asset holdings and investment property ratio as the dependent variable, respectively. For all regressions, we use Tobit regression. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels,

respectively. We test the difference of coefficients of EPU between the two groups. The null hypothesis is that the coefficients of EPU between the two groups are equal.

6. Conclusions

Large numbers of global non-financial corporations increase their non-currency financial asset holdings rapidly, and this phenomenon has become more common among Chinese listed firms since the outbreak of the 2007–2008 global financial crisis. It is important to understand the determinants and implications of non-financial corporates' portfolio choices regarding non-currency financial assets. By using an aggregate index to measure EPU developed by Baker et al. (2016), we empirically investigate the effect of EPU on firms' non-currency financial asset holdings. We find that EPU has a significantly negative effect on firms' non-currency financial asset holdings. In addition, we find that this effect is more pronounced after the outbreak of the global financial crisis, and that it persists for a long time. Moreover, the effect is still robust after addressing potential endogeneity. Furthermore, this negative effect is different for firms with heterogeneous characteristics. Our results show that for firms with financial constraints and less market competition (regions or industries), EPU has a weaker negative impact on corporate non-currency financial asset holdings. In summary, these findings provide a series of confounding proofs that speculation is the underlying motive driving firms to increase their financial asset holdings in China.

This study has three important implications. First, we provide new evidence on the theory that EPU has a significant impact on corporate operating behavior. Firms' financial asset holdings are negatively associated with EPU. Second, we document empirical evidence supporting the arguments derived by previous theoretical studies on corporate speculation. Indeed, firms speculate on financial assets under certain conditions. Third, this study sheds light on the determinants and implications of corporate portfolio choice about financial assets in China. Other than the precautionary saving motive in developed economies, Chinese firms invest in non-currency financial assets for speculation.

References

Acharya, V., Almeida, H.,&Campello, M. (2007). Is cash negative debt? A hedging perspective on corporate financial policies. Journal of Financial Intermediation,16(4), 515-554.

Acharya, V., Qian, J., & Yang, Z. (2019). In the shadow of banks: Wealth management products and issuing banks' risk in China. SSRN working paper.

Allen, F., Qian, J., & Qian, M. (2005). Law, finance, and economic growth in China. Journal of Financial Economics, 77(1), 57–116.

Allen, F., Qian, Y., Tu, G., & Yu, F. (2016). Entrusted loans: A close look at China's shadow banking system. SSRN working paper.

Allen, J.W., & Phillips, G.M. (2000). Corporate equity ownership, strategic alliances, and product market relationships. Journal of Finance, 55(6), 2791–2815.

Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. Journal of Finance, 59(4), 1777–1804.

An, H., Chen, Y., Luo, D., & Zhang, T. (2016). Political uncertainty and corporate investment: Evidence from China. Journal of Corporate Finance, 36, 174–189.

Baker, S.R., Bloom, N., & Davis, S.J. (2016). Measuring economic policy uncertainty. Quarterly Journal of Economics, 131(4), 1593–1636.

Becker, B., & Ivashina, V. (2015). Reaching for yield in the bond market. The Journal of Finance, 70(5), 1863–1902.

Beuselinck, C., Cao, L., Deloof, M., & Xia, X. (2017). The value of government ownership during the global financial crisis. Journal of Corporate Finance, 42, 481–493.

Bloom, N. (2009). The impact of uncertainty shocks. Econometrica, 77(3), 623–685.
Bloom, N., Bond, S., & Van Reenen, J. (2007). Uncertainty and investment dynamics. Review of Economic Studies, 74(2), 391–415.
Brandt, L., & Li, H. (2003). Bank discrimination in transition economies: Ideology, information, or incentives? Journal of Comparative Economics, 31(3), 387–413.
Calomiris, C.W., Love, I., & MartínezPería, M.S. (2012). Stock returns' sensitivities to crisis shocks: Evidence from developed and emerging markets. Journal of International Money and Finance, 31(4), 743–765.
Campbell, T.S., & Kracaw, W.A. (1990). Corporate risk management and the incentive effects of debt. Journal of Finance, 45(5), 1673–1686.
Demir, F. (2009). Financial liberalization, private investment and portfolio choice: Financialization of real sectors in emerging markets. Journal of Development Economics, 88(2), 314–324.
Du, J., Li, C., & Wang, Y. (2017). A comparative study of shadow banking activities of non-financial firms in transition economies. China Economic Review, 46, S35–S49.
Duchin, R. (2010). Cash holdings and corporate diversification. Journal of Finance, 65(3), 955–992.
Duchin, R.A.N., Gilbert, T., Harford, J., & Hrdlicka, C. (2017). Precautionary savings with risky assets: When cash is not cash. Journal of Finance, 72(2), 793–852.
Fan, G., Wang, X., & Zhang, L. (2001). Annual report 2000 marketization index for China's provinces. China & World Economy, 9(5).
Frazer, W.J. (1958). Large manufacturing corporations as suppliers of funds to the United States government securities market. Journal of Finance, 13(4), 499–509.
Gorton, G., Lewellen, S., &Metrick, A. (2012). The safe-asset share. American Economic Review, 102(3), 101–106.
Guay, W., & Kothari, S. P. (2003). How much do firms hedge with derivatives? Journal of Financial Economics, 70(3), 423–461.
Gulen, H., & Ion, M. (2016). Policy uncertainty and corporate investment. Review of Financial Studies, 29(3), 523–564.
Gungoraydinoglu, A., Colak, G., & Oztekin, O. (2017). Political Environment, Financial Intermediation Costs, and Financing Patterns. Journal of Corporate Finance, 44, 167–192.
Han, S., & Qiu, J. (2007). Corporate precautionary cash holdings. Journal of Corporate Finance, 13(1), 43–57.
Honoré, B. E. (1992). Trimmed LAD and least squares estimation of truncated and censored regression models with fixed effects. Econometrica, 60(3), 533–565.
Jeffers, J.R., & Kwon, J. (1969). A portfolio approach to corporate demands for government securities. Journal of Finance, 24(5), 905–919.
Jin, Y., & Jorion, P. (2006). Firm value and hedging: Evidence from US oil and gas producers. Journal of Finance, 61(2), 893–919.
Julio, B., & Yook, Y. (2012). Political uncertainty and corporate investment cycles. Journal of Finance, 67(1), 45–83.
Kaplan, S.N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? Quarterly Journal of Economics, 112(1), 169–215.
Li, K., Yue, H., & Zhao, L. (2009). Ownership, institutions, and capital structure: Evidence from China. Journal of Comparative Economics, 37(3), 471–490.
Lins, K. V., Servaes, H., & Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. Journal of Financial Economics, 98(1), 160–176.
Liu, L.X., Shu, H., & Wei, K.C.J. (2017). The impacts of political uncertainty on asset prices: Evidence from the Bo scandal in China. Journal of Financial Economics, 125(2), 286–310.

Ljungqvist, L. (1994). Asymmetric information: A rationale for corporate speculation. Journal of Financial Intermediation, 3(2), 188–203.
Maskin, E., Qian, Y., & Xu, C. (2000). Incentives, scale economies, and organization forms. Review of Economic Studies, 67(2), 359–378.
Miller, M. H., & Orr, D. (1966). A model of the demand for money by firms. The Quarterly Journal of Economics, 80(3), 413–435.
Miller, M. H., & Orr, D. (1968). The demand for money by firms: Extensions of analytic results. Journal of Finance, 23(5), 735–759.
Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. Journal of Financial Economics, 52(1), 3–46.
Pan, X., & Tian, G.G. (2017). Political connections and corporate investments: Evidence from the recent anti-corruption campaign in China. Journal of Banking and Finance. https://doi.org/10.1016/j.jbankfn.2017.03.005
Pástor, L., & Veronesi, P. (2012). Uncertainty about government policy and stock prices. Journal of Finance, 64, 1219–1264.
Pástor, L., & Veronesi, P. (2013). Political uncertainty and risk premia. Journal of Financial Economics, 110, 520–545.
Piotroski, J.D., & Zhang, T. (2014). Politicians and the IPO decision: The impact of impending political promotions on IPO activity in China. Journal of Financial Economics, 111(1), 111–136.
Rajan, R. G. (2010). Fault lines: How hidden fractures still threaten the world economy. New Jersey: Princeton University Press.
Selden, R. T. (1961). The postwar rise in the velocity of money a sectoral analysis. Journal of Finance, 16(4), 483–545.
Sufi, A. (2007). Bank lines of credit in corporate finance: An empirical analysis. Review of Financial Studies, 22(3), 1057–1088.
Tobin, J. (1965). Money and economic growth. Econometrica, 33(4), 671–684.
Wang, Y., Chen, C.R., & Huang, Y.S. (2014). Economic policy uncertainty and corporate investment: Evidence from China. Pacific-Basin Finance Journal, 26, 227–243.
Xie, F. (2009). Managerial flexibility, uncertainty, and corporate investment: The real options effect. International Review of Economics and Finance, 18(4), 643–655.
Xu, N., Chen, Q., Xu, Y., & Chan, K.C. (2016). Political uncertainty and cash holdings: Evidence from China. Journal of Corporate Finance, 40, 276–295.
Yun, H. (2009). The choice of corporate liquidity and corporate governance. Review of Financial Studies, 22, 1447–1475.

Appendix 1. Variable Definitions

Variable	Definition
Total financial asset holding (%)	(Traditional financial assets + Investment property)/Total assets*100 in the current quarter.
Traditional financial asset holding (%)	(Financial assets held for trading + Available-for-sale financial investments + Held-to-maturity financial investments)/Total assets*100 in the current quarter.
Investment property ratio (%)	Ratio of the firm's investment property to total assets in the current quarter, then multiplied by 100.
Economic Policy Uncertainty	The mean of current quarter's 3-monthly policy uncertainty indexes, adopting Baker et al.'s (2013) method to calculate Chinese monthly policy uncertainty index.
Firm size	Natural logarithm of total assets; total assets in yuan.
Cash flow (%)	Net cash flow normalized by total assets, then multiplied by 100.
Growth (%)	Total sales in quarter *t* divided by total sales in quarter *t*-1, then minus 1, and multiplied by 100.
Tobin's Q	(Market value of tradable shares + Market value of non-tradable shares + Total debt – Short term assets)/Total assets.
Leverage ratio (%)	Ratio of the firm's total debt to total assets in the current quarter, then multiplied by 100.
ROA (%)	Ratio of the firm's net profit to total assets in the current quarter, then multiplied by 100.
Margin profit	(Interest revenue + Investment revenue – Investment revenue from associates and joint ventures – Exchange gains + Revenue from fair value changes)/Operating revenue.
SOE	Equals one if the firm's ultimate control is state ownership, and zero otherwise.
GDP growth (%)	Quarterly GDP in quarter *t* divided by quarterly GDP in quarter *t*-1, then minus 1, and multiplied by 100.
Economic Policy Uncertainty _7 foreign countries	First calculate the mean of the current quarter's 3-monthly policy uncertainty index for China's seven largest international trade partners, adopting Baker et al.'s (2013) method to calculate monthly policy uncertainty index; then calculate the weighted average of EPU index, using a weight of the total trade amount between China and this country divided by China's total international trade amount.
Economic Policy Uncertainty _global	The mean of current quarter's 3-monthly global policy uncertainty index, adopting Baker et al.'s (2013) method to calculate monthly policy uncertainty index.
KZ index	KZ index developed by Kaplan and Zingales(1997).

Table A1. Economic policy uncertainty and corporate financial asset holdings, including equity investment

Specification	(1)OLS Without control	(2)OLS With control	(3)Tobit Without control	(4) Tobit With control
Economic policy uncertainty	-0.061**	-0.073***	-0.078**	-0.104***
	(-2.56)	(-2.97)	(-2.52)	(-2.82)
Firm size		0.036		-0.025
		(0.13)		(-0.06)
Cash flow		0.021**		0.032**
		(2.53)		(2.53)
Growth		-0.003***		-0.005***
		(-2.58)		(-2.84)
Tobin's Q		0.254***		0.410***
		(5.53)		(5.06)
Leverage ratio		-0.044***		-0.067***
		(-3.91)		(-3.60)
ROA		-0.080***		-0.121***
		(-3.47)		(-3.60)
Profit margin		0.706***		0.828***
		(5.63)		(5.46)
SOE		-1.625***		-2.626***
		(-2.96)		(-2.80)
GDP growth		-0.169***		-0.230***
		(-5.73)		(-5.40)
Quarter dummies	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	No	No
No. of obs.	51225	51225	51225	51225
Adjusted R^2	0.806	0.810		

Notes: This table reports the estimation of the effect of economic policy uncertainty on corporate financial asset holdings.The dependent variable is total financial asset holdings, which are replacedw ith total amounts of traditional financial assets, investment property, and equity investment. Other variables are defined in Appendix A. In Columns 1 and 2, the OLS regression estimations are shown. Column 1 includes only economic policy uncertainty as the independent variable. Column 2 includes all control variables. For both regressions, standard errors are clustered at the firm level. Column 3 and 4 repeat Columns 1 and 2 by using the Tobit model as regressions. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table A2
Correlation matrix

	Total financial asset holding	1	2	3	4	5	6	7	8	9	10	11
1. Traditional financial asset holding	0.789***	1										
2. Investment property ratio	0.635***	0.131***	1									
3. Economic Policy Uncertainty	−0.013***	−0.010**	−0.014***	1								
4. Firm size	0.014***	0.077***	−0.044***	−0.019***	1							
5. Cash flow	−0.015***	−0.002	−0.023***	0.008*	0.151***	1						
6. Growth	−0.010**	−0.002	−0.011**	−0.028***	−0.014***	0.079***	1					
7. Tobin's Q	−0.009**	0.014***	−0.045***	−0.096***	−0.439***	0.022***	0.026***	1				
8. Leverage ratio	0.024***	−0.010**	0.077***	−0.041***	0.523***	0.011**	0.004	−0.491***	1			
9. ROA	−0.024***	0.007	−0.052***	0.096***	−0.021***	0.404***	0.194***	0.336***	−0.310***	1		
10. Margin profit	0.180***	0.192***	0.075***	−0.012***	0.020***	−0.035***	0.010**	−0.020***	0.031***	−0.018***	1	
11. SOE	0.105***	0.081***	0.094***	−0.035***	0.398***	0.079***	−0.027***	−0.272***	0.348***	−0.102***	0.047***	1
12. GDP growth	0.006	0.007	0.005	−0.012***	0.005	0.202***	0.886***	0.012***	0.017***	0.304***	0.023***	0.009**

Table A3. The impact of economic policy uncertainty on corporate cash holding

Specification	(1) Without control	(2) With control
Economic policy uncertainty	0.946***	1.052***
	(14.43)	(17.28)
Firm size		-1.572***
		(-4.22)
Cash flow		0.182***
		(11.92)
Growth		0.004**
		(2.19)
Tobin's Q		-1.098***
		(-11.22)
Leverage ratio		-0.369***
		(-22.66)
ROA		0.292***
		(7.24)
SOE		-0.538
		(-0.56)
GDP growth		1.232***
		(21.58)
Quarter dummies	Yes	Yes
Firm fixed effects	Yes	Yes
No. of obs.	50498	50498
Adjusted R^2	0.596	0.673

Notes: This table estimates the effect of economic policy uncertainty on corporate cash holding. We use the same sample as in Table 2. The models we use in this table are as follows:

The dependent variable is corporate cash holding, which is the ratio of the firm's cash and cash equivalents to total assets in the current quarter. Control variables are defined in Appendix A. Column 1 includes only economic policy uncertainty as the independent variable. Column 2 includes all control variables. For all regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Table A4. Analysis of the impact of economic policy uncertainty on corporate financial asset holdings (IV-Tobit)

Variables	(1) IV=Last period EPU	(2)	(3) IV=EPU_7 foreign countries	(4)	(5) IV=EPU_global	(6)
	1st-stage	2nd-stage	1st-stage	2nd-stage	1st-stage	2nd-stage
Last period EPU	0.338***					
	(271.64)					
EPU_7 foreign countries			0.021***			
			(284.53)			
EPU_global					0.024***	
					(342.52)	
Economic policy uncertainty		-0.810***		-0.852***		-0.483***
		(-9.11)		(-10.94)		(-7.81)
Firm size	-0.164***	0.725***	0.037***	0.738***	-0.082***	0.762***
	(-17.44)	(4.99)	(5.31)	(5.10)	(-14.53)	(5.27)
Cash flow	-0.009***	-0.008	-0.001	-0.003	0.000	-0.001
	(-9.27)	(-0.49)	(-0.98)	(-0.21)	(0.60)	(-0.05)
Growth	0.000	-0.006**	0.000***	-0.005**	0.001***	-0.005**
	(0.23)	(-2.45)	(2.98)	(-2.24)	(7.25)	(-2.22)
Tobin's Q	-0.090***	0.157**	0.011***	0.163**	0.033***	0.198**
	(-28.20)	(1.98)	(4.21)	(2.11)	(14.77)	(2.57)
Leverage ratio	-0.002***	-0.022**	0.001	-0.018*	0.002***	-0.018*
	(-4.97)	(-2.13)	(1.50)	(-1.80)	(4.93)	(-1.74)
ROA	0.021***	-0.111***	-0.003**	-0.110***	0.001	-0.120***
	(11.43)	(-2.76)	(-2.26)	(-2.76)	(0.63)	(-3.02)
Margin profit	-0.016*	2.360***	0.037***	2.411***	0.036***	2.419***
	(-1.70)	(9.32)	(4.96)	(9.48)	(5.19)	(9.52)
SOE	0.032	1.920***	0.073***	1.957***	0.123***	1.949***
	(0.83)	(4.98)	(3.39)	(5.10)	(5.80)	(5.09)
GDP growth	-0.079***	-0.255***	-0.044***	-0.302***	0.048***	-0.254***
	(-77.79)	(-6.40)	(-44.03)	(-8.17)	(54.89)	(-7.44)
Quarter dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–-Paaprk Wald F statistic	77173.2		84453.9		1.2e+05	
Wald test of exogeneity (P value)	89.93(0.000)		148.37(0.000)		61.45(0.0000)	
No. of obs.	48240	48117	51225	51220	51225	51220
Adjusted R-squared	0.321		0.577		0.663	

Notes: This table presents estimates from the IV-Tobit regressions and the effect of economic policy uncertainty on corporate financial asset holdings. The variables are defined in Appendix A. Columns 1 and 2 use one-period-lagged Chinese economic policy uncertainty as the instrumental variable. In Columns 3 and 4, the instrumental variable is the average economic policy uncertainty of seven foreign countries. In Columns 5 and 6, we use global economic policy uncertainty as instrumental variables. For all regressions, standard errors are clustered at the firm level. T-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels,respectively.

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The Impact of Basel Accords on the Lender's Profitability under Different Pricing Decisions*

By HUANG BO AND LYN C. THOMAS*

Abstract: *In response to the deficiencies in financial regulation revealed by the global financial crisis, the Basel Committee on Banking Supervision (BCBS) is proposing to introduce a new capital regulatory standard to improve the banks' ability to absorb shocks arising from financial and economic stress. The regulatory capital requirements in the third of Basel Accords is conceptually similar to the mixture of Basel I (risk-invariant requirements) and Basel II (risk-based requirements), it introduces a non-risk based measure to supplement the risk-based minimum capital requirements and measures.*

We look at how the interest rate charged to maximise a lender's profitability is affected by the different versions of the Basel Accord that have been implemented in the last 20 years. We investigate three types of pricing models on a portfolio of consumer loans. These are a fixed price model, a two-price model and a variable risk based pricing model. We investigate the result under two different scenarios, firstly where there is an agreed fixed price the lender has to pay to acquire capital in the market and secondly when the lender decides in advance how much of its equity capital can be used to cover the requirements of a particular loan portfolio. We develop an iterative algorithm for solving these latter cases based on the solution approaches to the former. We also look at the sensitivity of the lending policy not only to the different Basel Accords but also to the riskiness of the portfolio and the costs of capital and loss given default values.

1 Introduction

Pricing consumer loans is implemented mainly through the interest rate charged, though in some cases there are also fees involved in setting up and operating the loans. In setting the interest rate lenders consider the cost of capital needed to finance the loan, the probability of a borrower will repay all the loan and if they do not repay, what percentage of the defaulted amount will eventually be lost – the loss given default. They also need to consider the take rate which is what percentage of the population will accept a loan offered at a particular interest rate. However, over the last twenty years the lenders, if they are covered by the banking regulations, also need to consider the regulatory capital they need to set aside to cover the unexpected losses on their loans.

Before 1988, there were no requirements for regulatory capital and we denote this requirement as Basel 0 (B0). Between 1988 and 2006, the regulations in the first Basel Accord (B1) required that banks set aside a fixed percentage of equity capital to cover all their risks in lending (Basel 1). For most lending this was 8% of the value of the loan. Kirstein (2001) pointed out this might result in adverse incentive influences. Although the cost of regulatory capital is the same for high risk and low risk borrowers, the bank will charge higher interest rates for more risky loans to compensate for the higher expected losses. So introducing such a regulatory capital requirement may encourage banks to replace low risk low profit customers with high risk high profit customers since they both require the same level of regulatory capital. So the Basel committee introduced a new capital requirement, denoted by Basel 2 (B2) where the capital requirements was sensitive to the credit risk inherent in bank loan portfolio. The Basel 2's proposal required the bank to set different regulatory capital ratios for borrowers with different default risks. The third of the Basel Accords (Basel 3) was recently developed in a response to the deficiencies in financial regulation

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revealed by the global financial crisis. Basel 3 tightens up what is required as capital, introduces liquidity requirements, and increases the capital requirement by factoring up the capital requirements of Basel 2. The capital requirement in Basel 2 was taken as 8% of the risk weighted assets to have the same terminology as Basel 1, where the risk weighted assets were given by a function of the probability of default of the loans.Basel 3 requires the capital requirement to be again 8.0% of risk weighted assets but then adds both a capital conservation buffer and a counter cyclical buffer. The mandatory capital conservation buffer is 2.5% of risk weighted assets, and its objective is to ensure that banks maintain a buffer of capital that can be used to withstand future periods of financial and economic stress.The discretionary countercyclical buffer, allows regulators to impose up to further capital up to 2.5% of risk weighted assets during periods of high credit growth. Thus we take the Basel 3 regulatory capital to be 13/8 ((8%+2.5%+2.5%)/8%) times the equivalent Basel 2 capital requirement. Table 1 shows the major differences between Basel 2 and 3.

The Basal Accords require banks to set aside regulatory capital to cover unexpected losses on a loan.If the chance of the loan defaulting l_D isLoss Given Default (LGD), the fraction of the defaulted amount that is actually lost.The minimum capital requirement (MCR) per unit of loan with a probability p of being good is defined as $l_D \cdot K(p)$. This is given under four different MCRs:

Basel 0: Describes the situation pre-1998 when there were no regulatory capital requirements so $K(p) = K_0 = 0$

Basel 1: Describes the MCR under the first Basel Accord where

$$K(p) = K_1 = \frac{0.08}{l_D}$$

Basel 2: Describes the MCR under the second Basel Accord where

$K_2(p) = N \cdot \left[\left(\frac{1}{1-R}\right)^{1/2} \cdot N^{-1} \cdot (1-p) + \left(\frac{R}{1-R}\right)^{1/2} \cdot N^{-1} \cdot (0.999) \right] - (1-p)$, where $R = 0.04$ (for credit cards), $N(\cdot)$ is the cumulative normal distribution and $N^{-1}(\cdot)$ is the inverse cumulative normal distribution.

Basel 3: the MCR for the third of Basel Accord can be written as:

$$K_3(p) = \left(\frac{13}{8}\right) \cdot K_2(p) = 1.625 \cdot K_2(p)$$

Basel 2	Basel3
a. Tier 1 Capital	
Tier 1 capital ratio = 4% Core Tier 1 capital ratio = 2% The total capital requirement is 8.0%.	Tier 1 Capital Ratio = 6% Core Tier 1 Capital Ratio (Common Equity after deductions) = 4.5% The total capital requirement is 8.0%.
b. Capital Conservation Buffer	

There no capital conservation buffer is required.	Banks will be required to hold a capital conservation buffer of 2.5% to absorb losses during periods of financial and economic stress.
c. Countercyclical Capital Buffer	
There no Countercyclical Capital Buffer is required.	A countercyclical buffer within a range of 0% – 2.5% of common equity or other fully loss absorbing capital will be implemented.

Table 1: Differences between Basel 2 and Basel 3

Kashyap and Stein (2003) pointed out that there are many potential benefits to risk-based capital requirements, as compared to the "one-size-fits-all" approach embodied in the Basel 1 regulation. The objective of this paper is to understand the influence of different Basel regulatory capital requirements (Basel 1, Basel 2 and Basel 3) on the lender's profitability under different pricing decisions (such as fixed (one) price model, a two price model, and a variable pricing model) in portfolio level.

Fixed-rate pricing was the dominant form of pricing of loans until the early 1990s. More recently the development of the internet and the telephone as new channels for loan applications has made the offer process more private to each individual (Thomas 2009), and developments in credit scoring and response modelling have assisted the banks in marketing their products more efficiently, and in increasing the size of their portfolios of borrowers (Chakravoriti and To 2006). The banks are able to "price" their loan products at different interest rates by adopting methods such as channel pricing, group pricing, regional pricing, and product versioning. Variable pricing, therefore, can improve the profitability of the lender by individual bargaining and negotiation. Since the lender can segment the applicants depending on their default risk and offer different loan terms to each segments, so the simplest variable pricing model is actually two prices model where we assume there are only two types of borrowers which differ in their ability to repay a loan (default risk).

There is a limited literature on the impact of the Basel Accords on consumer loan pricing. Allen DeLong and Saunders (2004) outline the relationship between the Basel accord and credit scoring, and they observe how corporate credit models are modified to deal with small business lending. Ruthenberg and Landskroner (2008) analyze the possible effects of Basel 2 regulation on the pricing of bank loans related to the two approaches for capital requirements (internal and standardized). They indicate that big banks might attract good quality firms since the reduction in interest rates produced by adopting the IRB approach. On the other hand lower quality firms will be benefit by borrowing from small banks, which are more likely to adopt the standardized approach. Perli and Najda (2004) suggest an alternative approach to the Basel capital allocation. They offer a model for the profitability of individual borrower revolving loan they use it to imply that the regulatory capital should be some percentile of the profitability distribution of the loan, but there is no reference to the effect on operating decision. Oliver and Thomas (2005) analyze

the changes in the operating decision of which potential consumer borrowers to accept and which to reject because of the effects of different Basel regulations imposed on the retail bank in portfolio level with predetermined capital. Based on the model suggested in that paper, we analyze the impact of different Basel regulations on pricing decisions under the three pricing strategies. We do this both in the case when the lender has an agreed cost of equity for each unit of equity needed to cover the regulatory capital requirement and when the lender decides in advance how much of its equity capital can be set aside to cover the requirements of this loan portfolio.

This paper is organised as follows. Section 2 looks at the profitability model of different pricing decisions (fixed price, two prices and variable pricing) on consumer loans. Section 3 use several numerical examples to investigate the impact of the Basel Accords on different pricing models associated with a portfolio of such loans. The objective each time is to maximise the expected profitability of the portfolio and we report the optimal interest rates that do this. This is under the case when there is an agreed cost of equity. In Section 4 we extend the models by assuming the bank decides in advance how much of its equity capital can be set aside to cover the required regulatory capital of a loan portfolio. Section 5 draws some conclusions from this work.

2 Pricing Models at portfolio level

To consider the pricing models at the portfolio level one needs first to define the profit model for an individual loan. Consider a loan of one unit offered by a lender to a borrower whose probability of being good – that is of repaying the loan in full- is$p$.Assume the rate charged on the loan is$r$ and if the loan defaults, it does so before there are any repayments and the fraction of the loan that is finally lost at the end of the collections process is l_D. Let r_Q be the required return on equity capital, which must be achieved to satisfy shareholders and let the risk free rate at which the lender can borrower the money be r_F. Let$B$ denote the sum of the cost of the regulatory capital $r_Q l_D K(p)$ and the risk free rater_F, which is the cost of lending 1 unit. If the lender offers loans at an interest rate r to a borrower whose probability of being Good and repaying is P, we assume the chance the borrower will take the loan – the take probability is $q(r,p)$. With these assumptions the expected profit from making an offer of a loan of 1 unit to an individual borroweris

$$E(Profit) = q(r,p)\cdot[(r-B)\cdot p-(l_D+B)\cdot(1-p)] \qquad \text{Eq.1}$$

where $B = r_Q l_D K(p) + r_F$.

2.1 Fixed (one) price model in portfolio level

For the fixed price model, we assume the lender only offers one interest rate r to all potential borrowers. We will assume throughout that the take rate or response rate function is the linear function:

$q(r,p) = min\{max[0,1-b\cdot(r-r_L)+c\cdot(1-p),1]\}$, for $r \geq r_L > 0$.

Eq. 2

This means the borrower's response rate is dependent on their riskiness as well as on the interest rate charged. Throughout the paper we compare the results by looking at a class of numerical examples. In these we assume $r_L = 0.04, b = 2.5,$ and $c = 2$. This implies that an 1%increase in interest rate drops the take probability by 0.025 while if the default probability of the borrower goes up by 0.01 (Good drops by this amount) the take probability goes up by 0.02. For borrower with a default rate of 0.01, $100\%$of them would take a loan of rate 6%, while only $50\%$of them would take a loan with interest rate 25%. To maximise the profit over a portfolio, the lender must accept the loans that have positive expected profit, but reject all the loans that are unprofitable. This defines a cut-off probability (or cut off point p_c) which is the probability of being Good at which the expected profit from the borrower is zero. Thus the lender should accept all the customers with probability of being good above the cut off point$p_c = \frac{l_D+B}{r+l_D}$, and reject all the

applications with probability of being good $of\ p_c$ or lower. In our numerical examples, we assume the probability of the borrowers being good has a uniform distribution. The probability density function is $f(p) = \frac{1}{1-a}, a \le p \le 1$, so it means no one with probability of being good less than a is in the potential borrowers' population. Therefore, the cut off point for a portfolio actually is $\max(a, p_c)$.

If we define $EP(r,p)$ to be the expected profit from a portfolio with cut off pointmax (a, p_c), we find

$$EP(r,p) = \underset{r,p_c}{\text{Max}} \int_{\max(a,p_c)}^{1} q(r,p) \cdot [(r-B) \cdot p - (l_D + B) \cdot (1-p)] \cdot f(p) \cdot dp$$

Eq. 3

where $B = r_Q l_D K(p) + r_F$.

2.2 Two Price Model at portfolio level

In this case, we assume the lender has two different rates that can be offered to potential borrowers. Suppose the rates are r_1 and r_2, $r_1 < r_2$, the lender's strategy is given by two values (a segmentation point p^* and a cut off point $\max(a, p_c)$). Rate $r_1$is made to the borrowers whose probability p of being good is $p \ge p^*$; rate r_2 is made to those who probability of being good is p, $p^* > p \ge ma\,x(a, p_c)$, where again it is assumed the probability of the borrowers being good in the portfolio has a uniform distribution over [a,1].

In the two-price model, the optimal cut off point depends on the higher rate r_2, so $p_c = \frac{l_D + B}{r_2 + l_D}$ since that rate gives higher profit than the other one. In this case $max\ (a, p_c)$is 'first round of screening' to determine the range of potential borrowers' population.

We believe the expected profit of the lender with inferior rate r_2 is always equal to or less than the expected profit of the lender with superior rate r_1, but the chance of borrowers accepting such a loan is always less. Sothe probability of being good p^*, at which the lender start to offer $r_1$rather thanr_2, can be achieved from the equality

$$q(r_1) \cdot [(r_1 - B) \cdot p - (l_D + B) \cdot (1-p)] = q(r_2) \cdot [(r_2 - B) \cdot p - (l_D + B) \cdot (1-p)]$$

Eq. 4

Using the take function given in (2) this results in $p^* =$

$$\frac{\left[1 + \frac{1}{c} - \frac{b}{c} \cdot l_D - \frac{b}{c} \cdot r_1 - \frac{b}{c} \cdot r_2 + \frac{b}{c} \cdot r_L\right] + \sqrt{\left(1 + \frac{1}{c} - \frac{b}{c} \cdot l_D - \frac{b}{c} \cdot r_1 - \frac{b}{c} \cdot r_2 + \frac{b}{c} \cdot r_L\right)^2 + 4 \cdot \frac{b}{c} \cdot (l_D + B)}}{2}$$

Eq. 5

So $p^*$is the segmentation point which divides those who passed the lender's 'first round of screening' into the two groups to be offered different interest rates.

The choice between lender and borrowers is a typical interactive decision-making. The lender, therefore, has to consider whether the rate offered is attractive to any borrowers. This lead to two constraints –one for each interest rate- that says there is an upper limit on the goodness of the borrowers if at least some of them to want to accept loans at that interest rate, namely:

$q(r_1) = 1 - b \cdot (r_1 - r_L) + c \cdot (1-p) > 0$,which results into $p_1 = 1 + \frac{1}{c} - \frac{b}{c} \cdot (r_1 - r_L)$

and

$q(r_2) = 1 - b \cdot (r_2 - r_L) + c \cdot (1-p) > 0$, which leads to $p_2 = 1 + \frac{1}{c} - \frac{b}{c} \cdot (r_2 - r_L)$

So if one offers r_1 only the borrowers who probability of being good is below $p_1$will accept it, and only those whose probability of being good is below p_2 will accept r_2.

Hence the expected value of lender's total profit is showed by following equation,

$$EP(r,p) = \underset{r_1,r_2,p^*,p_c,}{Max} \left\{ \int_{\max(a,p_c)}^{\min(p^*,p_2)} q(r_2,p)\cdot[(r_2-B)\cdot p-(l_D+B)(1-p)]\cdot f(p)\cdot dp + \int_{p^*}^{\min(1,p_1)} q(r_1,p)\cdot[(r_1-B)\cdot p-(l_D+B)(1-p)]\cdot f(p)\cdot dp \right\}$$

Eq.6

where $B = r_Q l_D K(p) + r_F$.

2.3 Variable Pricing Model in portfolio level

Variable pricing (risk based pricing) means that the interest rate charged on a loan to a potential borrower depends on the lender's view of the borrower's default risk and can any value.

If the lender believes the borrower has a probability p of being Good, then the lender believes the expected profit if a rate $r(p)$ is charged to be

$$EP(r,p) = \underset{r,p}{\text{Max}} \int_{a}^{1} q(r,p)\cdot[(r-B)\cdot p-(l_D+B)\cdot(1-p)]\cdot f(p)\cdot dp$$

Eq.7

where $B = r_Q l_D K(p) + r_F$.

In order to find the optimal interest rate for a certain probability p of being Good, we differentiate this equation with respect to r and set the derivate to zero, to find when the profit is optimised. This gives a risk based interest rate of

$$r^*(p) = B + (l_D + B)\frac{1-p}{p} - \frac{q(r,p)}{\frac{\partial q(r,p)}{\partial r}} \qquad \text{Eq.8}$$

This calculations of risk based interest rate can be found in the book by Thomas (2009). Note in this case there is no cut off probability of being Good below which one will not an applicant. Instead one offers such applicants such a high interest rate that it is highly unlikely that they will accept the offer. This occurs at probability levls of *p* where *q(r*(p),p) =0*.

3 The impact of the Basel Accords on the different pricing models at portfolio level

We calculate the various business measures such as the expected profit of lender, optimal interest rate and optimal cut off on numerical examples under the different Basel Accords. This allows us to see the impact of the changes in the Accord on profit and on who is likely to get loans.

3.1 Example for one price model

Consider the situation where $r_Q = 0.05$, $r_F = 0.05$, and $l_D = 0.5$ so that equity holders expect a return of 5% and the rate at which the lender can borrow money t subsequently lend out is also 5%. We also assume that for loans that default 50% of the original amount lent will be recovered by the end of the collections process. With this, regulatory capital for each Basel rule leads respectively to:

Basel 0: since $K(p) = K_0 = 0$, we have $= r_Q l_D K(p) + r_F = 0.05$.

Basel 1: $K(p) = K_1 = \frac{0.08}{l_D} = 0.16$, hence we have B= $r_Q l_D K(p) + r_F = 0.054$.

Basel 2: since $K_2(p) = N \cdot \left[(\frac{1}{1-R})^{1/2} \cdot N^{-1} \cdot (1-p) + (\frac{R}{1-R})^{1/2} \cdot N^{-1} \cdot (0.999)\right] - (1-p)$, where$R = 0.04$ (credit cards), then we have $B = r_Q l_D K_2(p) + 0.05$.

Basel 3: we assume $K_3(p) = 1.625 \cdot K_2(p)$, we get $B = 1.625 \cdot r_Q l_D K_2(p) + 0.05$

We now consider the portfolio where 1 unit is available to be lent over the whole portfolio. The portfolio has a distribution over the riskiness of the potential borrowers so that their chance of each being good is uniform over the region [a,1] where a can be 0.6,0.7,0.8 or 0.9. The optimal interest rates and the expected profits achieved under different Basel Accords are obtained by solving (2) and are shown in Table 2.

We can see from Table 2 that optimal interest rates for Basel 1, Basel 2 and Basel 3 are always bigger than optimal interest rates achieved under Basel 0. This is because the costs of regulatory capital need to be covered. The optimal interest rates charged drop but the expected portfolio profits rise up as the potential borrower portfolio become less risky. Obviously the expected portfolio profits for all Basel regulations are less than that of made with no regulatory capital requirements case. Comparing column 5 and column 8, one sees that the expected portfolio profits under Basel 2 is smaller than that achieved under Basel 1 until one reaches the a=0.9 portfolio. This is because Basel 2 regulation requires the lender to set flexible regulatory capital ratios for different risk types, the equity capital request decreases with increasing of the quality of the borrowers. We can see that in column 7 which shows the regulatory capital needed under Basel 2 (for the riskiest who are accepted in the portfolio) is larger than regulatory capital ratio of Basel 1 (which is fixed at K_1 =0.16) except when the minimum good rate a reaches 0.9. The expected portfolio profits for Basel 3 is always smaller than that for Basel 1 and 2 capital requirements since Basel 3 regulation set much tighter capital restriction on equity capital than Basel 1 and 2. This can be seen from regulatory capital ratios of Basel 3 showed in column 10 where the ratios of regulation are extremely high by comparing with that for Basel 1 and 2. The profit though under Basel 3 only decreases between 1% and 3.5% compared with Basel 2. The change in the optimal interest rate charged between the different Basel Accords is far less than the change that occurs when the portfolio gets less risky as it moves from 0.6 to 0.9.

a	r B0	E(P) B0	r B1	E(P) B1	r B2	K(2)	E(P) B2	r B3	K(3)	E(P) B3
0.6	0.3768	0.0618	0.3778	0.0599	0.3782	0.2447	0.0589	0.3933	0.3983	0.0571
0.7	0.35	0.0778	0.3523	0.0757	0.3535	0.2380	0.0747	0.3556	0.3868	0.0728
0.8	0.3140	0.0886	0.3162	0.0865	0.3169	0.2097	0.0859	0.3188	0.3408	0.0842
0.9	0.2791	0.0942	0.2812	0.0922	0.2810	0.1491	0.0923	0.2823	0.2423	0.0911

Table 2: Optimal Expected profit and optimal interest rates under fixed price

3.2 Example for two prices model

In this example we take the same borrowing rates and the LGD as in Example 2.1, namely, $r_Q = 0.05$, $r_F = 0.05$, and$l_D = 0.5$ and we keep the same linear response rate function with $r_L = 0.04, b = 2.5,$ and $c = 2$. The results under the different Basel regulations are given in Tables 3 to 6

Table 3: two price model under Basel 0: no requirement for regulatory capital

a	r_2	max (a, P_c)	r_1	p^*	Expected Profit
0.6	0.485568	0.6	0.317348	0.790765	0.07506936
0.7	0.415754	0.7	0.297977	0.845737	0.08508152

0.8	0.353758	0.8	0.279661	0.898441	0.09168503
0.9	0.297323	0.9	0.262075	0.94968	0.09493876

When the value of minimum good rate a increase that means the borrowers become less risky, the optimal cut off point and segment point increase and the expected portfolio profits increase as well, but the optimal interest rates (r_1, r_2) to charge decrease. Note that in all four portfolios we make offers to all the potential borrowers and make the offer of the better interest rate to just over half of them. The expected profit increases as the portfolio becomes less risky but of course both interest rates decrease in order to be able to attract sufficient of the higher quality applicants.

Table 4: Two price model under Basel 1:$K_1(p) = \frac{0.08}{l_D} = 0.16$

a	r_2	max (a, P_c)	r_1	p^*	Expected Profit
0.6	0.488475	0.6	0.319604	0.790703	0.07305781
0.7	0.418356	0.7	0.300156	0.845704	0.08304529
0.8	0.356118	0.8	0.281772	0.898428	0.0896575
0.9	0.299488	0.9	0.264128	0.949676	0.09294516

There is a small increase in the optimal interest rates being charged by comparing with the solutions for Basel 0 shown in Table 3, while the profits are slightly lower. This is because there are now regulatory capital costs to be covered. Again offers are made to everyone in the portfolio, but the p value at which one switches to the lower interest rate is fractionally lower under this set of regulations than under Basel 0.s needed to be considered in no regulatory requirement case.

Basel 2:

The Basel Accord 2's regulatory capital ratio varies with p, and it is difficult to integrate the expression $l_D \cdot K_2(p) = l_D \cdot N \cdot \left[(\frac{1}{1-R})^{1/2} \cdot N^{-1} \cdot (1-p) + (\frac{R}{1-R})^{1/2} \cdot N^{-1} \cdot (0.999)\right] - l_D \cdot (1-p)$ over the whole portfolio. We take two approximations to ease this calculation. In the first conservative approximation we set the probability of the borrowers being good p in equation of$l_D \cdot K_2(p)$ to equal with p_c if they take the higher interest rate $r_2$and p^* if they take the lower interest rate r_1. The regulatory capital ratio for all borrowers is always larger than the true regulatory capital required. We also build a model assuming that for the group who have the higher interest rate they all have regulatory capital corresponding to a probability of being good which is the average value between$Max(p_c, a)$ and $\min\{p^*, p_2\}$. For the higher quality group we assume the regulatory capital is taken as if they all have the average good probability between p^* and $\min\{1, p_1\}$ We found there is no significant difference in these two approximations so report just one set of results.

Table 5:Two price model under Basel 2 regulations

a	r_2	max (a, P_c)	r_1	p^*	Expected Profit
0.6	0.488913	0.6	0.31957	0.791461	0.072208
0.7	0.418609	0.7	0.299716	0.846327	0.082389
0.8	0.355927	0.8	0.280833	0.899	0.089405
0.9	0.298533	0.9	0.262549	0.950295	0.093397

It can be seen from Table 5 interest rate r_1 being charged on good quality borrowers under Basel 2 is always smaller than that for Basel 1, but the inferior rate r_2 being charged on risky borrowers is higher than that for Basel 1 if a=0.6 or 0.7 but lower than it if a=0.8 or 0.9. The expected profit is lower under Basel 2 than Basel 1 except in the case when a=0.9 when the potential set of borrowers is the least risky of the four cases. Thus under the two price model Basel 2 does what it was expected to do and encourages high quality loans, even if the effect is quite small. Again all the borrowers are made an offer of one of the two interest rates in all four cases. However the Basel 2 segment point is higher than the Basel 1 segment point, and in fact higher than the Basel 0 segment point. So under the Basel 2 regulations less of the portfolio is given the lower interest rate but one should treat this result with some caution because of the approximations concerning the regulatory capital.

Table 6: Two price model under Basel 3: $K_3(p) = 1.625 \cdot K_2(p)$

a	r_2	max (a, P_c)	r_1	p^*	Expected Profit
0.6	0.491035	0.6	0.320974	0.79186	0.070447
0.7	0.420426	0.7	0.30082	0.846656	0.080727
0.8	0.357323	0.8	0.281591	0.899298	0.087995
0.9	0.299371	0.9	0.262907	0.950565	0.092441

The optimal interest rates and expected portfolio profits for Basel 3 is given in Table 6 where we can see the expected portfolio profits for Basel 3 is always smaller than that for Basel 1 and 2 as a result of Basel 3 regulation setting much tighter capital restriction than Basel 1 and 2. The segment probability where one switches rates is always higher than that for Basel 2 and Basel 1. Both of optimal superior and inferior rates ($r_1$and r_2) are always higher than that for Basel 2. Moreover, the rate r_2 charged to riskier borrowers under Basel 3 is higher than that for Basel 1 in the three cases a+0.6,0.7 and 0.8 and only drops below the Basel 1 rate with the least risky portfolio a=0.9. The rate r_1 charged to the less risky borrowers is higher than the Basel 1 case if a=0.6 but then drops below the Basel 1 rate for "better" portfolios. So although Basel 3 still encourages lenders to seek out less risky portfolios the rewards compared with Basel 1 are non existent in profit and only the highest quality customers benefit from reduced rates.

3.3 Example for variable pricing model

We assume there is no adverse selection in this variable pricing model whereas in Huang and Thomas (2009) it is assumed that the fact the borrower accepts the loan affects his estimate of being good. Using the cost structure of the pervious example with $r_Q = 0.05$, $r_F = 0.05$ and $l_D = 0.5$, and assuming again the parameters for the linear response rate function are $r_L = 0.04$, $b = 2.5$, and $c = 2$, we get the numerical results in the following tables.The optimal interest rates offered by lender under Basel Accords are shown in Table 7

Table 7: optimal interest rates under variable pricing

p	$r(p)$ B0	$r(p)$ B1	$r(p)$ B2	$r(p)$ B3
0.35	1.015714	1.021428	1.022753	1.027153
0.4	0.8975	0.9025	0.904159	0.908321

0.5	0.72	0.724	0.725898	0.729584
0.6	0.588333	0.591667	0.59344	0.596632
0.7	0.482857	0.485714	0.487108	0.489765
0.8	0.39375	0.39625	0.397027	0.399076
0.9	0.315556	0.317777	0.317626	0.318922
0.95	0.279474	0.281579	0.280755	0.281555
0.96	0.272458	0.274542	0.27355	0.274233
0.97	0.265506	0.267567	0.266391	0.266945
0.98	0.258612	0.260654	0.259268	0.259678
0.99	0.251778	0.253798	0.252164	0.252406

Obviously the optimal interest rates charged decrease as the probability of the borrowers being good increases under all Basel regulation rules. Since there is no requirement for regulatory capital for Basel 0, the optimal interest rates for B0 are always less than those for Basel 1, 2 and 3 regulations. We can see from Table 7 that the interest rates for Basel 2 are higher than those required under Basel 1 until the probability of the borrowers being good is over 0.9. The optimal interest rates for Basel 3 also becomes smaller than that for Basel 1 as the probability of the borrowers being good is high enough. However, the tighter capital restriction in Basel 3, means this only happens when the probability of the borrower being good rises above 0.95.

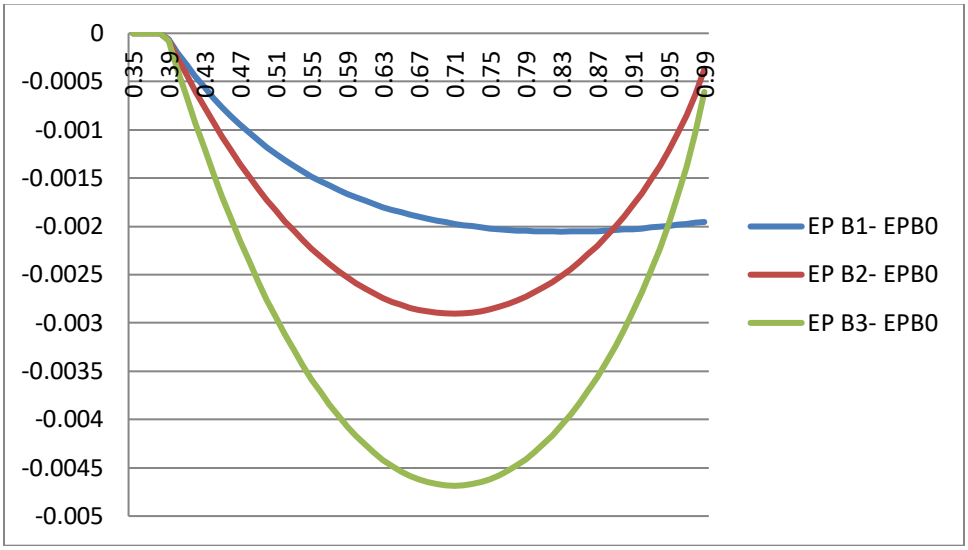
The expected individual profits for the Basel Accords are given in Table 8

Table 8: Expected individual borrower profits under variable pricing

p	$E(P)$ B0	$E(P)$ B1	$E(P)$ B2	$E(P)$ B3
0.35	0	0	0	0
0.4	0.000506	0.000306	0.00025093	0.000136
0.5	0.018	0.01682	0.016274144	0.01524
0.6	0.044204	0.042504	0.04161319	0.040034
0.7	0.068014	0.066057	0.06511253	0.063331
0.8	0.085078	0.083028	0.082395783	0.080741
0.9	0.094044	0.092011	0.092148375	0.090973
0.95	0.095501	0.093506	0.094284804	0.093529
0.96	0.095561	0.093576	0.094517747	0.093869
0.97	0.095545	0.093571	0.094694659	0.094165
0.98	0.095457	0.093493	0.094823436	0.094429
0.99	0.095295	0.093343	0.094920163	0.094686

In Table 8 one sees that the expected profits under all the Basel Accords increase as the borrowers become less risky. Since the regulatory capital rules in Basel 2 and Basel 3 depend on probability of the borrowers being good, the expected profit under both regulations becomes larger than that for Basel 1 when the probability of the borrowers being good is high enough . This is obvious if one plots the difference in profitability between each Basel regulation and Basel 0.

Figure 1: Difference in profitability between Basel Accords (Basel 1, Basel 2, Basel 3) and Basel 0



The above figure show the expected profits for Basel 1, Basel 2 and Basel 3 minus the profit achieved under Basel 0. Note in all cases there is no profit until the probability of being good is at least 0.35. The difference between Basel 2 and Basel 0 reaches its largest value when the probability of the applicant being good equals to 0.71, and thereafter the difference starts to lessen until it becomes 0. A comparison of curve for Basel 2 and that for Basel 3 shows the same thing happens to the difference in the profitability of Basel 3 and Basel 0. However Figure1 shows difference on profitability between Basel 1 and Basel 0 shows how different is the impact of Basel 1 where the difference curve does not diminish much as the probability of the applicant being good increases to 1. This is because Basel 1 requires a fixed amount of equity set aside (0.08) for all risk types (even those whose probability of being good is 1).

4 How the Basel Accords affects the different pricing models when there is a predetermined amount of equity capital

The previous model looked at what impact the Basel Accord requirements for regulatory capital have on the performances of lender's different pricing decisions assuming a known required rate of ROE at the portfolio level. A more realistic model is to consider the portfolio has a predetermined amount of equity capital available and so there is no known acceptable ROE. Instead the lender decides in advance how much of its equity capital can be used to cover the minimum capital requirements of a particular loan portfolio.

Initially we assume that the funds for portfolio are raised by borrowing from the market at the risk free rate r_F and loss given default on any loan is l_D irrespective of the rate charged. Ignoring the regulatory capital, the profit from a loan is modified from Eq.1 to

$$MaxE(Profit) = q(r,p) \cdot [(r - r_F) \cdot p - (l_D + r_F) \cdot (1 - p)] \qquad \text{Eq. 9}$$

where the linear take probability function $q(r,p)$ is

$min\{max[0,1 - b \cdot (r - r_L) + c \cdot (1 - p),1]\}$.

We assume the probability of these portfolio loans being good also has a uniform distribution in the range [a,1]. If we define $EP(r,a))$ to be the expected profit from a portfolio where the pricing

regime is to charge an interest rate r(p) and the potential portfolio only has borrowers with an a chance of being good, then

$$EP(r(.)) = \underset{r,}{\text{Max}} \int_{a}^{1} q(r(p),p) \cdot [(r(p) - r_F) \cdot p - (l_D + r_F) \cdot (1-p)] \cdot f(p) \cdot dp$$

Eq.10

The regulatory capital required for such a portfolio cannot exceed the equity capital Q set aside. Thus, given the limit on the equity capital provided, we need to solve the following constrained optimization problem in order to maximize the expected profit from the portfolio.

$EP(r(.)) = \underset{r,}{\text{Max}} \int_{a}^{1} q(r(p),p) \cdot [(r(p) - r_F) \cdot p - (l_D + r_F) \cdot (1-p)] \cdot f(p) \cdot dp$ Eq. 11

subject to

$Q(r,a) = \int_{a,}^{1} l_D \cdot k(p) \cdot f(p) \cdot q(r(p),p) \cdot dp \leq Q$ Eq. 12

This is equivalent (Thomas 2009) to solving an unconstrained optimisation problem with a Lagrangian function that must be maximised namely

$$EP(r,a) - \lambda(Q(r,a) - Q) \quad \text{Eq 13}$$

Under the Basel 2 and Basel 3 regulatory requirements where

$$k(p) = N \cdot \left[\left(\frac{1}{1-R}\right)^{1/2} \cdot N^{-1} \cdot (1-p) + \left(\frac{R}{1-R}\right)^{1/2} \cdot N^{-1} \cdot (0.999) \right] - l_D \cdot (1-p)$$

it is not feasible to get a closed form solution to the integration in (12) which has to be calculated in the fixed price and two price cases; the variable price case reduces to a knapsack problem and so the integrand is not required. So we undertake a numerical approximation to obtain (12). Given that we have a uniform distribution of borrowers over the probability of being good and that for any r we are only interested in a region where the take probability of the borrowers is larger than zero ($1 - b \cdot (r - r_L) + c \cdot (1-p) \geq 0$), Eq.12 can be rewritten into

$$\frac{l_D}{1-a} \int_{,a}^{\min\left(1, \frac{1-b(r-r_L)}{c}+1\right)} K(p) \cdot q(r,p) \cdot dp \leq Q \quad \text{Eq 14}$$

If we define $I[r,w] = \int_{w}^{\min\left(1, \frac{1-b(r-r_L)}{c}+1\right)} K(p) \cdot q(r,p) \cdot dp$

Then (14) becomes $\frac{l_D}{1-a} \cdot I[r,a] \leq Q$

We choose a set of points, a+kh, k=0,1,2, n where b=a+nh and then approximate by

$I(r,a,b) = \sum_{i=0}^{n-1} K(a+hi) \cdot q(r,a+hi)h$,

For example, if an interest rate $r$is being charged to borrowers whose probability of being good is not less than 0.7, so the equity capital set aside is given by following calculations:

$I(r,.7,1) = \sum_{i=0}^{29} K(.7+.01i) \cdot q(r,.7+.01i)0.01$;

Unlike the earlier part of this paper there is no market price of equity. We first check if the unconstrained solution to (11) satisfies the constraint (12). If so, that solution which is the solution under Basel 0 will also be the solution under the relevant Basel requirement. If it does not satisfy the contraint then there is a positive shadow price and we wish to solve (13). However for a fixed shadow price finding the optimal rate r in (13) is the same as the problems solved in section 3 where there was a fixed cost of equity. So one finds the optimal price and then checks whether with that price the constraint is exactly satisfied. One can then apply the bisection method or other

iterative routines to the shadow prices until one finds the shadow price and the corresponding optimal related price function that exactly satisfies constraint (12).

4.1 Numerical Examples

We use numerical examples to explore the impact of the various Basel Accord requirements on different pricing models when there is a predetermined amount of equity capital set aside to cover the regulatory requirements of the portfolio, We compare the optimal interest rate, optimal cut off and expected portfolio profits under the different Basel regulations.

4.1.1 Example for one price model

Using the cost structure of the examples from earlier part of this paper with $r_F = 0.05$ and $l_D = 0.5$, assume again the parameters for the linear response rate function are $r_L = 0.04, b = 2.5,$ and$c = 2$. We also assume the loan portfolio is of credit cards and so under the Basel 1 requirements the regulatory capital is $K(p) = K_1 = {}^{0.08}/_{l_D}$ while the correlation in the Basel 2 and Basel 3 capital requirement is $R = 0.04$. We can now apply the values in Eq. 11 and Eq. 13 under the three regulatory regimes (Basel 1, Basel 2, Basel3). Firstly the optimal interest rate, optimal cut off (max(a,p_c) and expected portfolio profits for Basel 1 is shown in Table 9

Table 9: Output of fixed price model with fixed quantity Q of equity to cover capital requirements

a	0.6		
Q	r	max (a, P_c)	$E(P)$
0.01	0.401949	0.816895	0.032002
0.02	0.386739	0.740423	0.050027
0.03	0.37903	0.679048	0.059286
0.04	0.376854	0.627242	0.061889
a	0.7		
Q	r	max (a, P_c)	$E(P)$
0.01	0.407457	0.841031	0.034311
0.02	0.393195	0.775777	0.056396
0.03	0.384206	0.724084	0.070762
0.04	0.36	0.7	0.0776
a	0.8		
Q	r	max (a, P_c)	$E(P)$
0.01	0.414136	0.869762	0.036977
0.02	0.401949	0.816897	0.064002
0.03	0.37	0.8	0.081575
0.04	0.32	0.8	0.088533
a	0.9		
Q	r	max (a, P_c)	$E(P)$
0.01	0.43	0.9	0.040137
0.02	0.380001	0.9	0.070034

0.03	0.330001	0.9	0.088055
0.04	0.279998	0.9	0.094201

In each of the Tables 9-11 we stop increasing the Q values when we reach the unconstrained solution, i.e. when no further equity capital is required

Table 10: Optimal interest rate, optimal cut off, expected portfolio profits under Basel 2

a	0.6		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.374611	0.82688	0.034369
0.02	0.38006	0.759399	0.047545
0.03	0.37953	0.708077	0.055931
0.04	0.377708	0.664649	0.060537
0.05	0.377513	0.629911	0.061878
a	0.7		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.369972	0.854468	0.038429
0.02	0.378746	0.787716	0.056217
0.03	0.380226	0.744864	0.066864
0.04	0.379595	0.70992	0.074234
0.05	0.351949	0.7	0.077804
a	0.8		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.363238	0.884763	0.045531
0.02	0.374369	0.828519	0.068081
0.03	0.370705	0.8	0.081397
0.04	0.315316	0.8	0.088609
a	0.9		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.353655	0.918846	0.064084
0.02	0.329441	0.9	0.088189

It is seen from these tables that the expected portfolio profits always increase as the borrowers become less risky. Meanwhile, the larger amount Q of equity set aside for a portfolio the lender have, the more profits one can achieve. The optimal interest rate to charge drops as increasing of amount Q of equity set aside for a portfolio under Basel 1 regulation.

Table 11: Optimal interest rate, optimal cut off, expected portfolio profits under Basel 3

a	0.6		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.366959	0.868989	0.025911

0.02	0.376899	0.808587	0.038035
0.03	0.379852	0.766591	0.046211
0.04	0.380205	0.736586	0.05156
0.05	0.379504	0.707384	0.056026
0.06	0.378389	0.680736	0.059173
0.07	0.37736	0.655069	0.061134
0.08	0.37686	0.630074	0.061881
a	0.7		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.362857	0.88628	0.029951
0.02	0.374217	0.829535	0.045115
0.03	0.378328	0.793269	0.054766
0.04	0.37979	0.768332	0.061179
0.05	0.380211	0.748692	0.065968
0.06	0.380007	0.724143	0.07143
0.07	0.379273	0.701342	0.07577
0.08	0.355765	0.7	0.077742
a	0.8		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.354892	0.914746	0.033662
0.02	0.367484	0.866581	0.052787
0.03	0.373242	0.835957	0.065086
0.04	0.375172	0.822824	0.070368
0.05	0.36719	0.8	0.082265
0.06	0.332626	0.8	0.087838
a	0.9		
Q	r	$\max(a, P_c)$	$E(P)$
0.01	0.349461	0.931685	0.053989
0.02	0.356492	0.909443	0.071506
0.03	0.340678	0.9	0.085203
0.04	0.292207	0.9	0.093795

It is interesting to note that under the Basel 2 and Basel 3 regulations the optimal interest rate increases as the equity available increases when there is very little equity available, However interest rates then decrease as the equity increases when there is more equity available. This is because increasing the interest rate has two counterbalancing effects. Firstly it increases the profit on each of the borrowers who accept the loan but it diminishes the chance an individual borrower will take the loan. When there is very little equity available, that equity constraint means one cannot take a large number of borrowers anyway and so it is more profitable to increase the interest

rate. When the amount of equity is still constraining but quite large then one wants to make sure one has enough borrowers to "use" all the equity and hence one starts to decrease the interest rate.

Figures 2 to 5 show the expected profits for the 4 Basel rules (regulatory requirements, Basel 1, Basel 2, and Basel 3) under the one price model.

Figure 2: Expected profit using fixed price under the Basel regulations with a=0.6.

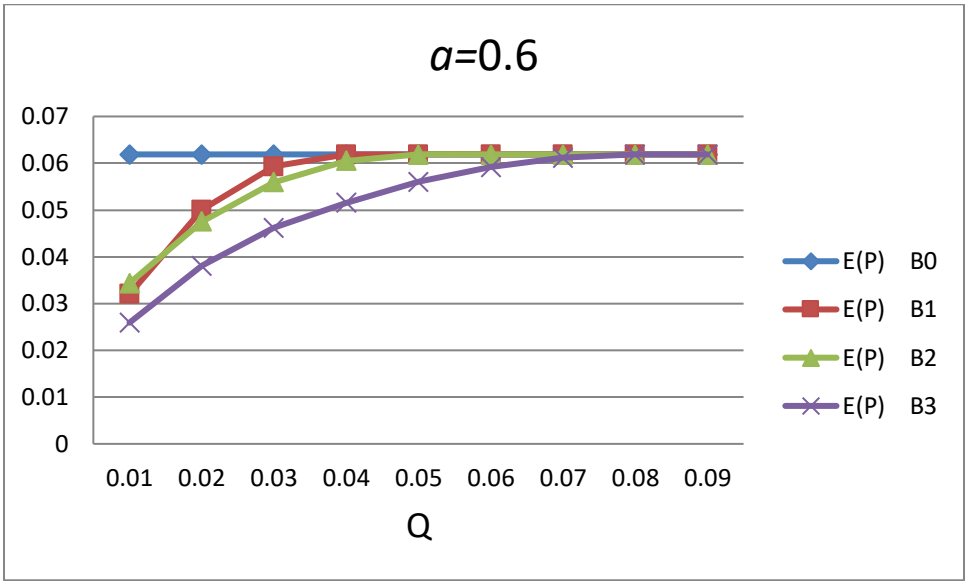


Figure 3: Expected profit using fixed price under the Basel regulations with a=0.7.

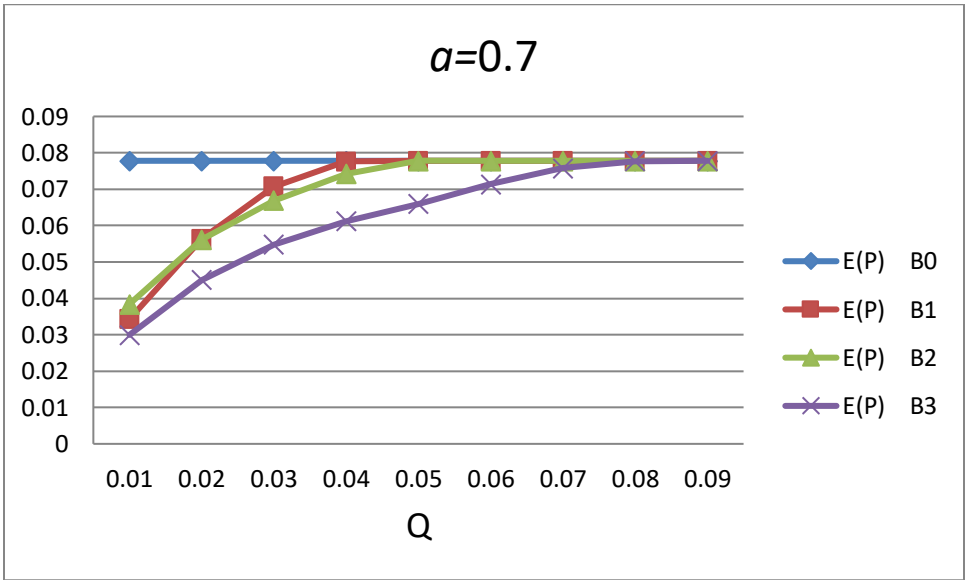


Figure 4: Expected profit using fixed price under the Basel regulations with a=0.8.

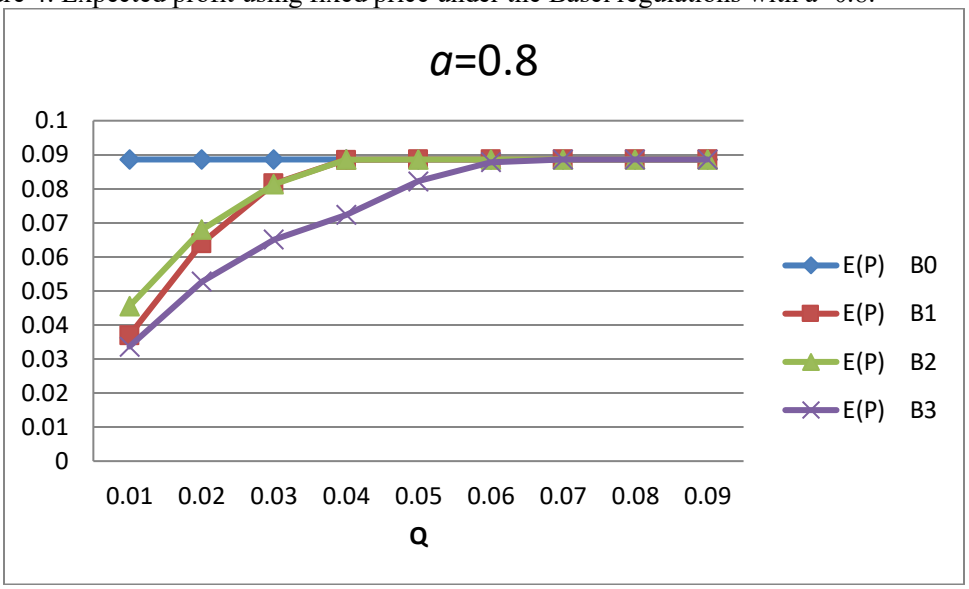
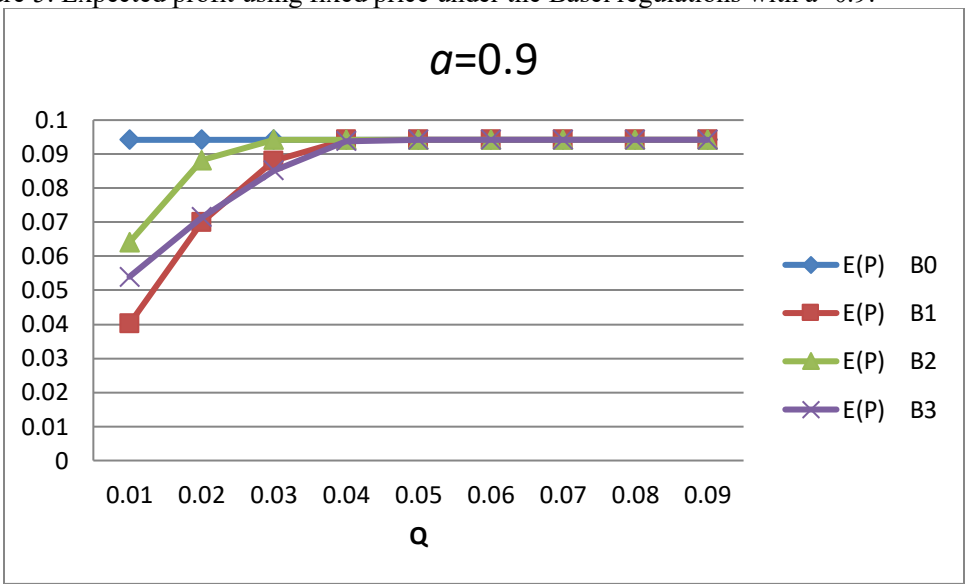


Figure 5: Expected profit using fixed price under the Basel regulations with a=0.9.



These Figures describe what happens to the expected profit as the equity capital set aside for a portfolio is increased from 0.1. As equity capital increases, the expected portfolio profits increase first. However, it is obvious to see the expected portfolio profits do not depend on the size of the regulatory capital. Once the expected portfolio profits reach the largest values which are the profits achieved under the Basel 0 regulation, the lender should stop increasing the equity capital. In these Figures if the lender has enough equity one ends up in the Basel 0 case regardless of which Basel requirement is used. Moreover, if the lender only has a little equity then the lender will take the "best" borrowers first and so the lender makes more profit with Basel 2 than Basel 1, since it requires less regulatory capital for these very good borrowers. However when the lender has more equity then they take more of the risky borrowers and so now Basel 1 leads to more profit than

Basel 2. For example, when $a = 0.7$ with $Q = 0.01$ the Basel 2 curve is above the Basel 1 curve. When the quality of the applicants rise, this trend will be more obvious so the Basel 2 curve shown in Figure 5 when $a = 0.9$ is always above the Basel 1 curve. Basel 3 regulation set much tighter capital restriction on equity capital than Basel 1 and 2, thus we can see from the Figures for value of a respectively equals to 0.6, 0.7 and 0.8 that the expected portfolio profit for Basel 3 is always lower than that for Basel 1and 2 capital requirements before the profit reaches the Basel 0 solution. With higher quality of borrowers such as $a = 0.9$, the expected profit for Basel 3 lies between the Basel 1 and Basel 2 if the capital restriction of Q is small.

4.1.2 Example for two prices model

For the two-price model, the customers are segmented into two groups by the lender. Thus the expected profit from the portfolio given the limit on the equity capital provided is modified from Eqs 11 and 12 to,

$$EP(r_1, r_2, a) = \left\{ \int_{\max(a, p_c)}^{p^*} q(r_2, p) \cdot [(r_2 - r_F) \cdot p - (l_D + r_F)(1 - p)] \cdot f(p) \cdot dp\, r_2 + \int_{p^*}^{1} q(r_1, p) \cdot [(r_1 - r_F) \cdot p - (l_D + r_F)(1 - p)] \cdot f(p) \cdot dp \right\}$$

Eq. 15

subject to

$$Q(r_1, r_2, a) = \int_{\max(a, p_c)}^{p^*} l_D \cdot K(p) \cdot f(p) \cdot q(r_2, p) \cdot dp + \int_{p^*}^{1} l_D \cdot K(p) \cdot f(p) \cdot q(r_1, p) \cdot dp \leq Q$$

Eq. 16

Where $p_c = \frac{l_D + r_F}{r_2 + l_D}$, and p* is defined by equation (4)

This is again a constrained optimisation problem and so we can solve using the Lagrangian approach namely to optimise

$$EP(r_1, r_2, a) - \lambda(Q(r_1, r_2, a) - Q)$$

Note again that this is equivalent to the problem in section 3 if we assume the cost of equity is λ and so for any λ we can solve to find the optimal rates that maximise the Lagrangian given that λ. So we solve the unconstrained problem which is equivalent to solving the problem under Basel 0. If this does not satisfy constraint (16) then we use a bisection approach to find the λ that when we solve to find the corresponding optimal rates r_1 and r_2 the constraint is exactly satisfied.

We take the same values used in the one price model example so that the risk free rate is 0.05 and the loss given default value is set as 0.5. The response rate function is also the same as in that example with $r_L = 0.04, b = 2.5,$ and $c = 2$. In this model, the calculations applied in Eqs 15 and 16 give the following results under the different regulatory regimes

Table 12:Expected portfolio profits, optimal rates and cut off points for two rate pricing under Basel 1

	$a = 0.6$			$a = 0.7$			$a = 0.8$			$a = 0.9$		
$Q = 0.01$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.540563	0.380708	0.034998	0.525008	0.390639	0.036354	0.511123	0.399903	0.040778	0.442378	0.39549	0.042145
	$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*	
	0.739984	0.874296		0.776579	0.89374		0.810881	0.911098		0.9	0.970296	
$Q = 0.02$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.561394	0.357092	0.055255	0.542857	0.362344	0.061962	0.44645	0.356033	0.068351	0.381178	0.366709	0.070305
	$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*	
	0.657626	0.829161		0.7	0.857562		0.8	0.934588		0.9	0.990736	
$Q = 0.03$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.55149	0.341818	0.069192	0.452909	0.326015	0.078915	0.379451	0.325686	0.083967	0.33	0.33	0.088054
	$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*	
	0.604856	0.800944		0.7	0.88912		0.8	0.959833		0.9	1	
$Q = 0.04$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.485568	0.317348	0.075069	0.415754	0.297977	0.085082	0.353758	0.279661	0.091685	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c)$	p^*	
	0.6	0.790765		0.7	0.845737		0.8	0.898441		0.9	0.94968	

Table 13:Expected portfolio profits, optimal rates and cut off points for two rate pricing under Basel 2

	$a = 0.6$			$a = 0.7$			$a = 0.8$			$a = 0.9$		
$Q = 0.01$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.512181	0.336644	0.039017	0.490955	0.332085	0.041492	0.474815	0.327972	0.052215	0.436327	0.31658	0.068005
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.767836	0.881632		0.812638	0.905259		0.842484	0.921008		0.9	0.951657	
$Q = 0.02$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.538626	0.339834	0.054335	0.523695	0.338564	0.059216	0.469353	0.32357	0.073331	0.330684	0.276542	0.091269
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.688585	0.840198		0.738898	0.866423		0.8	0.906057		0.9	0.974729	
Q=0.03	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.546024	0.338367	0.06472	0.505931	0.329949	0.074665	0.387419	0.294519	0.087642	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.636884	0.81346		0.7	0.855445		0.8	0.931816		0.9	0.94968	
Q=0.04	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.52187	0.328799	0.073186	0.424307	0.303237	0.083454	0.353758	0.279661	0.091685	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.6	0.802316		0.7	0.885065		0.8	0.898441		0.9	0.94968	
Q=0.05	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.485568	0.317348	0.075069	0.415754	0.297977	0.085082	0.353758	0.279661	0.091685	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.6	0.790765		0.7	0.845737		0.8	0.898441		0.9	0.94968	

Table 14:Expected portfolio profits, optimal rates and cut off points for two rate pricing under Basel 3

	$a = 0.6$			$a = 0.7$			$a = 0.8$			$a = 0.9$		
$Q = 0.01$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.505367	0.335298	0.036265	0.48452	0.3305	0.038758	0.453045	0.321934	0.040009	0.424242	0.31297	0.051087
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.78312	0.889688		0.824767	0.911675		0.879701	0.940438		0.924366	0.963391	
$Q = 0.02$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.520485	0.338083	0.042788	0.505367	0.335298	0.048353	0.483184	0.330188	0.057242	0.436559	0.316977	0.063034
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.747472	0.870922		0.78312	0.889688		0.82738	0.913031		0.905909	0.953956	
$Q = 0.03$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.535492	0.339766	0.051748	0.522258	0.338353	0.058235	0.479349	0.327155	0.071008	0.368954	0.29095	0.084757
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.701435	0.846866		0.742773	0.868458		0.8	0.903318		0.9	0.96536	
$Q = 0.04$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.543507	0.339404	0.059076	0.535627	0.339774	0.069129	0.42524	0.307892	0.082217	0.298939	0.26472	0.094142
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.661841	0.826372		0.700937	0.846606		0.8	0.919109		0.9	0.983558	
Q=0.05	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.546287	0.338109	0.065634	0.494346	0.326149	0.076448	0.397333	0.298001	0.086449	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.632133	0.810989		0.7	0.859248		0.8	0.928337		0.9	0.94968	
Q=0.06	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.546547	0.336141	0.071043	0.441843	0.308956	0.082376	0.337366	0.276956	0.090662	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
	0.601671	0.794856		0.7	0.878095		0.8	0.951418		0.9	0.94968	
Q=0.07	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.516254	0.327149	0.073515	0.383812	0.290058	0.083877	0.353758	0.279661	0.091685	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
0.6		0.804298		0.7	0.902796		0.8	0.898441		0.9	0.94968	
Q=0.08	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$	$r(2)$	$r(1)$	$E(P)$
	0.485568	0.317348	0.075069	0.415754	0.297977	0.085082	0.353758	0.279661	0.091685	0.297324	0.262075	0.094939
	$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*		$\max(a, P_c)$	p^*		$\max(a, P_c$	p^*	
0.6		0.790765		0.7	0.845737		0.8	0.898441		0.9	0.94968	

the expected portfolio profits for all Basel regulations in the two prices model are always greater than those in one price model. In two prices model both of superior rate r_1 and inferior rate r_2 in three Basel regimes decrease as increasing of the capital restriction of Q, and the segment probability in three Basel regimes increase along with increasing of Q. Moreover we can see in three Basel regimes the differences betweensuperior rate r_1 and inferior rate r_2 **are likely to be small** if the lender has more equity capitals.

Compare between expected profits for 4 regulation rules (with no regulatory requirements, Basel 1, Basel 2, and Basel 3) under two prices model.

Figure 6: Expected profit using fixed equity capital under the Basel regulations with a=0.6.

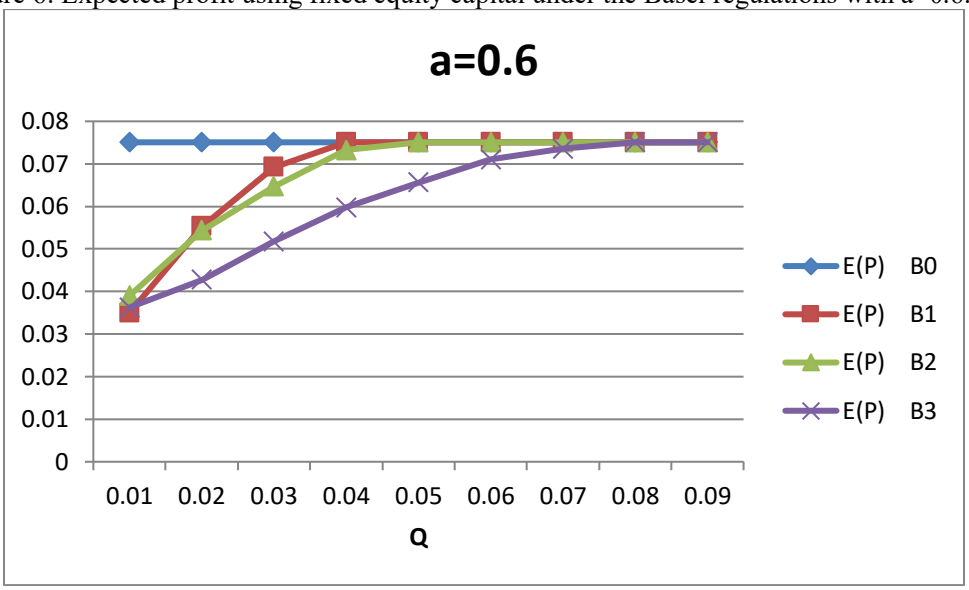


Figure 7: Expected profit using fixed equity capital under the Basel regulations with a=0.7.

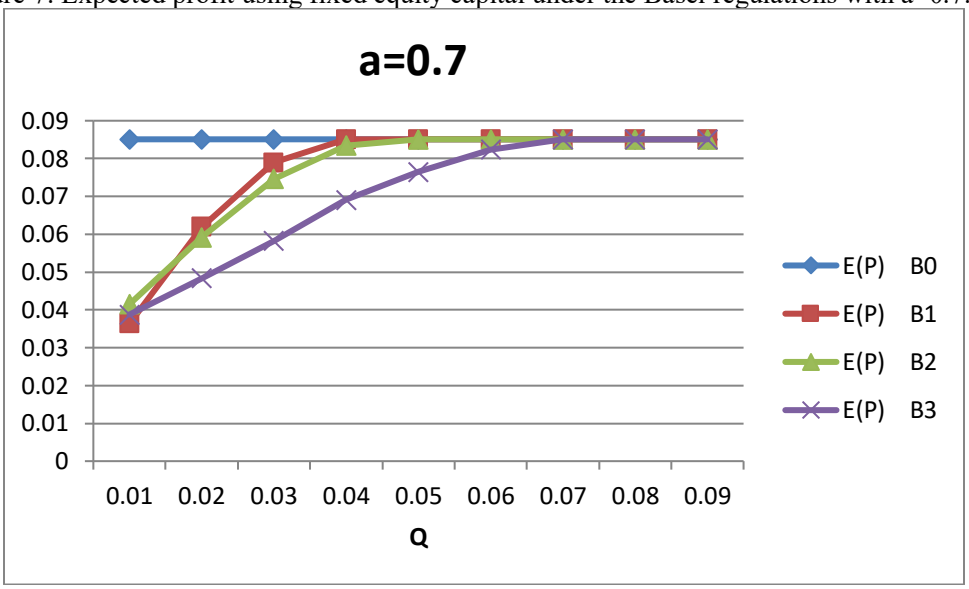


Figure 8: Expected profit using fixed equity capital under the Basel regulations with a=0.8.

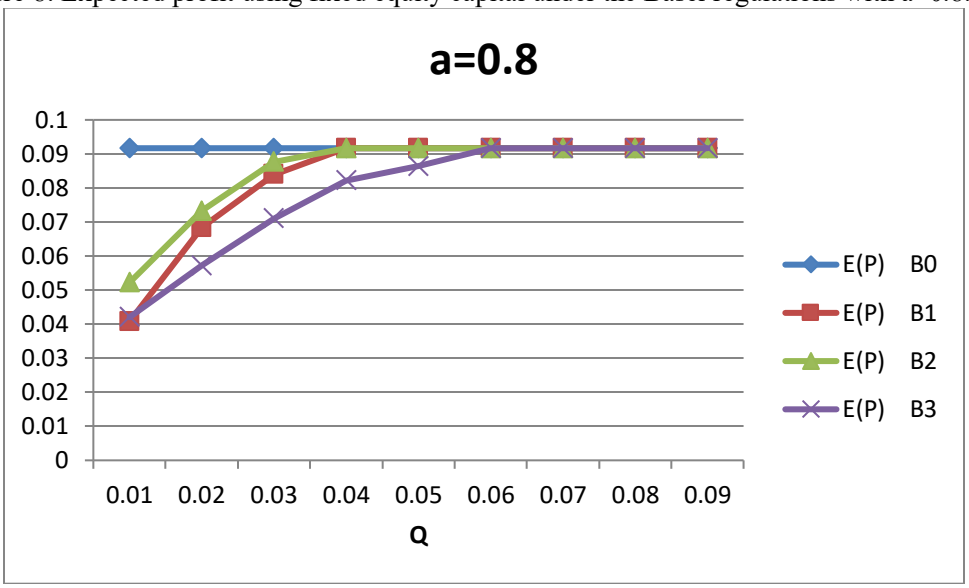
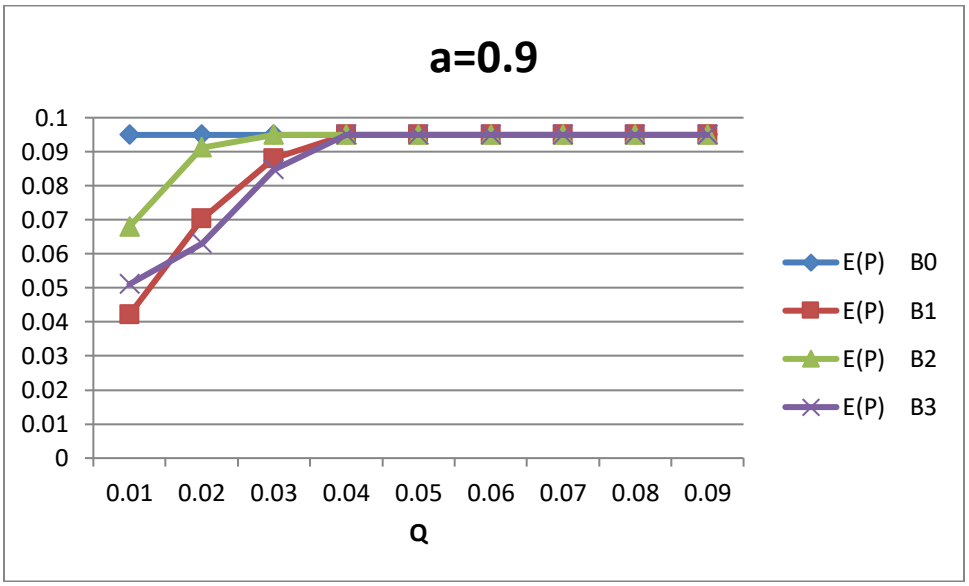


Figure 9: Expected profit using fixed equity capital under the Basel regulations with a=0.9.



These Figures describe what happens to the expected profit as the equity capital set aside for a portfolio is increased from 0.01. We can see the expected portfolio profits increase first as equity capital increases. If the lender has enough equity one ends up in the Basel 0 case regardless of which Basel requirement is used. As we know Basel 2 and Basel 3 requires less regulatory capital for these very good borrowers, so if the lender only has a little equity then the lender will take the "best" borrowers first and so the lender makes more profit with Basel 2 and Basel 3 than Basel 1,

and the expected portfolio profits for Basel 3 lies between that of Basel 2 and Basel 1 as the amount of Q equity capital set aside equals to 0.01.

4.1.3 Example for variable pricing model

Variable pricing means that the interest rate charged on a loan to potential borrower depends on the default risk of individuals. Thus in that case the expected profit is

$$EP(r(p),a) = \underset{r(p)}{\text{Max}} \int_a^1 q(r(p),p)\cdot[(r(p)-r_F)\cdot p-(l_D+r_F)(1-p)]\cdot f(p)\cdot dp$$

Eq. 17

Subject to Q(r(p),a)=∫_a^1▒ 〖 l_D K(p)q(r(p),p)f(p) 〗 dp≤Q

Eq. 18

Using the Lagrangian approach this is equivalent to finding the $r(p)$ that maximises $EP(r(p),a)-\lambda\cdot Q(r(p),a)$ where λ is chosen so that the constraint is satisfied. So initially one solves the unconstrained problem, which gives the solution under B0, where there is no Basel requirements and the variable rate function is $r_0(p)$ where $r_0(\cdot)$is the interest rate in (8) when there is no Basel requirement and so$B = r_F$. If there is insufficient equity available for this solution to hold we know that the shadow price of equity is positive and that the equity constraint is exactly satisfied. We find the solution by adjusting the shadow price of equity λ until the constraint is exactly satisfied. Solving the problem to find the optimal interest rates for a given λ is equivalent to solving the variable pricing problem in the previous section with the cost of equity being λ. So initially if there is no equity available obviously we want to accept no one. This is done by making λ very large which leads to extremely high interest rates, which no one will accept. As equity increases and so λ starts to fall we make lower interest rate offers to all borrowers. Eventually we will start making the optimal interest rate offer under Basel 0 to some of the potential borrowers. Since this is the one that maximises the profit form this group of borrowers we do not make lower interest rate offers to those even if λ has been further reduced. The point at which this happens for borrowers whose probability of being good is p is when their expected profitability per unit of regulatory capital $\theta(p)$is equal to λ. $\theta(p)$is the ratio

$$\theta(p)=\frac{((r_0(p)-r_F)p-(l_D+r_F)(1-p))}{l_D\cdot K(p)}$$ Eq. 19

Further discussion on the use of this marginal return on equity (ROE) can be found in the book by Thomas (2009).

Using the cost structure of all the previous examples in this section, we show the results when $r_L = 0.04, b = 2.5,\ c = 2, r_F = 0.05$ and $l_D = 0.5$.

Optimal interest rates with Basel 1 is shown in Table 14

Q	r(P) B1	r(P) B1	r(P) B1	r(P) B1	r(P) B1	r(P) B1	r(P) B1	r(P) B1	r(P) B1
0.01	0.778333	0.645714	0.53625	0.442222	0.399474	0.391208	0.383031	0.374939	0.366929
0.02	0.713333	0.59	0.4875	0.398888	0.358421	0.350583	0.342825	0.335143	0.327535
0.03	0.65	0.535714	0.44	0.356667	0.318421	0.311	0.303649	0.296367	0.289151
0.04	0.588334	0.482858	0.393751	0.315556	0.279474	0.272458	0.265506	0.258612	0.251778

Expected profits with Basel 1 is shown in Table 15

p	0.6	0.7	0.8	0.9	0.95	0.96	0.97	0.98	0.99
Q	E(P) B1	E(P) B1	E(P) B1	E(P) B1	E(P) B1	E(P) B1	E(P) B1	E(P) B1	E(P) B1

0.01	0	0.0216	0.044466	0.057945	0.061301	0.061717	0.062051	0.062304	0.062477
0.02	0.020767	0.047925	0.0675	0.07842	0.080698	0.080912	0.081048	0.081107	0.081091
0.03	0.0385	0.063125	0.0808	0.090242	0.091898	0.091995	0.092017	0.091964	0.091838
0.04	0.044204	0.068014	0.085078	0.094044	0.095501	0.095561	0.095545	0.095457	0.095295

It is obvious to see that the expected profit goes up as the riskiness of the borrower decreases, and expected profit also increases if the capital restriction of Q increases.

Optimal interest rates with Basel 2 is given in Table 16

p	0.6	0.7	0.8	0.9	0.95	0.96	0.97	0.98	0.99
Q	r(P) B2	r(P) B2	r(P) B2	r(P) B2	r(P) B2	r(P) B2	r(P) B2	r(P) B2	r(P) B2
0.01	0.825808	0.680541	0.546147	0.411877	0.33902	0.323222	0.306694	0.289109	0.269755
0.02	0.749203	0.616772	0.496987	0.380806	0.319811	0.306846	0.293407	0.279271	0.263956
0.03	0.68792	0.565757	0.457659	0.355948	0.304445	0.293746	0.282777	0.271401	0.259317
0.04	0.628679	0.516443	0.419642	0.33192	0.289591	0.281083	0.272503	0.263793	0.254833
0.05	0.588334	0.482858	0.393751	0.315556	0.279474	0.272458	0.265506	0.258612	0.251778

Expected profits with Basel 2 is given in Table 17

p	0.6	0.7	0.8	0.9	0.95	0.96	0.97	0.98	0.99
Q	E(P) B2	E(P) B2	E(P) B2	E(P) B2	E(P) B2	E(P) B2	E(P) B2	E(P) B2	E(P) B2
0.01	0	0	0.03863	0.07317	0.08708	0.08938	0.09143	0.09318	0.0945
0.02	0.00539	0.03663	0.06376	0.08447	0.09164	0.09272	0.09366	0.09441	0.09493
0.03	0.02933	0.05599	0.07691	0.09037	0.09402	0.09447	0.09482	0.09506	0.09516
0.04	0.04176	0.06604	0.08374	0.09344	0.09526	0.09538	0.09543	0.09539	0.09527
0.05	0.0442	0.06801	0.08508	0.09404	0.0955	0.09556	0.09555	0.09546	0.0953

We found that the expected portfolio profits for Basel 2 are smaller than that for Basel 1 when the probability of the borrowers being default is high. Though Basel 2 regulatory capital requirements are flexible, the costs of equity capital request decreases with decreasing of the riskiness of the borrowers. Hence the expected portfolio profit for Basel 2 is greater than that achieved under Basel 1 once the probability of the borrowers being good reaches 0.9.

Optimal interest rate with Basel 3 is shown in Table 18

p	0.6	0.7	0.8	0.9	0.95	0.96	0.97	0.98	0.99
Q	r(P) B3	r(P) B3	r(P) B3	r(P) B3	r(P) B3	r(P) B3	r(P) B3	r(P) B3	r(P) B3
0.01	0.874643	0.721194	0.577487	0.431686	0.279474	0.272458	0.265506	0.258612	0.251778
0.02	0.801613	0.660401	0.530621	0.402064	0.284676	0.276894	0.269104	0.261277	0.253349
0.03	0.762609	0.627932	0.505589	0.386243	0.294041	0.284877	0.275581	0.266073	0.256176
0.04	0.722775	0.594772	0.480027	0.370086	0.303821	0.293215	0.282346	0.271082	0.259128

0.05	0.68543	0.563685	0.456061	0.354939	0.313185	0.301197	0.288824	0.275878	0.261956
0.06	0.646425	0.531216	0.43103	0.339118	0.323173	0.309712	0.295732	0.280993	0.264971
0.07	0.609081	0.500128	0.407064	0.323971	0.332953	0.31805	0.302497	0.286002	0.267924
0.08	0.588334	0.482858	0.393751	0.315556	0.351266	0.33366	0.315164	0.295381	0.273453

Expected profits with Basel 3 is shown in Table 19

p	0.6	0.7	0.8	0.9	0.95	0.96	0.97	0.98	0.99
Q	E(P) B3	E(P) B3	E(P) B3	E(P) B3	E(P) B3	E(P) B3	E(P) B3	E(P) B3	E(P) B3
0.01	0	0	0.01756	0.063701	0.08326	0.086571	0.089565	0.092145	0.094133
0.02	0	0.012851	0.047611	0.077206	0.088708	0.090572	0.092227	0.093619	0.09465
0.03	0	0.031183	0.060062	0.082802	0.090965	0.09223	0.09333	0.09423	0.094864
0.04	0.017092	0.046096	0.070191	0.087354	0.092802	0.093578	0.094227	0.094726	0.095039
0.05	0.030063	0.056581	0.077313	0.090555	0.094093	0.094527	0.094858	0.095076	0.095162
0.06	0.039142	0.063922	0.082298	0.092795	0.094997	0.09519	0.095299	0.09532	0.095247
0.07	0.043558	0.067492	0.084724	0.093885	0.095436	0.095513	0.095514	0.095439	0.095289
0.08	0.044204	0.068014	0.085078	0.094044	0.095501	0.095561	0.095545	0.095457	0.095295

Though Basel 3 requires a much tighter capital restriction than Basel 2, the expected profits for Basel 3 are smaller than that for Basel 2.

5 Conclusion

Our analysis began with looking at the model of probability of a single loan, then we expand this to a particular portfolio loan related to different pricing decisions, which allows us to use several numerical examples to explore what the Basel Accords will effect various business measures including expected profit, optimal interest rate, and optimal cut off.

From the results yielded from those numerical examples, we find that using variable pricing the resultant profit is always the highest of the three, and profit achieved by using two prices model is always higher than that of using one price model. The profit made with no regulatory capital requirements case is always the greatest among the four cases (Basel 0, Basel 1, Basel 2, and Basel 3) if there is no any impact of adverse selection. If the borrower has a good quality, then Basel 2 will give more profit to the lender than Basel 1. And if the borrower is more risky, then the lender make more profit with Basel 1. The expected portfolio profits for Basel 3 is always smaller than that for Basel 1 and Basel 2. For predetermined equity capital, if the lender only has a little equity then the lender can make more profit with Basel 2 than Basel 1, but if the lender has more equity then they are taking more of the risky applicants and so Basel 1 gives more profit than Basel 2. With higher quality borrowers, the expected profit for Basel 3 lies between the Basel 1 and Basel 2 if the capital restriction of Q is very small.

6 Reference

Allen, L.DeLong, G.and Saunders, A. (2004). *Issues in he credit risk modeling of retail markets*, Journal ofBanking and Finance 28, 727-752

Basel Committee on Banking Supervision (2001). *The new Basel Capital Accord*, Consultative Document.

Basel Committee on Banking Supervision (2004). *International convergence of capital measurement andcapital standards – a revised framework*, Bank for International Settlements.

Basel Committee on Banking Supervision (2010).*Basel III: A global regulatory framework for more resilient banks and banking systems*, Bank for International Settlements.

Chakravoriti, S. and To, T. (2006). *A theory of credit cards.* International Journal of Industrial Orgnization, 25, 583-595.

Huang, B., & Thomas, L.C. (2009). Credit card pricing and impact of adverse selection. *Proceedings of Credit Scoring Conference - XI*, Edinburgh, UK

Kirstein, R (2001). *The New Basle Accord, Internal Ratings, and the Incentives of Banks,* German Working Papers in Law and Economics.

Kashyap, A. and Stein,J. (2003). *Cyclical Implications of the Basel II Capital Standards*, University of Chicago, working paper.

Oliver, R.W. and Thomas , L. (2005): *Optimal Score Cutoffs and Pricing of Regulatory Capital In Retail Credit Portfolios,* Working Papers.

Perli, R.and Nayda, W. (2004).*Economic and Regulatory Capital Allocation for Revolving Retail Exposures*, Discussion Paper, Federal Reserve Board, Washington.

Ruthenberg , D. and Landskroner, Y. (2008). *Loan pricing under Basel II in an imperfectly competitive banking market,* Journal of Banking and Finance 32: 2725–2733.

Thomas, L. (2009). *Consumer credit models: pricing, profit, and portfolios*. Oxford: Oxford University Press.

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